

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1149	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT DEFY MEDIA, LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT ORDERED, ADJUDGED AND DECREED that all claims asserted in this suit between Plaintiff Guada Technologies LLC and Defendant Defy Media, LLC, are hereby DISMISSED WITH PREJUDICE.

CLERK <i>David A. O'foole</i>	(BY) DEPUTY CLERK ch	DATE 2/3/17
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1157	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT SLACKER, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT ORDERED, ADJUDGED AND DECREED that all claims asserted in this suit by Plaintiff Guada Technologies LLC are hereby DISMISSED WITH PREJUDICE

CLERK <i>David A. O'foole</i>	(BY) DEPUTY CLERK ch	DATE 1/19/17
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08/10)

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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1148	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT BATANGA, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT It is therefore ORDERED, ADJUDGED AND DECREED that all claims asserted in this suit between Plaintiff Guada Technologies LLC and Defendant Batanga, Inc., are hereby DISMISSED WITH PREJUDICE.
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CLERK <i>David A. O'Toole</i>	(BY) DEPUTY CLERK Nakisha Love	DATE 12/15/16
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
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 Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1159	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT SPOTIFY USA INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1158	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT SMULE, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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 Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1157	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT SLACKER, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

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Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1156	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT RHAPSODY INTERNATIONAL INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1155	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT RELIANCE MAJESTIC HOLDINGS, LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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 Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1154	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT PANDORA MEDIA, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following
 Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.);

DOCKET NO. 2:16-cv-1152	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT MLB ADVANCED MEDIA, L.P.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1150	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT EMUSIC.COM INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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 Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.);

DOCKET NO. 2:16-cv-1151	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT IHEARTMEDIA, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1156	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT RHAPSODY INTERNATIONAL INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT It is therefore ORDERED, ADJUDGED AND DECREED that all claims asserted in this suit between Plaintiff Guada Technologies LLC and Defendant Rhapsody International Inc. are hereby DISMISSED WITHOUT PREJUDICE.
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CLERK <i>David A. O'Poole</i>	(BY) DEPUTY CLERK NKL	DATE 11/21/16
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

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Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1154	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT PANDORA MEDIA, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

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PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT RELIANCE MAJESTIC HOLDINGS, LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

Trademarks or Patents. (the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:16-cv-1156	DATE FILED 10/14/2016	U.S. DISTRICT COURT Eastern District of Texas, Marshall Division
PLAINTIFF GUADA TECHNOLOGIES LLC		DEFENDANT RHAPSODY INTERNATIONAL INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,231,379	6/12/2007	GUADA TECHNOLOGIES LLC
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
-------	-------------------	------

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4093276

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
NOEMA, INC.	09/19/2016
RECEIVING PARTY DATA	
Name:	GUADA TECHNOLOGIES LLC
Street Address:	2591 DALLAS PARKWAY, STE 300,PMB #846
City:	FRISCO
State/Country:	TEXAS
Postal Code:	75034
PROPERTY NUMBERS Total: 4	
Property Type	Number
Patent Number:	7231379
Patent Number:	7257574
Patent Number:	7260567
Patent Number:	7370056
CORRESPONDENCE DATA	
Fax Number:	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Email:	thalfon@gmail.com
Correspondent Name:	GUADA TECHNOLOGIES LLC
Address Line 1:	2591 DALLAS PARKWAY, STE 300,PMB #846
Address Line 4:	FRISCO, TEXAS 75034
NAME OF SUBMITTER:	TIFFANY HALFON
SIGNATURE:	/Tiffany Halfon/
DATE SIGNED:	10/12/2016
This document serves as an Oath/Declaration (37 CFR 1.63).	
Total Attachments: 3	
source=Exhibit A - Fully executed#page1.tif	
source=Exhibit A - Fully executed#page2.tif	
source=Exhibit A - Fully executed#page3.tif	

PATENT ASSIGNMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, Noema, Inc., a New York corporation located at 200 East 69th Street #24B, New York, NY 10021 ("*Assignor*"), does hereby assign, transfer, and convey unto Guada Technologies LLC, a Texas limited liability company, having an address at 2591 Dallas Parkway, Suite 300, PMB #846, Frisco, Texas 75034, ("*Assignee*"), or its designees, all right, title, and interest that exist today and may exist in the future in and to any and all of the following (collectively, the "*Patent Rights*"):

(a) the patent applications and patents listed in the table below (the "*Patents*" or "*Patent*");

Patent(s) or Application No(s).	Country	Filing Date	Title of Patent(s) and First Named Inventor
7,231,379	US	11/19/2002	Navigation in a hierarchical structured transaction processing system Prashant Parikh
7,257,574	US	09/14/2004	Navigational learning in a structured transaction processing system Prashant Parikh
7,260,567	US	03/11/2004	Navigation in a hierarchical structured transaction processing system Prashant Parikh
7,370,056	US	03/11/2004	Navigation in a hierarchical structured transaction processing system Prashant Parikh

(b) all patents and patent applications (i) to which the Patent directly or indirectly claims priority, (ii) for which the Patent directly or indirectly forms a basis for priority, and/or (iii) that were co-owned applications that directly or indirectly incorporate by reference, or were incorporated by reference into, the Patent;

(c) all reissues, reexaminations, extensions, continuations, continuations in part, continuing prosecution applications, requests for continuing examinations, divisions, registrations of any item in any of the foregoing categories (a) and (b);

Exhibit A

(d) all inventions, invention disclosures, and discoveries described in any item in any of the foregoing categories (a) through (c) and all other rights arising out of such inventions, invention disclosures, and discoveries;

(e) all rights to apply in any or all countries of the world for patents, certificates of invention, utility models, industrial design protections, design patent protections, or other governmental grants or issuances of any type related to any item in any of the foregoing categories (a) through (d), including, without limitation, under the Paris Convention for the Protection of Industrial Property, the International Patent Cooperation Treaty, or any other convention, treaty, agreement, or understanding;

(f) all causes of action (whether known or unknown or whether currently pending, filed, or otherwise) and other enforcement rights under, or on account of, the Patents and/or any item in any of the foregoing categories (b) through (e), including, without limitation, all causes of action and other enforcement rights for

- (i) past, present, and future damages,
 - (ii) injunctive relief, and
 - (iii) any other remedies of any kind for past, present, and future infringement;
- and

(g) all rights to collect royalties and other payments under or on account of the Patent and/or any item in any of the foregoing categories (a) through (f).

Assignor represents, warrants and covenants that:

(1) Assignor has the full power and authority, and has obtained all third party consents, approvals and/or other authorizations required to enter into the Letter Agreement and to carry out its obligations hereunder, including the assignment of the Patent Rights to Assignee; and

(2) Assignor owns, and by this document assigns to Assignee, all right, title, and interest to the Patent Rights, including, without limitation, all right, title, and interest to sue for infringement of the Patent Rights. Assignor has obtained and properly recorded previously executed assignments for the Patent Rights as necessary to fully perfect its rights and title therein in accordance with governing law and regulations in each respective jurisdiction. The Patent Rights are free and clear of all liens, claims, mortgages, security interests or other encumbrances, and restrictions. There are no actions, suits, investigations, claims or proceedings threatened, pending or in progress relating in any way to the Patent Rights. There are no existing contracts, agreements, options, commitments, proposals, bids, offers, or rights with, to, or in any person to acquire any of the Patent Rights.

Assignor hereby authorizes the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models or other governmental grants or issuances that may be granted upon any of the Patent Rights in the name of Assignee, as the assignee to the entire interest therein.

Exhibit A

The terms and conditions of this Assignment of Patent Rights will inure to the benefit of Assignee, its successors, assigns, and other legal representatives and will be binding upon Assignor, its successors, assigns, and other legal representatives.

ASSIGNOR: Noema, Inc.

By: Prashant Parikh
Name: PRASHANT PARIKH
Title: CEO
Date: 9/19/2016

ASSIGNEE: Guada Technologies LLC

By: Dipankar Halder
Name: DIPANKAR HALDER
Title: MANAGING MEMBER
Date: 19, SEPTEMBER 2016



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	06/12/2007	7231379	4428-4001	5023

27123 7590 05/23/2007
MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 485 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Prashant Parikh, New York, NY;
Stanley Peters, Menlo Park, CA;



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023
27123	7590	03/30/2007	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			WU, YICUN	
			ART UNIT	PAPER NUMBER
			2165	
			MAIL DATE	DELIVERY MODE
			03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

**Supplemental
Notice of Allowability**

Application No.

10/299,359

Examiner

Yicun Wu

Applicant(s)

PARIKH ET AL.

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to appeal brief filed 11/2/2007.
2. The allowed claim(s) is/are 1-7.
3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>1/19/2007</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____. |
|---|---|

Yicun Wu
Patent Examiner
Technology Center 2102

FORM PTO-1449 INFORMATION DISCLOSURE CITATION	Attorney Docket: 4754-4000	Serial No. 10/299,359
	Applicant(s) Prashant Parikh and Stanley Peters	
	Filing Date: November 19, 2002	Group Art Unit: 2175

U.S. PATENT DOCUMENTS

Examiner Initial	Patent No./ Publication No.	Issue Date/ Publication Date	Name	Class	Sub-Class	Filing Date
<i>JP</i>	6,510,406 B1	January 21, 2003	Marchisio			March 22, 2000
<i>JP</i>	6,859,212 B2	February 22, 2005	Kumar et al.			April 4, 2001

FOREIGN PATENT DOCUMENTS

Examiner Initial	Patent Number	Publication Date	Country	Class	Sub-Class	Translation

OTHER DOCUMENTS

Examiner	<i>JP</i>	Date Considered <i>3/25/07</i>
EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.		

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSU: FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

27123 7590 01/25/2007

MORGAN & FINNEGAN, L.L.P.
 3 WORLD FINANCIAL CENTER
 NEW YORK, NY 10281-2101

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSU: FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023

TITLE OF INVENTION: NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	04/25/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
WU, YICUN	2165	707-003000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p>
---	--

Morgan & Finnegan LLP

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **Noema, Inc.** (B) RESIDENCE: (CITY and STATE OR COUNTRY) **New York, NY**

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input checked="" type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 13-4500 (enclose an extra copy of this form).</p>
---	--

5. Change in Entity Status (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature:  Date: 2/26/07

Typed or printed name: Richard Straussman Registration No. 39,847

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal

Application Number:	10299359
Filing Date:	19-Nov-2002
Title of Invention:	NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
First Named Inventor/Applicant Name:	Prashant Parikh
Filer:	Richard Straussman/Anita Coughlan
Attorney Docket Number:	4428-4001

Filed as Small Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	2501	1	700	700
Publ. Fee- early, voluntary, or normal	1504	1	300	300

IPR2019-01304

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1000

Electronic Acknowledgement Receipt

EFS ID:	1542556
Application Number:	10299359
International Application Number:	
Confirmation Number:	5023
Title of Invention:	NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
First Named Inventor/Applicant Name:	Prashant Parikh
Customer Number:	27123
Filer:	Richard Straussman/Anita Coughlan
Filer Authorized By:	Richard Straussman
Attorney Docket Number:	4428-4001
Receipt Date:	26-FEB-2007
Filing Date:	19-NOV-2002
Time Stamp:	10:36:35
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 1000
RAM confirmation Number	1476
Deposit Account	134500

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	4754_4000_Issue_Fee.pdf	137170	no	1

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	8325	no	2
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Warnings:

Information:

Total Files Size (in bytes):			145495		
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1400
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27123 7590 01/25/2007
MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101

EXAMINER
WU, YICUN
ART UNIT PAPER NUMBER
2165
DATE MAILED: 01/25/2007

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/299,359 11/19/2002 Prashant Parikh 4428-4001 5023

TITLE OF INVENTION: NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	04/25/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
- B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
 Commissioner for Patents
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 Alexandria, Virginia 22313-1450
 or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

27123 7590 01/25/2007

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NEW YORK, NY 10281-2101

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023

TITLE OF INVENTION: NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	04/25/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
WU, YICUN	2165	707-003000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____</p> <p>3 _____</p>
--	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. Change in Entity Status (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
10/299,359 11/19/2002 Prashant Parikh 4428-4001 5023

Table with 1 column: EXAMINER

WU, YICUN

Table with 2 columns: ART UNIT, PAPER NUMBER

2165

DATE MAILED: 01/25/2007

MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 291 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 291 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/299,359

Examiner

Yicun Wu

Applicant(s)

PARIKH ET AL.

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1. This communication is responsive to appeal brief filed 11/2/2006.
- 2. The allowed claim(s) is/are 1-7.
- 3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

- 4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
- 4. Examiner's Comment Regarding Requirement for Deposit
of Biological Material
- 5. Notice of Informal Patent Application
- 6. Interview Summary (PTO-413),
Paper No./Mail Date _____
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other _____.

Yicun Wu
Patent Examiner
Technology Center 2100



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Bib Data Sheet

CONFIRMATION NO. 5023

SERIAL NUMBER 10/299,359	FILING OR 371(c) DATE 11/19/2002 RULE	CLASS 707	GROUP ART UNIT 2165	ATTORNEY DOCKET NO. 4428-4001
------------------------------------	---	---------------------	-------------------------------	---

APPLICANTS
 Prashant Parikh, New York, NY;
 Stanley Peters, Menlo Park, CA;

**** CONTINUING DATA ******* *None*

**** FOREIGN APPLICATIONS ******* *None*


IF REQUIRED, FOREIGN FILING LICENSE GRANTED SMALL ENTITY ****
**** 12/30/2002**

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY NY	SHEETS DRAWING 11	TOTAL CLAIMS 26	INDEPENDENT CLAIMS 6
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
Verified and Acknowledged Examiner's Signature: <i>[Signature]</i> Initials: <i>[Initials]</i>				

ADDRESS
27123

TITLE
Navigation in a hierarchical structured transaction processing system

FILING FEE RECEIVED 550	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees (Filing)
		<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)
		<input type="checkbox"/> 1.18 Fees (Issue)
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit

Issue Classification 	Application/Control No. 10/299,359	Applicant(s)/Patent under Reexamination PARIKH ET AL.
	Examiner Yicun Wu	Art Unit 2165

ISSUE CLASSIFICATION										
ORIGINAL					INTERNATIONAL CLASSIFICATION					
CLASS		SUBCLASS			CLAIMED			NON-CLAIMED		
707		2			G	06	F	17	/30	
CROSS REFERENCES								/		/
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)							/		/
707	6	3	4				/		/	
							/		/	
							/		/	
							/		/	
							/		/	

_____ (Assistant Examiner) (Date)		<i>Yuler</i> (Primary Examiner)	11/19/07 (Date)	Total Claims Allowed: 7	
<i>A. White</i> (Legal Instruments Examiner)				O.G. Print Claim(s) 1	O.G. Print Fig. 9

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47							
Final	Original	Final	Original	Final	Original	Final	Original						
1	①		31		61		91		121		151		181
2	2		32		62		92		122		152		182
3	3		33		63		93		123		153		183
4	4		34		64		94		124		154		184
5	5		35		65		95		125		155		185
6	6		36		66		96		126		156		186
7	⑦		37		67		97		127		157		187
	8		38		68		98		128		158		188
	9		39		69		99		129		159		189
	10		40		70		100		130		160		190
	11		41		71		101		131		161		191
	12		42		72		102		132		162		192
	13		43		73		103		133		163		193
	14		44		74		104		134		164		194
	15		45		75		105		135		165		195
	16		46		76		106		136		166		196
	17		47		77		107		137		167		197
	18		48		78		108		138		168		198
	19		49		79		109		139		169		199
	20		50		80		110		140		170		200
	21		51		81		111		141		171		201
	22		52		82		112		142		172		202
	23		53		83		113		143		173		203
	24		54		84		114		144		174		204
	25		55		85		115		145		175		205
	26		56		86		116		146		176		206
	27		57		87		117		147		177		207
	28		58		88		118		148		178		208
	29		59		89		119		149		179		209
	30		60		90		120		150		180		210

Search Notes



Application/Control No.

10/299,359

Examiner

Yicun Wu

Applicant(s)/Patent under Reexamination

PARIKH ET AL.

Art Unit

2165

SEARCHED

Class	Subclass	Date	Examiner
707	1,2,3,4 5,6,7,8 9,10, 100	2/18/2004	YW
	101 102		
	103 104.1		
updated	search	11/25/2004	
updated	search	8/16/2005	
updated	search	1/19/07	YW

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner
707	2,3,4,6	12/19/07	YW

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
inventor search (double patenting) uspto uspgpub usocr epo jpo ibmtech derwent	2/18/2004	YW
acm ieee npl internet Search strategy attached		
consulted Dov Popovici	2/18/2004	
updated search	11/25/2004	
updated search	8/16/2005	
consulted Todd Swann John Eularshee A	1/19/2007	YW
appeal cont. Eddie Lee Jeff Grathin	1/19/07	YW
appeal cont Joe Dixon Jeff Grathin	10/12/2006	YW
Updated Search	1/19/07	YW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Prashant Parikh and Stanley Peters **Confirmation No.:** 5023
Serial No. : 10/299,359 **Group Art Unit:** 2175
Filed : November 19, 2002 **Examiner:** Yicun Wu
For : NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Information Disclosure Statement is filed in accordance with 37 C.F.R. §§1.56, 1.97 and 1.98. The items listed on Form PTO-1449, a copy of which is enclosed, are made of record to assist the Patent and Trademark Office in its examination of this application. The Examiner is respectfully requested to fully consider the items and to independently ascertain their teaching.

1. For each of the following items listed on the enclosed copy of Form PTO-1449 that is not in the English language, an English language translation of that item or a portion thereof or a concise explanation of the relevance of that item is enclosed:

2. For each of the following items listed on the enclosed copy of Form PTO-1449 that is not in the English language, a concise explanation of the relevance of that item is incorporated in the specification of the above-identified application.
3. Any copy of the items listed on the enclosed copy of Form PTO-1449 that is not enclosed with this Information Disclosure Statement was previously cited by or submitted to the Patent and Trademark Office in application Serial No. _____, filed _____.
4. No fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with:
 - 37 C.F.R. §1.97(b)(1), within three months of the filing date of a national application other than a CPA; or
 - 37 C.F.R. §1.97(b)(2), within three months of the date of entry into the national stage as set forth in §1.491 in an international application; or


- 37 C.F.R. §1.97(b)(3), before the mailing date of a first Office action on the merits; or
- 37 C.F.R. §1.97(b)(4) before the mailing date of a first office action after the filing of an RCE under §1.114.
5. No fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(c), after the period specified in paragraph 4 above but before the mailing date of a final action or a Notice of Allowance (where there has been no prior final action), and is accompanied by one of the certifications pursuant to 37 C.F.R. §1.97(e) set forth in paragraph 9 below.
6. A fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(c), after the period specified in paragraph 4 above but before the mailing date of a final action or a notice of allowance (where there has been no prior final action):
- A check in the amount of \$180.00 is enclosed in payment of the fee.
- Charge the fee to Deposit Account No. 13-4500, Order No. _____.
7. **A fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(d), after the mailing date of a final action or a notice of allowance, whichever comes first, but before payment of the issue fee, and is accompanied by:**
- a. one of the certifications pursuant to 37 C.F.R. §1.97(e) set forth in paragraph 9 below; and
- b. the fee due under 37 C.F.R. §1.17(p) which is paid as set forth in paragraph 11 below.
8. This Information Disclosure Statement is being filed in compliance with:
- a. 37 C.F.R. §1.313(b)(3) or §1.313(c)(1), after the issue fee has been paid and information cited in this Information Disclosure Statement may render at least one claim unpatentable and is accompanied by the attached Petition To Withdraw Application From Issue and fee pursuant to 37 C.F.R. §1.17(h);
- b. 37 C.F.R. §1.313(c)(2) or §1.313(c)(3), after the issue fee has been paid and information cited in this Information Disclosure Statement is to be considered in a Request for Continued Examination (RCE) or a Continuation application upon abandonment of the instant application and is accompanied by the attached Petition To Withdraw Application From Issue and fee pursuant to 37 C.F.R. §1.17(h).
- c. The fee due under 37 C.F.R. §§1.17(h) is paid as set forth in paragraph 11 below.

9. I hereby certify that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.
- I hereby certify that no item of information in the Information Disclosure Statement filed herewith was cited in a communication from a foreign patent office in a counterpart foreign application or, to my knowledge after making reasonable inquiry, was known to any individual designated in §1.56(c) more than three months prior to the filing of this Information Disclosure Statement.**
10. This document is accompanied by a Search Report Communication which was cited in a corresponding PCT or Foreign counterpart application
11. A check in the amount of \$_____ is enclosed in payment of the fees due under 37 C.F.R. §§1.17(h) and 1.17(p).
- Charge the fees due under 37 C.F.R. §§1.17(h) and 1.17(p) to Deposit Account No. 13-4500, Order No. 4754-4000.**
- The Commissioner is hereby authorized to charge any additional fees which may be required for this Information Disclosure Statement, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4754-4000.**

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: January 19, 2007

By:


Richard Straussman
Registration No. 39,847

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
3 World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile

FORM PTO-1449 INFORMATION DISCLOSURE CITATION	Attorney Docket: 4754-4000	Serial No. 10/299,359
	Applicant(s) Prashant Parikh and Stanley Peters	
	Filing Date: November 19, 2002	Group Art Unit: 2175

U.S. PATENT DOCUMENTS

Examiner Initial	Patent No./ Publication No.	Issue Date/ Publication Date	Name	Class	Sub-Class	Filing Date
	6,510,406 B1	January 21, 2003	Marchisio			March 22, 2000
	6,859,212 B2	February 22, 2005	Kumar et al.			April 4, 2001

FOREIGN PATENT DOCUMENTS

Examiner Initial	Patent Number	Publication Date	Country	Class	Sub-Class	Translation

OTHER DOCUMENTS

Examiner	Date Considered
----------	-----------------

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

Electronic Patent Application Fee Transmittal

Application Number:	10299359			
Filing Date:	19-Nov-2002			
Title of Invention:	Navigation in a hierarchical structured transaction processing system			
First Named Inventor/Applicant Name:	Prashant Parikh			
Filer:	Richard Straussman/Anita Coughlan			
Attorney Docket Number:	4428-4001			
Filed as Large Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	1451773
Application Number:	10299359
International Application Number:	
Confirmation Number:	5023
Title of Invention:	Navigation in a hierarchical structured transaction processing system
First Named Inventor/Applicant Name:	Prashant Parikh
Customer Number:	27123
Filer:	Richard Straussman/Anita Coughlan
Filer Authorized By:	Richard Straussman
Attorney Docket Number:	4428-4001
Receipt Date:	19-JAN-2007
Filing Date:	19-NOV-2002
Time Stamp:	15:46:52
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	255
Deposit Account	134500

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	4754_4000_IDS.pdf	258116	no	4

Warnings:

Information:

This is not an USPTO supplied IDS fillable form

2	Fee Worksheet (PTO-06)	fee-info.pdf	8188	no	2
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Warnings:

Information:

Total Files Size (in bytes):	266304
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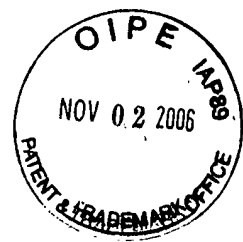
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.



Docket No. 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/299,359
Applicant(s) : Prashant Parikh *et al.*
Filed : November 19, 2002
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
Group Art Unit : 2175
Examiner : Wu, Yicun
Docket No. : 4754-4000
Customer No. : 27123

EXPRESS MAIL CERTIFICATE

Express Mail Label No.: EV 497 660 628 US

Date of Deposit: November 2, 2006

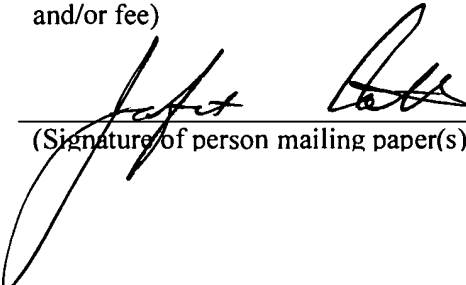
I hereby certify that the following attached paper(s) and/or fee

1. Response to Non-Compliant Appeal Brief Pursuant To 37 C.F.R. § 41.37 (5 pages); and
3. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Commissioner of Patent, P.O. Box 1450, Alexandria, VA 22313-1450.

Jafet Cotto

(Typed or printed name of person mailing papers(s) and/or fee)


(Signature of person mailing paper(s) and/or fee)

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



11-06-06

AF/ITW

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application No. : 10/299,359
Applicant(s) : Prashant Parikh *et al.*
Filed : November 19, 2002
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
Group Art Unit : 2175
Examiner : Wu, Yicun
Docket No. : 4754-4000
Customer No. : 27123

**RESPONSE TO NON-COMPLIANT APPEAL BRIEF
PURSUANT TO 37 C.F.R. § 41.37**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

REMARKS

This responds to the "Notification of Non-Compliant Appeal Brief (37 CFR 41.37).

The undersigned does not understand the basis for the Notification in that: (a) neither of the independent claims, claims 1 & 7, contain any elements that are expressed in the means-plus-function or step-plus-function form allowed by 35 U.S.C. §112, ¶6, and (b) the brief does contain a concise explanation of the subject matter of claims 1 and 7 at beginning at just above the middle of page 4 and ending 5 lines down on page 6. Moreover, that explanation includes references to the specification and figures as required.

The undersigned has rigorously reviewed the CFR and MPEP in this regard and, absent further explanation, presumes that the basis for the Notification is that references to the specification are provided by reference to paragraph rather than specific lines.

Notwithstanding the hyper-technical nature of such a distinction, consistent with MPEP 1205.03, a replacement for the section previously submitted is provided below that essentially reproduces the prior submission but adds a heading “The Independent Claims”, provides additional non-exhaustive references and now includes line number references in instances where paragraph numbers were previously provided.

In the event that this is not what the Office intended, it is respectfully requested that further elaboration be provided so that it is possible to comply in a meaningful manner.

* * *

I. SUMMARY OF THE CLAIMED SUBJECT MATTER

The Claimed Invention

Appellant’s claimed invention solves the inadequacies of prior art systems, by allowing the system to cause the user to “jump” from one node in the hierarchy to another node that is not directly connected to that node, without having to traverse through every intervening node in the path on the basis of a keyword association. See claims 1 and 7, page 5, lines 12-15. In other words, by implementing the claimed invention, the user is not bound by the rigid hierarchical arrangement because an input or response can cause the system to ignore the hierarchy and as a result of a keyword relationship cause a direct jump to a different non-directly connected node (page 5, lines 12-21), thereby bypassing intervening nodes that would otherwise need to be traversed according to approaches of the prior art (“jumping” in this context being defined both explicitly, and by implication, in the specification to mean a direct traversal from one node or vertex to another node or vertex that is not directly connected to it (i.e., without

traversal through any intervening nodes or vertices or to a node or vertex whose only least common ancestor with that node or vertex is the root node or vertex)). See, e.g., FIG. 2, pg. 8, line 20 – pg. 9, line 2; pg. 3, lines 18-19; pg. 5, lines 16-21; and pg. 9, line 19 – pg. 11, line 5).

For example, in the simplified arrangement of Figure 1 which, for purposes of explanation, could represent an interactive voice response travel reservation system where the boxes labeled “2”, “4” and “5” might represent aspects involved with booking a domestic reservation and the boxes under the box labeled “3” might represent aspects involved with booking an international flight. See 1/27/05 Response to Final Office Action, e.g., p. 7. A customer wishing to book a flight to “San Jose” in Costa Rica could conceivably, unintentionally, navigate down through the nodes associated with a domestic booking by saying “San Jose” at an early point, only to realize, when hotels in California are mentioned, a mistake has been made. Id. At that point, with the conventional systems of the prior art, the person would have to either start all over or back-traverse through the options and try to navigate down through the international options by first mentioning “Costa Rica” or “International” at the starting point. Id. In contrast, with the methods of independent claim 1 or claim 7, the person might simply say, “not California, I want San Jose, Costa Rica” at which point, the system would cause the user to directly “jump” to the node under the box labeled “3” associated with booking travel in Costa Rica without forcing a back-navigation through all the intervening nodes or a restart. Id.

The Independent Claims

Independent claim 1 is specifically directed to a method of navigating in a system having multiple navigable nodes interconnected in a hierarchical arrangement (pg. 7, lines 5 – 15, pg. 7, lines 5-6). The method includes: “receiving an input from a user of the system,” (pg.

10, lines 21-23, pg. 11, line 16, pg. 13, lines 10-12, pg. 16, lines 1-2, pg. 17, lines 9, 14, 18 & 20, and pg. 19, line 2) the input containing at least one word identifiable with at least one keyword from among multiple keywords (pg. 10, line 20 – pg. 11, line 4, pg. 11, lines 13-20, pg. 12, line 1 - pg. 14, line 3), identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node” (pg. 10, line 11 – pg. 16, line 15).

Independent claim 7 is directed to a method of navigating an arrangement of nodes representable as a hierarchical graph containing vertices, and edges connecting at least two of the vertices (pg. 7, lines 5 – 15, pg. 7, lines 5-6). The method includes: “receiving an input from a user as a response to a verbal description associated with a first vertex (pg. 10, lines 21-23, pg. 11, line 16, pg. 13, lines 10-12, pg. 16, lines 1-2, pg. 17, line 9, 14, 18 & 20, pg. 19, line 2); analyzing the input to identify a meaningful term that can be associated with at least one keyword (pg. 14, line 8 – pg. 16, line 15, pg. 36, line 1 - 14); selecting a vertex in the graph structure that is not connected by an edge to the first vertex. (pg. 5, lines 3-14)”; and jumping to the vertex (pg. 10, line 11 - page 16, line 15).

CONCLUSION

Appellant respectfully submits that the Appeal Brief filed October 19, 2005 is compliant and, if not, then the instant submission makes it compliant. Accordingly, consideration of the appeal on the merits is now respectfully requested.

No extensions or fees are believed to be necessary for entry of this paper. In the event that a fee or extension is required, Applicants respectfully petition for such extension as is necessary for entry or consideration of this paper and the Commissioner is hereby authorized to

charge any additional fees which may be required to Deposit Account No. 13-4500, Order No. 4754-4000.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

Dated: November 2, 2005

By:



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023
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EXAMINER

ART UNIT	PAPER NUMBER
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DATE MAILED: 10/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.


Notification of Non-Compliant Appeal Brief (37 CFR 41.37)	Application No. 10/299,359	Applicant(s) PARIKH ET AL.	
	Examiner Yicun Wu	Art Unit 2165	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

The Appeal Brief filed on 19 October 2005 is defective for failure to comply with one or more provisions of 37 CFR 41.37.

To avoid dismissal of the appeal, applicant must file an amended brief or other appropriate correction (see MPEP 1205.03) within **ONE MONTH or THIRTY DAYS** from the mailing date of this Notification, whichever is longer.
EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136.

1. The brief does not contain the items required under 37 CFR 41.37(c), or the items are not under the proper heading or in the proper order.
2. The brief does not contain a statement of the status of all claims, (e.g., rejected, allowed, withdrawn, objected to, canceled), or does not identify the appealed claims (37 CFR 41.37(c)(1)(iii)).
3. At least one amendment has been filed subsequent to the final rejection, and the brief does not contain a statement of the status of each such amendment (37 CFR 41.37(c)(1)(iv)).
4. (a) The brief does not contain a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number and to the drawings, if any, by reference characters; and/or (b) the brief fails to: (1) identify, for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function under 35 U.S.C. 112, sixth paragraph, and/or (2) set forth the structure, material, or acts described in the specification as corresponding to each claimed function with reference to the specification by page and line number, and to the drawings, if any, by reference characters (37 CFR 41.37(c)(1)(v)).
5. The brief does not contain a concise statement of each ground of rejection presented for review (37 CFR 41.37(c)(1)(vi)).
6. The brief does not present an argument under a separate heading for each ground of rejection on appeal (37 CFR 41.37(c)(1)(vii)).
7. The brief does not contain a correct copy of the appealed claims as an appendix thereto (37 CFR 41.37(c)(1)(viii)).
8. The brief does not contain copies of the evidence submitted under 37 CFR 1.130, 1.131, or 1.132 or of any other evidence entered by the examiner **and relied upon by appellant in the appeal**, along with a statement setting forth where in the record that evidence was entered by the examiner, as an appendix thereto (37 CFR 41.37(c)(1)(ix)).
9. The brief does not contain copies of the decisions rendered by a court or the Board in the proceeding identified in the Related Appeals and Interferences section of the brief as an appendix thereto (37 CFR 41.37(c)(1)(x)).
10. Other (including any explanation in support of the above items):

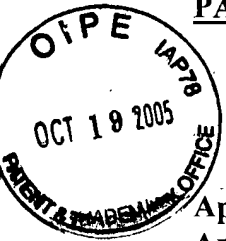

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10-21-05

AP
JPW

PATENT

Docket No. 4754-4000
Application No. 10/299,359



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application No. : 10/299,359
Applicant(s) : Prashant Parikh *et al.*
Filed : November 19, 2002
For : NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM
Group Art Unit : 2175
Examiner : Wu, Yicun
Docket No. : 4754-4000
Customer No. : 27123

REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41(a) (1)

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the provisions of 37 C.F.R. § 41.39(b)(2) and § 41.41(a), Appellant hereby requests that the appeal be maintained and submits this Reply Brief in response to the Examiner's Answer. This Reply Brief is from a rejection designated as a new ground of rejection issued by the Patent Office in the Examiner's Answer mailed August 24, 2005 non-finally rejecting pending claims 1-7 in the above-identified patent application. Appellant submits herewith a Reply Brief Transmittal (in duplicate).

Based on the arguments presented herein, Appellant requests that the Board of Patent Appeals & Interferences order the rejection of the pending claims in the Examiner's Answer be withdrawn, that Appellant's claimed invention be confirmed as patentable, and the pending claims be allowed.

For the convenience of the Board, the following “Table of Contents” identifies where each section required by 37 C.F.R. § 41.37(c)(1)(i) - (c)(1)(x) begins. The Table of Contents is followed by a Table of Authorities identifying the legal support relied upon in the instant appeal.

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I. REAL PARTY IN INTEREST

The real party in interest of the patent application on appeal is its current assignee, Noema, Inc., a New York corporation by right of an assignment from Semiosis, Inc., a New York corporation to Noema, Inc. All right, title and interest to the above-identified patent application was assigned by the inventors, Prashant Parikh and Stanley Peters, to Semiosis, L.L.C. in an assignment document executed on November 18, 2002 and November 13, 2002, respectively, which assignment was recorded in the Patent and Trademark Office on May 27, 2003 at Reel 014100, Frame 0747. All right, title and interest to the above-identified patent application was subsequently assigned by Semiosis, L.L.C. to Semiosis, Inc. in an assignment document executed on December 1, 2004, which assignment was recorded in the Patent and Trademark Office on December 10, 2004 at Reel 016062, Frame 0250. All right, title and interest to the above-identified patent application was subsequently assigned by Semiosis, Inc. to Noema, Inc. in an assignment document executed on August 9, 2005, which assignment was submitted for recordation in the Patent and Trademark Office on August 18, 2005.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or the inventors that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

There are 7 claims pending in this application, numbered 1-7. Claims 1-7 stand rejected under 35 U.S.C. § 103(a) and are the subject of this appeal, claims 8-26 having been cancelled in response to a restriction requirement and preserved in divisional applications. A complete copy of the claims involved in the appeal is attached hereto.

IV. STATUS OF AMENDMENTS

All prior amendments have been entered prior to the original appeal and are reflected in the present claims on appeal by reference to cancelled claims 8-26. No new amendments have been made since institution of the appeal.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Background

The named inventors have devised certain methods for navigation in hierarchically arranged systems. See application, e.g., Fig. 1 and p. 7, ¶¶ 1-3. Examples of such systems include, but are not limited to, interactive voice response systems, interactive television program listing systems, geographic information systems, and automated voice response systems. See application, e.g., Figs. 3-6, and related text. Such systems are typically arranged so that a user navigates through the hierarchy through an iterative process of information presentation or query to the user and response by the user. Through this iterative presentation-response scheme the user will traverse through the system and, ideally, end up with a desirable result. See application, e.g., p. 2, ¶ 2. The most common example of such a system from the perspective of an average user is a telephone menu system whereby a caller is prompted, for example, to proceed in English press or say “1”, to proceed in Spanish press “2” or say “dos”, etc. If the user presses “1” they might receive a series of additional prompts, for example, for sales press or say “1”, for returns press or say “2”, for customer service press or say “3”, etc. with each successive input causing the user to traverse to a new part (i.e. a new “node” (in this case the next menu)) of the hierarchy. Notably, the hierarchical configuration is rigidly fixed (i.e. each successive traversal is limited to either those options presented or abandoning the process and restarting) such that traversal can only occur between two connected vertexes or nodes (in the above example, via one of the available menu options).

A simplified example of such a hierarchically arranged system is shown in Figure 1, where each box represents a node in the hierarchy. See application, e.g., Fig. 1 and p. 7, ¶¶ 1-3. Such systems are inherently problematic in that if, for example, the user realizes that he made a mistake and thus caused a traversal down the wrong branch, prior art methods provide the user with very limited choices for correcting a mistake. The user must either exit the system altogether and start again from the beginning, or retrace their steps and back-navigate through each and every node until the top, or an appropriate “least common ancestor node” in the hierarchy is reached at which point the “downward” process through the system can begin again. See 1/27/05 Response to Final Office Action, e.g., p. 7.

The Claimed Invention

Appellant’s claimed invention solves these inadequacies of prior art systems, by allowing the system to cause the user to “jump” from one node in the hierarchy to another node that is not directly connected to that node, without having to traverse through every intervening node in the path on the basis of a keyword association. See claims 1 and 7. In other words, by implementing the claimed invention, the user is not bound by the rigid hierarchical arrangement because an input or response can cause the system to ignore the hierarchy and as a result of a keyword relationship cause a direct jump to a different non-directly connected node, thereby bypassing intervening nodes that would otherwise need to be traversed according to approaches of the prior art (“jumping” in this context being defined both explicitly, and by implication, in the specification to mean a direct traversal from one node or vertex to another node or vertex that is not directly connected to it (i.e., without traversal through any intervening nodes or vertices or to a node or vertex whose only least common ancestor with that node or vertex is the root node or vertex)). See application, e.g., FIG. 2, paragraph spanning pp. 8-9; p.3, 2nd to last ¶; p. 5, last ¶; and pp. 9-11, “Example 1.”

For example, in the simplified arrangement of Figure 1 which, for purposes of explanation, could represent an interactive voice response travel reservation system where the boxes labeled “2”, “4” and “5” might represent aspects involved with booking a domestic reservation and the boxes under the box labeled “3” might represent aspects involved with booking an international flight. See 1/27/05 Response to Final Office Action, e.g., p. 7. A customer wishing to book a flight to “San Jose” in Costa Rica could conceivably, unintentionally, navigate down through the nodes associated with a domestic booking by saying “San Jose” at an early point, only to realize, when hotels in California are mentioned, a mistake has been made. Id. At that point, with the conventional systems of the prior art, the person would have to either start all over or back-traverse through the options and try to navigate down through the international options by first mentioning “Costa Rica” or “International” at the starting point. Id. In contrast, with the methods of independent claim 1 or claim 7, the person might simply say, “not California, I want San Jose, Costa Rica” at which point, the system would cause the user to directly “jump” to the node under the box labeled “3” associated with booking travel in Costa Rica without forcing a back-navigation through all the intervening nodes or a restart. Id.

Independent claim 1 is specifically directed to a method of navigating in a system having multiple navigable nodes interconnected in a hierarchical arrangement. The method includes: “receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords, identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.” Independent claim 7 is directed to a method of navigating an arrangement of nodes representable as a hierarchical graph

containing vertices, and edges connecting at least two of the vertices. The method includes: “receiving an input from a user as a response to a verbal description associated with a first vertex; analyzing the input to identify a meaningful term that can be associated with at least one keyword; selecting a vertex in the graph structure that is not connected by an edge to the first vertex.”

VI. GROUND OF REJECTIONS TO BE REVIEWED ON APPEAL

Whether claims 1-7 are obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 6,676,159 to Lin et al. (“Lin”) in view of U.S. Patent No. 5,812,134 to Pooser et al. (“Pooser”).

VII. APPELLANT’S ARGUMENT

Claims 1-7 stand rejected, under 35 U.S.C. § 103(a), as being obvious over Lin et al. U.S. Pat. No. 6,676,159 (“Lin”) in view of Pooser et al. U.S. Patent No. 5,812,134 (“Pooser”).

Appellant respectfully traverses the rejection of claims 1-7 under 35 U.S.C. § 103(a). As demonstrated herein, the claim rejections of the Examiner’s Answer are improper, and should be withdrawn because: (A) the Examiner’s Answer obviousness rejections are based on legally and factually flawed analyses, because (1) the alleged obviousness rejections are based on a misrepresentation of Pooser, and (2) the Examiner’s Answer fails to make a *prima facie* obviousness case because the combination of Pooser with Lin does not render the claimed invention obvious. Accordingly, the rejection of these claims is improper, and should be withdrawn. See M.P.E.P. § 2143.

A. The Patent Office’s Obviousness Rejections Are Based Upon Factually And Legally Flawed Analyses

The Federal Circuit has clearly and repeatedly articulated the guidelines to be followed in rejecting a claim for obviousness.

The factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of

record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with.

In re Lee, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002) (citation omitted).

It is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the Appellant to overcome the *prima facie* case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole. See id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Here, the Examiner's Answer rejection for obviousness is based on a flawed factual analysis of the teachings and suggestions of Pooser. As a result, the Examiner's Answer

has failed to establish a *prima facie* obviousness case because Pooser does not disclose what is attributed to it in the Examiner's Answer.

There is no motivation to combine Lin with Pooser in such a way as would result in the invention as claimed. Still further, no combination of Lin with Pooser, even if a motivation existed, would teach or suggest all the limitations of the pending claims in the manner claimed. See M.P.E.P. § 2143.03; In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

1. The Patent Office Rejections Are In Part Based On A Mischaracterization Of Pooser

The M.P.E.P. states:

As an initial matter, Office personnel should determine the scope and content of the relevant prior art. Each reference must qualify as prior art under 35 U.S.C. § 102 (e.g., Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987) ("Before answering Graham's 'content' inquiry, it must be known whether a patent or publication is in the prior art under 35 U.S.C. § 102.")) and should be in the field of applicant's endeavor, or be reasonably pertinent to the particular problem with which the inventor was concerned. In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Accord, e.g., In re Clay, 966 F.2d 656, 658-59, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992).

See M.P.E.P. § 2144.08.

a. The Rejection Of Independent Claims 1 And 7 Is Factually Erroneous

The Examiner's Answer erroneously contends that Pooser teaches "not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node (Pooser et al. col. 9, lines 26-29)." See Examiner's Answer at p. 4. However, the Examiner's Answer is unsound because Pooser fails to disclose the teaching attributed to it by the Examiner's Answer namely the system jumping the user to a "not directly connected to the first node" and that the at least one node "is associated with the at least one keyword."

Contrary to the claimed invention, and as relied upon as a result of this claim limitation's absence in Lin (Examiner's Answer, page 4), Pooser's navigational system instead discloses the user, not a system, selecting nodes within the hierarchical structure and it does not have "keywords" involved in navigation.

Specifically, Pooser provides a three-dimensional graphical representation of information permitting a user to navigate through the hierarchy (col. 3, lines 3-17; col. 6, lines 37-43) by direct node selection. By presenting a visual representation, a user of Pooser is aware of all available nodes. This permits a "user to effectively visualize the overall size, complexity and organization of the entire information base... [and] relationships among various [nodes]" (col 3, lines 13-17). The user is "continuously provided with information regarding the 'position' of the information unit being currently examined relative" to every other node graphically (col. 3, lines 58-61). As a result, the "user is naturally guided on the path in a left-to-right direction" (col 3, lines 40-42) and thus, able to select a desired node from those displayed.

While Pooser's visual architecture arguably permits the user to selectively jump to a visually presented "related node on another thread" (col. 9, lines 26-29), such a jump is only possible because the "graphic display of the overall structure of the information base is always visible to the user" (col. 3, lines 61-63) [emphasis added]. Additionally, Pooser stipulates a user "will navigate... by pointing at, and selecting, the desired information unit via a position indicating icon" displayed as a visual representation (col. 10, lines 10-13). If the user lacked visual representation of the hierarchy provided by Pooser, yet still retained the ability to physically select a node, the user would be incapable of knowing what other nodes existed or where they were, precluding jumping to any unconnected node, let alone the user's desired node.

Additionally, Pooser provides the user with general content of the node, to allow a user to select his perceived desired node, instead of the system selecting the “jumped” to node. Jumping in Pooser is not based upon use of keywords as described and claimed in the instant application. In fact, putting aside the user versus system distinction, there are no keywords in Pooser that are used to interrelate two unconnected nodes to each other such that arrival at one can cause a jump to the other.

In sum, Pooser merely discloses a method of displaying a graphical representation of a hierarchical structure, allowing a user to identify his “position” relative to the remainder of the database, and to manually select a specific displayed node. Neither of which have anything to do with the instant disclosure, let alone the invention as claimed.

With Appellant’s claimed invention, there is no graphical representation of the hierarchical arrangement. No information need be available to the user to enable the user to know of: (a) the existence of other nodes, (b) the user’s current location in the hierarchy (other than the start point), or (c) any keyword-based relationship among the nodes. A user presently located at an individual node gives the system an input, from that input either (i) a keyword association occurs and, as a result, the system then jumps the user to a node associated with the at least one keyword of the system’s selection (claim 1) or (ii) a “meaningful term” is identified from the input and then the system jumps the user “based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex” (claim 7).

In Appellant’s claimed invention, the user does not select, indeed they are unable to physically select, the desired node. The user is unaware and need not be aware of the overall

hierarchal structure. The system jumps the user to another node which is not directly connected to the first node because, as set forth in the claim of the association.

This distinction is best demonstrated from the fact that, with the instant invention, even if the user was presented with a graphical representation of the hierarchy, a user's input at a node could squarely cause a jump to a node that would seem undesirable to the user based upon viewing the graphical representation but would, in fact, be more desirable, from an ultimate navigation standpoint, based upon the keyword association. To reiterate in summary, the user in Pooser is the one who selects the next node – it is not done on the basis of a keyword association as set forth in the claims and in Pooser, there are no keywords associating the various nodes to each other such that the system will jump a user from one of the nodes to another as a result of some keyword association.

There is a significant conceptual difference between the two approaches. The cited Lin and Pooser art, alone or in combination, are akin to providing a map of the United States to someone in New York wanting to travel West. Using the map, they can determine whether they want to go to Seattle, San Francisco or San Diego, the route they should take, and how they can proceed directly there.

In contrast, the instant invention is akin to placing someone in a car in New York, and having them start going West without a map or any idea where they will end up. If they arrive in Chicago and they provide an input that is associated with the keyword “warm,” they may be placed on an airplane to a new destination (i.e., a “jump”) and, upon arrival, given a new car to continue their journey. Notably, the destination arrived at by airplane might be Miami, Phoenix, Atlanta or Boston and would be of the system's choosing – not that of the traveler.

Indeed the trip might involve several “jumps” some of which, from a map standpoint, might seem illogical or undesirable, but would get them to their goal faster.

Therefore, with respect to claim 1, the combination of Lin and Pooser does not disclose, teach or suggest the system jumping the user from a first node to another node “not directly connected to the first node,” as the Examiner’s Answer contends nor does it disclose jumping based upon a keyword association.

The rejection of independent claim 7 in the Examiner’s Answer is similarly erroneous and also improper, as it failed to even address the particular claim language of claim 7. This rejection is also prejudicial to Appellant, particularly on appeal, because the Examiner’s Answer failed to specifically address each of claim 7’s limitations, including, “receiving an input from a user as a response to a verbal description associated with a first vertex” (emphasis added) leaving Appellant to guess at what the Office might be thinking and rendering it impossible to substantively rebut this contention.

Notwithstanding this error of formality, as noted above the Examiner’s Answer consistently misconstrues Pooser’s navigational system and thus, fails to recognize that Pooser alone or in combination with Lin fails to disclose claim 7’s limitation of “selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex.” As noted above, Pooser merely adds a graphical depiction of a hierarchical scheme that allows a user to select any one of the displayed nodes. Again, Pooser’s user, not the system, selects the next vertex in the graph structure and no combination of Lin and Pooser would do otherwise.

Since the cited references (viz., Lin and Pooser), when taken alone or in combination, fail to teach, disclose, or suggest all of the claim elements of Appellant's claim 1 and 7 under 35 U.S.C. § 103(a), as set forth by the Examiner's Answer, the rejections are incomplete and thus, improper and must be withdrawn.

b. Dependent Claim 2 Is Factually Independently Allowable

In light of the above, all of the dependent claims are allowable by virtue of their dependency from claim 1 (directly or indirectly). Still further, dependent claim 2 is independently allowable on its own merits as detailed below.

The Examiner's Answer erroneously contends that Lin, as modified in view of Pooser, teaches "providing a verbal description associated with the at least one node to the user." See Examiner's Answer at p. 5.

First, the Examiner's Answer is a *non sequitur*. If providing a verbal description is *per se* well known in the art, then there is no need to cite Pooser. However the statement also reflects a mis-reading of the claim itself or ignores the actual words of the claim. Every limitation must be considered in addressing obviousness. In re Wilder, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970) ("every limitation positively recited in a claim must be given effect in order to determine what subject matter that claim defines"). Appellant's claimed "verbal description" limitation is an output, while Pooser merely addresses an input function.

Specifically, and contrary to the claimed invention, Pooser's navigational system teaches the selection of the desired node which may be performed by a "voice-controlled... input device" (col. 10, line 13) [emphasis added]. A graphical representation is still essential for the user's selection. The voice-controlled aspect in Pooser is more correctly equated to a mouse-click selection (col. 10, line 12).

In the instant application, “verbal description” is defined as “a set of words relating to the subject matter whether presented audibly or in written form.” See application, e.g., p. 2, 2nd to last ¶. This referenced “verbal description” is the output of the system, not an input by the user. Such “verbal descriptions” may include a telephonic pre-recorded prompt or a written prompt. Id.; and p. 5, last ¶. The user’s input to the “verbal description” output by the system is what is interpreted by Appellant’s system. Appellant’s system then jumps the user to the not directly connected to the first node, but associated with the at least one keyword.

Since, the cited references (viz., Lin and Pooser), when taken alone or in combination, fail to teach, disclose, or suggest all of the claim elements of Appellant’s claim 2 under 35 U.S.C. § 103(a), the rejection should be withdrawn.

In sum, the Examiner’s Answer failed to properly determine the scope and content of Pooser, or it would have recognized that Pooser lacked the very teaching attributed to it. Accordingly, the obviousness rejections based on Pooser are improper as a matter of law and Patent Office practice, and thus should be reversed and the claims confirmed as patentable.

2. The Patent Office Has Failed To Establish Prima Facie Obviousness

An obviousness analysis places the initial burden to make out a *prima facie* case of obviousness on the Patent Office. Specifically, the M.P.E.P. states:

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

See M.P.E.P. § 2142 (emphasis added).

Here, there is neither motivation to combine, nor any reasonable expectation that the combination would result in the claimed subject matter. See M.P.E.P. §§ 2143-2143.02. A *prima facie* case requires both correct factual findings and a correct obviousness conclusion based on those findings.

Pooser does not teach or suggest the limitations attributed to it by the Examiner's Answer. As a result, no combination of Lin with Pooser would arrive at or suggest any of the pending claims. Therefore, the Examiner's Answer has failed to establish a *prima facie* obviousness case.

Indeed, the Examiner's Answer specifically combines Pooser with Lin, because Pooser allegedly teaches the claim limitations admittedly lacking from Lin, namely: "not directly connected to the first node but is associated with the at least one keyword, and jumping to at least one node." See Examiner's Answer at p. 4. Since Pooser neither teaches nor suggests "not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node" attributed to it, Pooser does not and cannot cure the deficiencies of Lin. Thus, the Examiner's Answer fails to establish a *prima facie* obviousness case, because no combination of Lin with Pooser would arrive at or suggest Appellant's claimed invention.

Moreover, as Pooser necessitates a graphical interface, irrespective of its visual configuration, it is ultimately the user which selects the jumped-to node based on its visual representation, not any keyword association. Additionally, of necessity from the above, there is no motivation to combine Lin and Pooser in such a manner as would achieve the claimed invention.

In sum, it is respectfully submitted that Lin in view of Pooser cannot render the claims obvious. Therefore, the Examiner's Answer has failed to establish a *prima facie*

obviousness case. Accordingly, the obviousness rejections based on Lin in view of Pooser should be reversed and all the claims confirmed as patentable.

CONCLUSION

Appellant respectfully submits that the pending claims are not obvious, the rejection of the pending claims over Lin in view of Pooser be withdrawn, and thus, Appellant's claimed invention should be confirmed as patentable.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

Dated: October 19, 2005

By:



Richard Straussman
Registration No. 39,847

Attorney for Appellant

Correspondence Address:

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New York, New York 10281-2101
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VIII. CLAIMS APPENDIX

1. (original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,

identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and

jumping to the at least one node.

2. (original) The method of claim 1 further comprising:

providing a verbal description associated with the at least one node to the user.

3. (original) The method of claim 1 further comprising:

searching a thesaurus correlating keywords with synonyms.

4. (original) The method of claim 3 wherein the searching further comprises:

identifying the at least one word as synonymous with the at least one keyword.

5. (original) The method of claim 1 further comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword; and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. (original) The method of claim 5 further comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

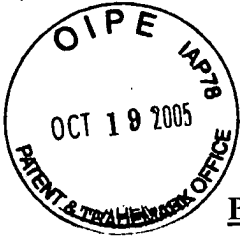
receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

Claims 8 through 26 (Cancelled).



Docket No.: 4754-4000

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application No. : 10/299,359
Applicant(s) : Prashant Parikh *et al.*
Filed : November 19, 2002
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
Group Art Unit : 2175
Examiner : Wu, Yicun
Docket No. : 4754-4000
Customer No. : 27123

EXPRESS MAIL CERTIFICATE

Mail Stop Appeal Brief - Patents
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Express Mail Label No.: EV 622 481 813 US

Date of Deposit: October 19, 2005

I hereby certify that the following attached paper(s) and/or fee

1. Reply Brief Pursuant To 37 C.F.R. § 41.41(a) (1) (18 pages); and
2. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Mail Stop Appeal Brief - Patents, Commissioner For Patents, P.O Box 1450, Alexandria, VA 22313-1450.

Albert Isles

(Typed or printed name of person mailing papers(s) and/or fee)

(Signature of person mailing paper(s) and/or fee)

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023
27123	7590	08/24/2005	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			WU, YICUN	
			ART UNIT	PAPER NUMBER
			2165	

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/299,359

Applicant(s)

PARIKH ET AL.

Examiner

Yicun Wu

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 08 June 2005.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-7 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-7 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

Art Unit: 2165

1. In view of the appeal Brief filed on 6-8-2005, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or, request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

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2. **DETAILED ACTION**

Claims 1-7 are presented for examination.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Patent 6,675,159) in view of Pooser et al. (U.S. Patent 5,812,134).

As to Claims 1 and 7, Lin et al. discloses a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system (Lin et al. col. 9, lines 26-45), the input containing at least one word identifiable with at least one keyword from among multiple keywords, identifying at least one node, other than the first node (Lin et al. col. 10, lines 26-40).

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Lin et al. does not teach not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

Pooser et al. teaches not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node (i.e. the navigational system allows the user to skip any part of the thread, return to a previous node (or element), or jump to a related node on another thread. Pooser et al. col. 9, lines 26-29).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. wherein not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. by the teaching of Pooser et al. because providing the not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node allows allow the user to efficiently navigate through the information base as taught by Pooser et al. (col. 6, lines 37-43).

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As to Claim 2, Lin et al. as modified teaches a method wherein the searching comprising:

providing a verbal description associated with the at least one node to the user (providing a verbal description is well known in the art).

As to Claim 3, Lin et al. as modified teaches a method wherein the searching comprising:

searching a thesaurus correlating keywords with synonyms (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 4, Lin et al. as modified teaches a method wherein the searching comprising:

identifying the at least one word as synonymous with the at least one keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 5, Lin et al. as modified teaches a method wherein the searching comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15); and

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learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 6, Lin et al. as modified teaches a method wherein the searching comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

Art Unit: 2165

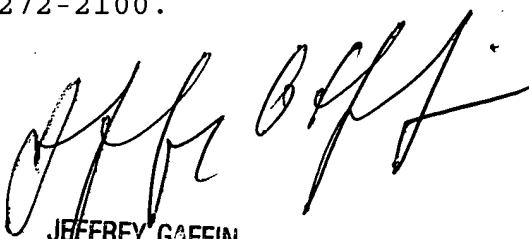
Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 571-272-4087. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Gaffin can be reached on 571-272-4146. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Yicun Wu
Patent Examiner
Technology Center 2100



JEFFREY GAFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

August 18, 2005

Notice of References Cited	Application/Control No. 10/299,359	Applicant(s)/Patent Under Reexamination PARIKH ET AL.	
	Examiner Yicun Wu	Art Unit 2165	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
A	US-5,812,134	09-1998	Pooser et al.	707/102
B	US-			
C	US-			
D	US-			
E	US-			
F	US-			
G	US-			
H	US-			
I	US-			
J	US-			
K	US-			
L	US-			
M	US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
O					
P					
Q					
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S					
T					

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes



Application/Control No.

10/299,359

Examiner

Yicun Wu

Applicant(s)/Patent under Reexamination

PARIKH ET AL.

Art Unit

2165

SEARCHED

Class	Subclass	Date	Examiner
707	1,2,3,4 5,6,7,8 9,10, 100	2/18/2004	YW
	101 102		
	103 104.1		
updated	search	11/25/2004	
updated	search	8/16/2005	

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
inventor search (double patenting) uspto uspgpub usocr epo jpo ibmtech derwent	2/18/2004	YW
acm ieee npl internet Search stratagy attached		
consulted Dov Popovici	2/18/2004	
updated search	11/25/2004	
updated search	8/16/2005	

Index of Claims



Application/Control No.

10/299,359

Examiner

Yicun Wu

Applicant(s)/Patent under Reexamination

PARIKH ET AL.

Art Unit

2165

√	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

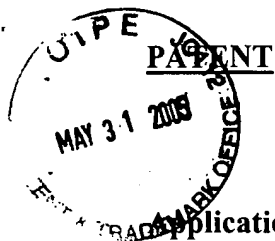
N	Non-Elected
I	Interference

A	Appeal
O	Objected

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Docket No. 4754-4000
Application No. 10/299,359

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/299,359
Applicant(s) : Prashant Parikh *et al.*
Filed : November 19, 2002
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM
Group Art Unit : 2175
Examiner : Wu, Yicun
Docket No. : 4754-4000
Customer No. : 27123

APPEAL BRIEF PURSUANT TO 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the provisions of 37 C.F.R. § 41.37, Appellant submits this brief in support of its appeal. The appeal is from the decision of the Examiner in a Final Office Action mailed December 3, 2004, which finally rejected pending claims 1 – 7 in the above-identified patent application. Appellant submit herewith an Appeal Brief Transmittal (in duplicate).

Based on the arguments presented herein, Appellant requests that the Board of Patent Appeals & Interferences order the final rejection of the pending claims be withdrawn, that Appellant’s claimed invention be confirmed as patentable, and the pending claims be allowed.

For the convenience of the Board, the following “Table of Contents” identifies where each section required by 37 C.F.R. § 41.37(c)(1)(i)- (c)(1)(x) begins. The Table of Contents is followed by a Table of Authorities identifying the legal support relied upon in the instant appeal.

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I. REAL PARTY IN INTEREST

The real party in interest of the patent application on appeal is its assignee, SEMIOSIS, INC., a New York corporation. All right, title and interest to the above-identified patent application was assigned by the inventors, Prashant Parikh and Stanley Peters, to SEMIOSIS, L.L.C. in an assignment document executed on November 18, 2002 and November 13, 2002, respectively, which assignment was recorded in the Patent and Trademark Office on May 27, 2003 at Reel 014100, Frame 0747. All right, title and interest to the above-identified patent application was subsequently assigned by SEMIOSIS, L.L.C. to SEMIOSIS, INC. in an assignment document executed on December 1, 2004, which assignment was submitted for recordation in the Patent and Trademark Office on December 10, 2004.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or the inventors that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1 – 7 are pending in this patent application, and are the subject of this appeal. Claims 1 – 7 stand finally rejected as unpatentable under 35 U.S.C. § 103(a).

IV. STATUS OF AMENDMENTS

An Advisory Action Before the Filing of an Appeal Brief ("Advisory Action") mailed on March 7, 2005, indicated that the Response to Final Office Action filed on January 27, 2005, was entered for purposes of appeal. No other amendments were filed subsequent to the Advisory Action.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Background

The named inventors have devised certain methods for navigation in hierarchically arranged systems. See application, e.g., Fig. 1 and p. 7, ¶¶ 1 – 3. Examples of such systems include, but are not limited to, interactive voice response systems, interactive television program listing systems, geographic information systems, and automated voice response systems. See application, e.g., Figs. 3 – 6, and related text. Such systems are typically arranged so that a user navigates through the hierarchy through an iterative process of information presentation or query to the user and response by the user. Through this iterative presentation-response scheme the user will traverse through the system and, ideally, end up with a desirable result. See application, e.g., p. 2, ¶ 2. The most common example of such a system from the perspective of an average user is a telephone menu system whereby a caller is prompted, for example, to proceed in English press or say “1”, to proceed in Spanish press “2” or say “dos”, etc. If the user presses “1” they might receive a series of additional prompts, for example, for sales press or say “1”, for returns press or say “2”, for customer service press or say “3”, etc. with each successive input causing the user to traverse to a new part (i.e. a new “node” (in this case the next menu)) of the hierarchy. Notably, the hierarchical configuration is rigidly fixed (i.e. each successive traversal is limited to either those options presented or abandoning the process and restarting) such that traversal can only occur between two connected vertexes or nodes (in the above example, via one of the available menu options).

A simplified example of such a hierarchically arranged system is shown in Figure 1, where each box represents a node in the hierarchy. See application, e.g., Fig. 1 and p. 7, ¶¶ 1 – 3. Such systems are inherently problematic in that if, for example, the user realizes that he made a mistake and thus caused a traversal down the wrong branch, prior art methods provide

the user with very limited choices for correcting a mistake. The user must either exit the system altogether and start again from the beginning, or retrace their steps and back-navigate through each and every node until the top, or an appropriate “least common ancestor node” in the hierarchy is reached at which point the “downward” process through the system can begin again. See 1/27/05 Response to Final Office Action, e.g., p. 7.

The Claimed Invention

Appellant’s claimed invention solves these inadequacies of prior art systems, by allowing the user to “jump” from one node in the hierarchy to another node that is not directly connected to that node, without having to traverse through every intervening node in the path. See 1/27/05 Response to Final Office Action, e.g., paragraph spanning p. 6 – p. 7. In other words, by implementing the claimed invention, the user is not bound by the rigid hierarchical arrangement because an input or response can cause a direct jump to a different node, thereby bypassing intervening nodes that would otherwise need to be traversed according to approaches of the prior art (“jumping” in this context being defined both explicitly, and by implication, in the specification to mean a direct traversal from one node or vertex to another node or vertex that is not directly connected to it (i.e., without traversal through any intervening nodes or vertices or to a node or vertex whose only least common ancestor with that node or vertex is the root node or vertex)). See application, e.g., FIG. 2, paragraph spanning pp. 8-9; p.3, 2nd to last ¶; p. 5, last ¶; and pp. 9-11, “Example 1.”

For example, in the simplified arrangement of Figure 1 which, for purposes of explanation, could represent an interactive voice response travel reservation system where the boxes labeled “2”, “4” and “5” might represent aspects involved with booking a domestic reservation and the boxes under the box labeled “3” might represent aspects involved with booking an international flight. See 1/27/05 Response to Final Office Action, e.g., p. 7. A

customer wishing to book a flight to “San Jose” in Costa Rica could conceivably, unintentionally, navigate down through the nodes associated with a domestic booking by saying “San Jose” at an early point, only to realize, when hotels in California are mentioned, a mistake has been made. Id. At that point, with the conventional systems of the prior art, the person would have to either start all over or back-traverse through the options and try to navigate down through the international options by first mentioning “Costa Rica” or “International” at the starting point. Id. In contrast, with the methods of independent claim 1 or claim 7, the person might simply say, “not California, I want San Jose, Costa Rica” at which point, the system would directly “jump” to the node under the box labeled “3” associated with booking travel in Costa Rica without forcing a back-navigation through all the intervening nodes or a restart. Id.

Independent claim 1 is specifically directed to a method of navigating in a system having multiple navigable nodes interconnected in a hierarchical arrangement. The method includes receiving an input containing at least one identifiable keyword from a user at a first node, identifying at least one other node that is associated with the at least one identifiable keyword but that is not directly connected to the first node, and jumping to the other node. Independent claim 7 is directed to a method of navigating an arrangement of nodes representable as a hierarchical graph containing vertices, and edges connecting at least two of the vertices. The method includes the steps of receiving an input containing at least one keyword from a user at a first node as a response to a verbal description, selecting a vertex in the hierarchical graph that is associated with the keyword but that is not connected by an edge to the first vertex, and jumping to the other vertex.

VI. GROUNDS OF REJECTIONS TO BE REVIEWED ON APPEAL

Whether claims 1 – 7 are obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 6,676,159 to Lin et al. (“Lin”) in view of U.S. Patent No. 6,408,290 to Thiesson et al. (“Thiesson”).

Whether the Patent Office improperly rejected claims 2 – 6 based on a construction of the claim term “jumping” which is inconsistent with its definition in the specification.

VII. APPELLANT’S ARGUMENT

Claims 1 – 7 stand rejected, under 35 U.S.C. § 103(a), as being obvious over Lin et al. U.S. Pat. No. 6,676,159 (“Lin”) in view of Thiesson et al. U.S. Patent No. 6,408,290 (“Thiesson”).

Appellant respectfully submits that, as demonstrated herein, the claim rejections of the Final Office Action are improper, and should be withdrawn because: (A) the rejections are based on an improper construction of the claims, and (B) the Final Office Action obviousness rejections are based on legally and factually flawed analyses, because (1) the alleged obviousness rejections are based on a misinterpretation of Thiesson, and (2) the Final Office Action fails to make a *prima facie* obviousness case because the combination of Thiesson with Lin does not render the claimed invention obvious. Individually, each such action is contrary to law. Collectively, those actions demonstrate that an improper standard of patentability is being applied to the claimed invention.

For appeals, 37 CFR § 41.37(c)(1)(vii) states that “Each ground of rejection must be treated under a separate heading.” However, in the interest of brevity and avoiding redundancy the arguments are identically applicable to all rejections. Hence, they are argued together and appropriate leeway in applying with the separateness requirement is requested.

**A. THE PATENT OFFICE’S REJECTIONS ARE BASED
IN PART ON AN IMPROPER INTERPRETATION OF
THE TERM “JUMPING” AS USED IN THE CLAIMS**

The Supreme Court has clearly articulated that a claim term must be defined to comport with the whole instrument.

[A] necessarily sophisticated analysis of the whole [patent] document [is] required by the standard construction rule that a term can be defined only in a way that comports with the instrument as a whole.

Markman v. Westview Instruments, Inc., 517 U.S. 370, 389, 38 USPQ2d 1461, 1470 (1996).

It is also well-established that an inventor may be his own lexicographer. See, e.g., ZMI Corp. v. Cardiac Resuscitator Corp., 844 F.2d 1576, 1580, 6 USPQ2d 1557, 1560 (Fed. Cir. 1988); Markman v. Westview Instruments, Inc., 52 F.3d 967, 979, 34 USPQ2d 1321, 1330 (Fed. Cir. 1995); Hormone Research Foundation, Inc. v. Genentech, Inc., 904 F.2d 1558, 1563, 15 USPQ2d 1039, 1043 (Fed. Cir. 1990). “The terms of a claim will be given their ordinary meaning, unless it appears that the inventor used them differently.” ZMI Corp., 844 F.2d at 1580. For proper claim construction, one must look to the specification to determine if the inventor used the claim terms differently from their ordinary accustomed meaning. ZMI Corp., 844 F.2d at 1580; see also, Hormone Research Foundation, Inc., 904 F.2d at 1563. In particular, “the specification aids in ascertaining the scope and meaning of the language employed in the claims inasmuch as words must be used in the same way in both the claims and the specification.” ZMI Corp., 844 F.2d at 1580.

The Patent Office has adopted procedures to apply these standards in examining an application. In particular, Patent Office practice provides that “[w]here an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim.” (emphasis added) See M.P.E.P. § 2111.01(III) (citing Toro Co. v. White

PATENT

**Docket No. 4754-4000
Application No. 10/299,359**

Consolidated Indus. Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999) (meaning of words used in a claim “is not construed in a lexicographic vacuum, but in the context of the specification and drawings.”)). See also In re Marosi, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) (“Claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their ‘broadest reasonable interpretation.’” 710 F.2d at 802, 218 USPQ at 292 (quoting In re Okuzawa, 537 F.2d 545, 548, 190 USPQ 464, 466 (CCPA 1976)) (emphasis in original). Any special meaning assigned to a term “must be sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention.” See M.P.E.P. § 2111.01(III) (citing Multiform Desiccants Inc. v. Medzam Ltd., 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998)).

The Final Office Action has rejected the pending claims based on an improper construction of the claim term “jumping” by disregarding the definition applied in the Specification, contrary to the claim construction rules set forth by the Federal Circuit, its predecessor court (the C.C.P.A.), and the Patent Office. The Final Office Action contended the claim term “jumping” was “not clearly defined in Applicant’s [sic] specification,” and rejected the claims using “the broadest possible interpretation” of the claim term. See Final Office Action at p. 2. In response, Appellants identified many instances in the specification where the claim term “jumping” is defined, both explicitly and by implication in such a manner as would be understood by a person of ordinary understanding in the field. Yet, the Final Office Action completely disregarded Appellant’s definition of “jumping” given in Appellant’s specification, and maintained the claim rejections based on the improper claim construction. See Advisory Action at p. 2. Thus, the Final Office Action is applying an improper definition of the claim

term “jumping” that is inconsistent with that set forth in the specification itself. Such alternative definition must be ordered discarded as improper as a matter of law and Patent Office practice.

Accordingly, the rejection implying that “jumping” is not clearly defined should be reversed as should the claim rejections involving a construction of “jumping” that is at odds with Appellant’s definition.

B. THE PATENT OFFICE’S OBVIOUSNESS REJECTIONS ARE BASED UPON FACTUALLY AND LEGALLY FLAWED ANALYSES

Notwithstanding the improper construction of “jumping” which mandates reversal of the art rejections, since they are premised upon the Patent Office construction, rather than the meaning specified by Appellant, the Final Office Action misconstrues the disclosures of the cited art, further compounding the error.

The Federal Circuit has clearly and repeatedly articulated the guidelines to be followed in rejecting a claim for obviousness.

The factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with.

In re Lee, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002) (citation omitted).

The standard for determining obviousness under 35 U.S.C. § 103(a), as set forth by the Supreme Court in Graham v. John Deere Co., 383 U. S. 1, 17, 148 USPQ. 459, 467 (1966), requires a factual determination to ascertain: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; and (3) the differences between the claimed subject matter and the prior art. Based on these factual inquiries, a preliminary determination is made as to whether the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the alleged invention was made.

Here, the Final Office Action's obviousness rejections are based on a flawed factual analysis of the teachings and suggestions of Thiesson. As a result, the Final Office Action has failed to establish a *prima facie* obviousness case because Thiesson does not disclose what is attributed to it in the Final Office Action.

Moreover, because Thiessen factually lacks the very aspects the Final Office Action alleges is lacking from Lin, even if the two are properly combined, no combination of Lin with Thiesson would not teach or suggest all the limitations of the pending claims.

2. THE PATENT OFFICE REJECTIONS ARE BASED ON A MISCHARACTERIZATION OF THIESSON

The M.P.E.P. states:

As an initial matter, Office personnel should determine the scope and content of the relevant prior art. Each reference must qualify as prior art under 35 U.S.C. § 102 (e.g., Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987) ("Before answering Graham's 'content' inquiry, it must be known whether a patent or publication is in the prior art under 35 U.S.C. § 102.")) and should be in the field of applicant's endeavor, or be reasonably pertinent to the particular problem with which the inventor was concerned. In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Accord, e.g., In re Clay, 966 F.2d 656, 658-59, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992).

See M.P.E.P. § 2144.08.

The Final Office Action erroneously contends that Thiesson teaches "not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node (Thiesson et al. Fig. 10, from H_d1 to O_c1.)." See Final Office Action at p. 4. However, the Final Office Action is wrong on several accounts. First, Thiesson does not disclose the teaching attributed to it by the Final Office Action because Thiesson does not disclose hierarchically interconnected "navigable" nodes at all, let alone ones "navigable" in the manner of Appellants' claimed invention. Second, Thiesson does not teach "jumping" from a

first node to another node that is “not directly connected to the first node,” as the Final Office Action contends.

Quite the contrary, Thiesson discloses various Bayesian networks. Bayesian networks are simply ways to represent cause and effect interrelationships – typically among various system variables. Specifically, in mathematical parlance, a Bayesian network is a technique for representing the probabilistic relationships between variables in directed acyclic graphs. For example, Fig. 2 of Thiesson shows a simplified network for various aspects of an automobile and relates to “troubleshooting automobile problems” by illustrating how a change to one element of an automotive system will affect other elements of the system. The interrelationship is partially shown by representing by interconnection lines between directly affected aspects. For example, as shown, the variable “Battery Power 212” has a direct effect upon the variables represented by “Radio 214”, “Lights 216”, “Engine Turns Over 218”, and “Gas Gauge 222” and an indirect effect upon the “Engine Start 234” variable via the “Engine Turns Over 218” variable. However, in Bayesian networks in general and this example of Thiessen in particular, no change can be made to the “Battery 208” variable that will affect the “Engine Start 234” variable without also effecting a change to both the “Battery Power 212” and “Engine Turns Over 218” variables intervening in between. Considered another way, Fig. 2 is like a spreadsheet with each oval representing a cell in the spreadsheet, and each cell containing a value determined by a formula in including the value in one or more other cells. If one changes the value in a given hypothetical spreadsheet cell, for argument sake the cell at the intersection of row 9 and column 3, all other cells having a formula that directly or indirectly includes the value at row 9, column 3 will automatically modify to reflect that change.

In sum, Thiesson discloses methods of using network relationships to compute the values of the variables in a Bayesian network based on certain input values, and Thiesson's systems specifically relate to mixing of such networks and neither of which have anything to do with the instant disclosure, let alone the invention as claimed.

First and most simply, Thiesson does not disclose navigable hierarchically interconnected nodes. While it is true that Thiesson discloses "nodes" in a general computer science sense, the similarity stops there. There is simply no way to navigate among Thiesson's nodes since Thiessen relates to changes in variables. Moreover, implementing a change to a value in one of Thiesson's nodes will propagate through and affect all other connected nodes (i.e. all nodes that are, directly or indirectly, a function of that variable). There is also no user choice involved in the matter – if a value of a variable is changed, this will necessarily induce a change in every other node that is directly or indirectly a function of the variable.

Indeed, on this point Thiessen is conceptually analogous to a set of independent and dependent claims in a patent application – if an amendment is made to a particular claim, that amendment will necessarily apply to that claim and every other claim that depends from it whether, directly or indirectly. Thus, in a case having 4 claims, each dependent upon the immediately preceding claim, an amendment to claim 1 would also affect the scope of claims 2 through 4. An amendment to claim 3 however, would only affect claims 3 and 4. Hence, the dependency implies a relationship among the claims, but there is no navigation involved.

In contrast, a user navigating the hierarchy of "navigable" nodes in a system implementing Appellant's claimed invention is actually sent down a path from a first node to another node depending on, e.g., their response to queries posed at the first node, and, more importantly, irrespective of whether the two nodes are directly connected. Extending that

concept as best as possible to the above patent application example, and in contrast to Thiessen, this would be analogous to having a 4 claim case having dependencies as above wherein an amendment to claim 1 would only affect claim 4 (i.e. despite claim 4's dependency from claim 3, and claim 3's dependency from claim 2, and claim 2's dependency from claim 1).

Therefore, Thiesson does not disclose, teach or suggest "navigable" nodes nor does it disclose, teach or suggest "jumping" from a first node to another node that is "not directly connected to the first node," as the Final Office Action contends.

When Appellant challenged this position as raised by the Patent Office in the original Office Action, the Final Office Action supported the contention, by specifically pointing to Fig. 10 of Thiesson, stating that going from H_d1 to O_c1 involves "jumping" from one node to another unconnected "node." See Final Office Action at p. 4. However, a cursory examination of Fig. 10 shows that H_d1 and O_c1 are in fact directly connected (notwithstanding the fact that Fig. 10 is still illustrating a cause and effect relationship, and not a navigable hierarchical arrangement of nodes). There is unequivocally no jumping from one node to an unconnected node in Thiesson. For example, there is no ability to directly jump from O_c2 to O_d2, as would be required if Thiesson's system were in any way applicable to Appellants' claimed invention.

In sum, the Final Office Action failed to properly determine the scope and content of Thiesson, or it would have recognized that Thiesson lacked the very teaching the Final Office Action attributed to it. Accordingly, the obviousness rejections based on Thiesson are improper as a matter of law and Patent Office practice, and thus should be reversed and the claims confirmed as patentable.

3. THE PATENT OFFICE HAS FAILED TO ESTABLISH PRIMA FACIE OBVIOUSNESS

An obviousness analysis places the initial burden to make out a *prima facie* case of obviousness on the Patent Office. Specifically, the M.P.E.P. states:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

See M.P.E.P. § 2142 (emphasis added).

To establish a *prima facie* obviousness case, the prior art references, when combined, must teach or suggest all the claim limitations. See M.P.E.P. § 2142 (emphasis added). However, as discussed above, Thiesson does not teach or suggest the limitations attributed to it by the Final Office Action. As a result, no combination of Lin with Thiesson would arrive at or suggest any of the pending claims. Therefore, Final Office Action has failed to establish a *prima facie* obviousness case.

As the Final Office Action recognized, there is no navigation in Lin from one node to another except by a traversal through every intervening node in a path leading from one to the other – the very antithesis of the instant invention. Indeed, the Final Office Action specifically combines Thiesson with Lin, because Thiesson allegedly teaches the claim limitations admittedly lacking from Lin, namely: “not directly connected to the first node but is associated with the at least one keyword, and jumping to at least one node.” See Final Office Action at p. 4. Since Thiesson neither teaches nor suggests the limitations the Final Office

Action attributed to it, then Thiesson does not cure the deficiencies of Lin. Thus, contrary to the Final Office Action's contentions, the Final Office Action has failed to establish a *prima facie* obviousness case, because no combination of Lin with Thiesson would arrive at or suggest Appellant's claimed invention.

Moreover, the 6/04/04 Office Action contends that it would have been obvious to modify Lin by the teachings of Thiesson because "providing the not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node [*sic*] allows the improvement of collaborative filtering systems as taught by Thiesson et al. (col. 7, lines 10–16)." See 6/04/04 Office Action at p. 5. This contention is wrong on two accounts. First, the referenced passage of Thiesson stating that collaborative filtering can be improved *per se* is a far cry from a motivation for or teaching of jumping among non-connected nodes at all, let alone one which could be said to provide sufficient teaching that Lin and Thiesson could be combined in a manner that would achieve the claimed invention, any more than a teaching that gas mileage in cars can be improved suggests any specific modification that would achieve that result. Collaborative filtering has nothing substantive to do with how one navigates from node-to-node in a system pertinent to the instant subject matter – not a navigable system of the prior art, nor a navigable system in which Appellants' invention can be implemented – and it has even less to do with Appellants' invention as claimed.

In sum, it is respectfully submitted that Lin in view of Thiesson can not render the claims obvious. Therefore, the Final Office Action has failed to establish a *prima facie* obviousness case. Accordingly, the obviousness rejections based on Lin in view of Thiesson should be reversed and all the claims confirmed as patentable.

CONCLUSION

Appellant respectfully submits that the above demonstrates that the rejections of the Final Office Action are improper because: (A) the rejections are based on an improper construction of the claims, and (B) the Patent Office's rejections for obviousness are based upon legally and factually flawed analyses, because (1) the alleged obviousness rejections are based on a misinterpretation of Thiesson, and (2) the Final Office Action fails to make a *prima facie* obviousness case, because the combination of Thiesson with Lin does not render the claimed invention obvious.

Appellant respectfully request that the Board order that the final rejection of the pending claims be withdrawn, Appellant's claimed invention be confirmed as patentable, and that the pending claims be allowed.

Respectfully submitted,

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Dated: May 31, 2005

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VIII. CLAIMS APPENDIX

1. (original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:
at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,
identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and
jumping to the at least one node.
2. (original) The method of claim 1 further comprising:
providing a verbal description associated with the at least one node to the user.
3. (original) The method of claim 1 further comprising:
searching a thesaurus correlating keywords with synonyms.
4. (original) The method of claim 3 wherein the searching further comprises:
identifying the at least one word as synonymous with the at least one keyword.
5. (original) The method of claim 1 further comprising:
determining that the at least one word is neither a keyword nor a synonym of any
keyword; and
learning a meaning for the word so that the word will be treated as a learned synonym for
at least one particular keyword of the multiple keywords.

6. (original) The method of claim 5 further comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

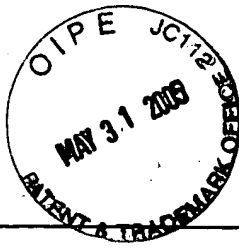
Claims 8 through 26 (Cancelled).

IX. EVIDENCE APPENDIX

<u>TAB</u>	<u>ITEM</u>	<u>RECORDED/FILED</u>
A.	Copy of Assignment Recordation from Inventors to SEMIOSIS, L.L.C.	May 27, 2003
B.	Copy of Request for Recordation of Assignment from SEMIOSIS, L.L.C. to SEMIOSIS, INC.	December 10, 2004



UNITED STATES
PATENT AND
TRADEMARK OFFICE



NOVEMBER 04, 2003

Chief Financial Officer and Chief Administrative Officer
Washington, DC 20231
www.uspto.gov

PTAS

MORGAN & FINNEGAN, L.L.P.
RICHARD STRAUSSMAN
345 PARK AVENUE
NEW YORK, NY 10154



102459850A

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 05/27/2003

REEL/FRAME: 014100/0747
NUMBER OF PAGES: 7

BRIEF: CORRECTIVE TO CORRECT THE FIRST ASSIGNOR'S NAME PREVIOUSLY RECORDED AT REEL 013511 FRAME 0923. (ASSIGNMENT OF ASSIGNOR'S INTEREST)

ASSIGNOR:
PARIKH, PRASHANT

DOC DATE: 11/18/2002

ASSIGNOR:
PETERS, STANLEY

DOC DATE: 11/13/2002

ASSIGNEE:
SEMIOSIS L.L.C.
254 EAST 68TH STREET
NEW YORK, NEW YORK 10021

SERIAL NUMBER: 10299359
PATENT NUMBER:

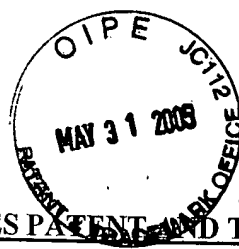
FILING DATE: 11/19/2002
ISSUE DATE:

REVIEWED BY AUDIT DEPT.

DATE 11/12 - BY *[Signature]*

RECEIVED
AUDIT DEPT.
NOV 10 A
MORGAN & FINNEGAN

IPR2019-01304



Docket No.: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters
Serial No.: 10/299,359 **Group Art Unit:** 2165
Filed: November 19, 2002 **Examiner:** Yicun Wu
For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Mail Stop Assignment
Recordation Services
U.S. Patent and Trademark Office
Office of Public Records
Crystal Gateway 4, Room 335
P.O Box 1450
Alexandria, VA 22313-1450

Express Mail Label No.: EV455192345US

Date of Deposit: December 10, 2004

I hereby certify that the following attached paper(s) and/or fee

- 1. Recordation Form Cover Sheet (2 pages);
- 2. Assignment (2 pages);
- 3. Check in the amount of \$40.00; and
- 4. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Mail Stop Assignment, Recordation Services, U.S. Patent and Trademark Office, Office of Public Records, Crystal Gateway 4, Room 335, P.O Box 1450, Alexandria, VA 22313-1450.

Albert Isles

(Typed or printed name of person mailing paper(s) and/or fee)

(Signature of person mailing paper(s) and/or fee)

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



PATENT

Docket No.: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters
Serial No.: 10/299,359 **Group Art Unit:** 2165
Filed: November 19, 2002 **Examiner:** Yicun Wu
For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

RECORDATION FORM COVER SHEET PURSUANT TO 37 C.F.R. § 3.31

MAIL STOP ASSIGNMENT RECORDATION SERVICES
U.S. Patent and Trademark Office
Office of Public Records
Crystal Gateway 4, Room 335
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Please record the attached original documents or copy thereof.

1. Name of conveying party/parties:

Name SEMIOSIS L.L.C.

Internal Address: _____

Street Address: 254 East 68th Street

City New York New York Zip 10021 Country USA

2. Name and address of receiving party/parties:

Name SEMIOSIS, INC.

Internal Address: _____

Street Address: 254 East 68th Street

City New York New York Zip 10021 Country USA

[] Additional names and addresses attached.

PATENT

Docket No.: **4754-4000**

3. Name of conveyance: Assignment Merger Security Agreement
 Change of Name Other _____

Execution Date: **December 1, 2004**

4. Application Number(s) or Patent Number(s):
 This document is being filed together with a new application which was executed on _____
 Patent Application No.(s) **10/299,359**
 Patent No.(s) _____

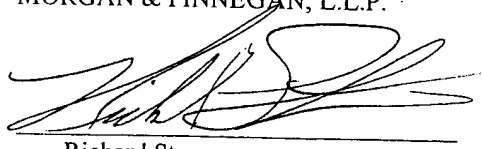
5. Address all future communications to:

**MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, New York 10281-2101**

6. Total number of applications and patents involved: 1.
7. Total fee (37 CFR §3.41): \$40.00 property x 1 property(ies) = \$40.00.
 A check in the amount of \$ 40.00 to cover the recordation fee is enclosed.
 Charge fee to Deposit Account No. 13-4500. Order No. ____
 The Commissioner is hereby authorized to charge any additional fees which may be required for this recordation, or credit any overpayment to Deposit Account No. 13-4500. Order No. **4754-4000**.
8. To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.



By: _____
Richard Straussman
Registration No. 39,847

Dated: December 10, 2004

CORRESPONDENCE ADDRESS:

Total number of pages including the recordation cover sheet **4**

MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, New York 10281-2101
(212) 415-8700
(212) 415-8701 Facsimile

ASSIGNMENT OF APPLICATIONS FOR PATENT

WHEREAS SEMIOSIS L.L.C. (hereinafter referred to as ASSIGNOR), having an office at 254 East 68th Street, New York, New York 10021, U.S.A. is the owner of the entire interest, by right of assignment, of all discoveries and inventions described in all applications for Letters Patents (or similar legal protection to be obtained therefore) and identified in TABLE 1 below, in the United States, its territorial possessions, and all foreign countries, and to any and all legal protection to be obtained therefor:

Serial No.	Filing Date	Title
10/299,359	Nov. 19, 2002	Navigation In A Hierarchical Structured Transaction Processing System
10/799,429	March 11, 2004	Navigation In A Hierarchical Structured Transaction Processing System
10/799,506	March 11, 2004	Navigation In A Hierarchical Structured Transaction Processing System
PCT/US03/34134	Oct. 27, 2003	Navigation In A Hierarchical Structured Transaction Processing System

TABLE 1

and **WHEREAS** SEMIOSIS, INC., (hereinafter referred to as ASSIGNEE), a corporation organized under the laws of the State of New York having an office at 254 East 68th Street, New York, New York 10021, U.S.A. is desirous of acquiring all of ASSIGNOR'S interest and rights to and under said discoveries and inventions and in, to and under applications for Letters Patents, Letters Patents, or similar legal protection to be obtained therefor in the United States and in any and all foreign countries.

NOW, THEREFORE, TO ALL WHOM IT MAY CONCERN, WITH EFFECT FROM THE DATE OF EXECUTION HEREOF:

Be it known that, for good and valuable consideration provided by ASSIGNEE to ASSIGNOR, the receipt of which is hereby acknowledged, ASSIGNOR hereby sells, assigns and transfers to ASSIGNEE, its successors, legal representatives and assigns, the full and exclusive right, title and interest to all said discoveries or inventions in the United States and its territorial possessions and in all foreign countries and to all Letters Patent or similar legal protection in the United States and its territorial possessions and in any and all foreign countries to be obtained for said invention by said application or any continuation, division, renewal, substitute or reissue thereof or any legal equivalent thereof in a foreign country for the full term or terms for which the same may be granted.

SAID ASSIGNOR hereby authorizes and requests the Commissioner for Patents of the United States of America and any Official of any country or countries foreign to the United States of America whose duty it is to issue Letters Patent on applications as aforesaid, to issue all such Letters Patent for said discovery or invention to the ASSIGNEE, as assignee of the entire right, title and interest in, to and under the same in accordance with the terms of this instrument.

SAID, ASSIGNOR, hereby covenants that it has full right to convey the entire right, title and interest herein sold, assigned, transferred and set over;

AND SAID ASSIGNOR hereby further covenants and agrees that the ASSIGNEE, its successors, legal representatives, or assigns, may apply for foreign Letters Patent on said discovery or invention and claim the benefits of the International Convention, and that it will, at any time, when called upon to do so by the ASSIGNEE, its successors, legal representatives, or assigns, communicate to the ASSIGNEE, its successors, legal representatives, or assigns, as the case may be, provide any facts known respecting said discovery or invention, and execute and deliver any and all lawful papers that may be necessary or desirable to perfect the title to the said discovery or invention, the said applications and the said Letters Patent in the ASSIGNEE, its successors, legal representatives and assigns, and that if reissues of the said Letters Patent or disclaimers relating thereto, or divisions, continuations, or refilings of the said applications, or any thereof, shall hereafter be desired by the ASSIGNEE, its successors, legal representatives, or assigns, it will, when called up to do so by the ASSIGNEE, its successors, legal representatives, or assigns, sign all lawful papers, make all rightful oaths, execute and deliver all such disclaimers and all divisional, continuation and reissue applications so desired, and do all lawful acts requisite for the application for such reissues and the procuring thereof and for the filing of such disclaimers and such applications, and generally do everything possible to aid the ASSIGNEE, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for said invention or discover in all countries, and without further compensation but at the expense of the ASSIGNEE, its successors, legal representatives and assigns.

For: SEMIOSIS L.L.C.

For: SEMIOSIS, INC.

By: Prashant Parikh
Its: President

By: Prashant Parikh
Its: President

Dated: 12/1/04

Dated: 12/1/04

STATE OF NEW YORK)
) ss.
COUNTY OF NEW YORK)

On the 1st day of December, in the year 2004, before me, the undersigned, a Notary Public in and for said State, personally appeared **Prashant Parikh**, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose (name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

James A. Goldstein
Notary Public
JAMES A. GOLDSTEIN
Notary Public, State of New York
No. 31-1493595
Qualified in New York County
Commission Expires April 30, 2007



06-2-05

ZAW
AFP

Docket No. 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh *et al.* Confirmation No. 5023
 Serial No.: 10/299,359 Group Art Unit: 2175
 Filed: November 19, 2002 Examiner: Wu, Yicun
 For: NAVIGATION IN A HIERARCHICAL STRUCTURED
 TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Mail Stop APPEAL BRIEF-Patents
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

Express Mail Label No.: **EV623606109US**

Date of Deposit: **May 31, 2005**

I hereby certify that the following attached paper(s) and/or fee

1. Appeal Brief Transmittal (1 page in duplicate);
2. Appeal Brief Pursuant To 37 C.F.R. §41.37 (27 pages) including Exhibits A and B;
3. Petition And Fee For Extension Of Time (2 pages);
4. Check in the amount of \$250.00; and
5. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Mail Stop APPEAL BRIEF-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Albert Isles

(Typed or printed name of person mailing papers(s) and/or fee)

(Signature of person mailing paper(s) and/or fee)

Address:

MORGAN & FINNEGAN, L.L.P
 Three World Financial Center
 New York, New York 10281-2101
 (212) 415-8700 Phone
 (212) 415-8701 Facsimile



Docket No. 4754-4000

Serial No. 10/299,359

Docket No. 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh *et al.* Confirmation No. 5023
Serial No.: 10/299,359 Group Art Unit: 2175
Filed: November 19, 2002 Examiner: Wu, Yicun
For: NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

APPEAL BRIEF/REPLY BRIEF/SUPPLEMENTAL BRIEF TRANSMITTAL

Mail Stop APPEAL BRIEF-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

- Transmitted herewith in triplicate is the Appeal Brief for Appellant(s) which is due on May 29, 2005. The Notice of Appeal was filed on March 29, 2005.
- Transmitted herewith in triplicate is the Reply Brief for Appellant(s) which is due on _____. The Examiner's Answer was mailed on _____.
- Transmitted herewith in triplicate is a Supplemental Brief for Appellant(s) which is due on _____ in response to the Office Action reopening prosecution on _____. Appellant(s) hereby request that the appeal of the above-identified application be reinstated.
- A Petition and Fee for Extension of Time to extend the term for filing the Appeal Brief Reply Brief Supplemental Brief is enclosed.

The item(s) checked below are appropriate:

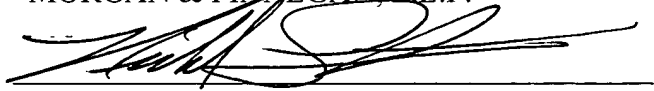
- Appeal Fee (Large Entity) - \$500.00
- Appeal Fee Under 37 CFR §1.9(f) (Small Entity) - \$250.00
- Fee enclosed (Check for \$250.00)
- Fee not required (Fee paid in prior appeal)
- Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4754-4000. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: May 31, 2005

By:



Richard Straussman
Registration No. 39,847

Correspondence Address:
MORGAN & FINNEGAN, L.L.P.
3 World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



Docket No. 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters

Group Art Unit: 2165

Serial No.: 10/299,359

Examiner: Yicun Wu

Filed: November 10, 2002

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

PETITION AND FEE FOR EXTENSION OF TIME (37 C.F.R. § 1.136(a))

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. **This is a petition for an extension of time for filing an Appeal Brief pursuant to 37 C.F.R. §41.37.**
2. The communication in connection with the matter for which this extension is requested
 - is filed herewith.**
 - has been filed on _____.
3. **Applicant(s) is/are entitled to Small Entity Status.**
 - Statement has already been filed

4.	<u>Total Months Requested</u>	<u>Fee for Other than Small Entity</u>	<u>Fee for Small Entity</u>
a.	<input checked="" type="checkbox"/> one month	\$120.00	\$60.00
b.	<input type="checkbox"/> two months	\$450.00	\$225.00
c.	<input type="checkbox"/> three months	\$1,020.00	\$510.00
d.	<input type="checkbox"/> four months	\$1,590.00	\$795.00
e.	<input type="checkbox"/> five months	\$2,160.00	\$1,080.00
f.	<input type="checkbox"/> An extension for _____ months has already been secured for filing the above-identified communication and the fee paid therefor of \$_____ is deducted from the total fee due for the total months of extension now requested. The fee for this extension (\$ _____), minus the fee previously paid (\$_____) equals \$_____ (total fee due).		

06/03/2005 MAHMED1 00000044 134500 10299359

Express Mail Certificate Label No. EV623606109US


02 FC:2251 9088080J00 DA

5. A check in the amount of \$ _____ to cover the extension fee is attached.
6. **Charge fee to Deposit Account No. 13-4500, Order No. 4754-4000.
A DUPLICATE COPY OF THIS SHEET IS ATTACHED.**
7. **The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500. Order No. 4754-4000. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.**

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: May 31, 2005

By: _____


Richard Straussman
Registration No. 39,847

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
3 World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters

Group Art Unit: 2165

Serial No.: 10/299,359

Examiner: Yicun Wu

Filed: November 10, 2002

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

**NOTICE OF APPEAL TO THE BOARD
OF PATENT APPEALS AND INTERFERENCES**

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant(s) hereby appeal(s) to the Board of Patent Appeals and Interferences from the decision(s) dated March 7, 2005 of the Primary Examiner. The item(s) checked below are appropriate:

- Fee not required (Fee paid in prior appeal)
- Appeal Fee Large Entity (\$500.00)
- Small Entity Appeal Fee (\$250.00)**
- A check in the amount of \$250.00 to cover the appeal fee is enclosed.**
- Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4754-4000. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.**

04/01/2005 HAHMED1 00000039 10299359

01 FC:2401

250.00 OP

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: March 29, 2005

By:

Richard Straussman
Registration No. 39,847

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
3 World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile



03/31/05

AF \$1
JW

Docket No.: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters

Serial No.: 10/299,359 **Group Art Unit:** 2165

Filed: November 19, 2002 **Examiner:** Yicun Wu

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Mail Stop AF
 Commissioner For Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

Express Mail Label No.: EV455194151US

Date of Deposit: March 29, 2005

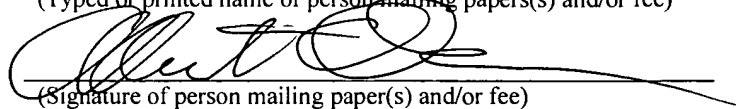
I hereby certify that the following attached paper(s) and/or fee

1. Notice Of Appeal To The Board Of Patent Appeals and Interferences (1 page);
2. Petition And Fee For Extension Of Time (2 pages);
3. Checks in the amounts of \$250.00 and \$60.00; and
4. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Mail Stop AF, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Albert Isles

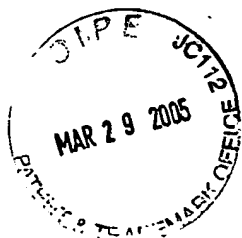
(Typed or printed name of person mailing papers(s) and/or fee)



(Signature of person mailing paper(s) and/or fee)

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
 Three World Financial Center
 New York, NY 10281-2101
 (212) 415-8700 Telephone
 (212) 415-8701 Facsimile



Docket No. 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters

Group Art Unit: 2165

Serial No.: 10/299,359

Examiner: Yicun Wu

Filed: November 10, 2002

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

PETITION AND FEE FOR EXTENSION OF TIME (37 C.F.R. § 1.136(a))

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. **This is a petition for an extension of time for filing a Notice of Appeal in response to the Advisory Action dated March 7, 2005.**

2. The communication in connection with the matter for which this extension is requested

- is filed herewith.**
- has been filed on _____.

3. **Applicant(s) is/are entitled to Small Entity Status.**

Statement has already been filed

4.	<u>Total Months Requested</u>	<u>Fee for Other than Small Entity</u>	<u>Fee for Small Entity</u>
a.	<input checked="" type="checkbox"/> one month	\$120.00	\$60.00
b.	<input type="checkbox"/> two months	\$450.00	\$225.00
c.	<input type="checkbox"/> three months	\$1,020.00	\$510.00
d.	<input type="checkbox"/> four months	\$1,590.00	\$795.00
e.	<input type="checkbox"/> five months	\$2,160.00	\$1,080.00

04/01/2005 MAHMED1 00000039 10299359

02 FC:2251


60.00 0P

5. A check in the amount of \$60.00 to cover the extension fee is attached.
6. Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
7. The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500. Order No. 4754-4000. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: March 29, 2005

By: _____


Richard Straussman
Registration No. 39,847

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
3 World Financial Center
New York, NY 10281-2101
(212) 415-8700 Telephone
(212) 415-8701 Facsimile

Am



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023
27123	7590	03/07/2005	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			WU, YICUN	
			ART UNIT	PAPER NUMBER
			2165	

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Advisory Action
Before the Filing of an Appeal Brief**

Application No. 10/299,359	Applicant(s) PARIKH ET AL.	
Examiner Yicun Wu	Art Unit 2165	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 27 January 2005 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. The reply was filed after a final rejection, but prior to filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
- a) The period for reply expires _____ months from the mailing date of the final rejection.
- b) The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
- Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. The reply was filed after the date of filing a Notice of Appeal, but prior to the date of filing an appeal brief. The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- (a) They raise new issues that would require further consideration and/or search (see NOTE below);
- (b) They raise the issue of new matter (see NOTE below);
- (c) They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
- (d) They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. Applicant's reply has overcome the following rejection(s): _____.
6. Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. For purposes of appeal, the proposed amendment(s): a) will not be entered, or b) will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
- The status of the claim(s) is (or will be) as follows:
- Claim(s) allowed: none.
- Claim(s) objected to: _____.
- Claim(s) rejected: 1-7.
- Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: the claimed limitations of the finally rejected claims are still met by prior art of record (Lin et al. (U.S. Patent 6,675,159) in combination with Thiesson et al. (U.S. Patent 6,408,290)).
12. Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). _____
13. Other: _____.


CHARLES RONÉS
PRIMARY EXAMINER



DO not enter you 2/3/05

Docket No: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Prashant Parikh and Stanley Peters
Serial No. : 10/299,359 Group Art Unit: 2175
Filed : November 19, 2002 Examiner: Wu, Yicun
For : NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

Mail Stop AF
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO FINAL OFFICE ACTION

Responsive to the Final Official Action mailed December 3, 2004, Applicants respectfully request reconsideration in view of the following remarks. This "Response to Office Action" is being filed within 2 months of the date the Final Office Action was mailed.

The currently pending claims are reflected in the listing of claims which begins on page 2 of this paper. None of the claims have been amended.

Remarks/Arguments begin on page 4 of this paper.

01-28-05

AF
Wu



Docket No.: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters
Serial No.: 10/299,359 Group Art Unit: 2165
Filed: November 19, 2002 Examiner: Yicun Wu
For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Mail Stop AF
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Express Mail Label No.: EV455192592US

Date of Deposit: January 27, 2005

I hereby certify that the following attached paper(s) and/or fee

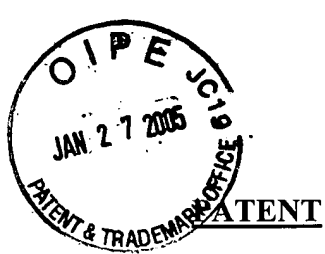
- 1. Response To Final Office Action (12 pages); and
- 2. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Mail Stop AF, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Jafet Cotto
(Typed or printed name of person mailing papers(s) and/or fee)

(Signature of person mailing paper(s) and/or fee)

Correspondence Address:
MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
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(212) 415-8700 Telephone
(212) 415-8701 Facsimile



Docket No: 4754-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Prashant Parikh and Stanley Peters
Serial No. : 10/299,359 Group Art Unit: 2175
Filed : November 19, 2002 Examiner: Wu, Yicun
For : NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

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P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO FINAL OFFICE ACTION

Responsive to the Final Official Action mailed December 3, 2004, Applicants respectfully request reconsideration in view of the following remarks. This "Response to Office Action" is being filed within 2 months of the date the Final Office Action was mailed.

The currently pending claims are reflected in the listing of claims which begins on page 2 of this paper. None of the claims have been amended.

Remarks/Arguments begin on page 4 of this paper.

LISTING OF CLAIMS

1. (original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,

identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and

jumping to the at least one node.

2. (original) The method of claim 1 further comprising:

providing a verbal description associated with the at least one node to the user.

3. (original) The method of claim 1 further comprising:

searching a thesaurus correlating keywords with synonyms.

4. (original) The method of claim 3 wherein the searching further comprises:

identifying the at least one word as synonymous with the at least one keyword.

5. (original) The method of claim 1 further comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword; and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. (original) The method of claim 5 further comprising:
adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

Claims 8-26 (canceled).

REMARKS

This responds to the Final Office Action mailed December 3, 2004. Claims 1-7 are currently pending. The objection to the claims because of certain informalities has been maintained. Claims 1-7 have been rejected as unpatentable, under 35 U.S.C. §103(a), over Lin et al. U.S. Pat. No. 6,676,159 in view of Thiesson et al. U.S. Patent No. 6,408,290. Applicants again respectfully traverse on the grounds that neither Lin et al. nor Thiesson et al. bear any meaningful relation to the invention claimed (or described) in the instant application.

Accordingly, reconsideration of the objections and rejections is respectfully urged in view of the following which adds to the remarks provided in response to the prior Office Action which, in the interest of brevity, are incorporated herein by reference as if fully set forth herein.

Specification Objections

The withdrawal of the objection to the Specification is gratefully acknowledged.

Claim Objections

The clarification provided by the instant Final Office Action as to the alleged problem with claims 2 through 6, namely that the term “jumping” used in those claims “is not clearly defined in Applicant’s [sic] specification.” For completeness, it is noted that the term “jumping” appears in all 7 claims, not just claims 2 through 6. The objection is respectfully traversed for the following reasons.

Applicants have defined the term “jumping”, both explicitly and by implication, in the Specification to mean a traversal from one node or vertex to another node or vertex not directly connected to it, without traversal through intervening nodes or vertices. In simplest form, the term is defined in connection with the description of FIG. 2 and in the following paragraph:

By making use of these associations the “tree” can be negotiated by allowing presentation of relevant verbal descriptions for the nodes associated with a term, irrespective of where in the hierarchy they are, thereby causing a “jump” to a particular node without necessarily traversing the tree in the rigid hierarchical manner. (Application at paragraph spanning p. 8-9).

The following representative, non-exhaustive examples from the Specification further illustrate and/or support the above definition (indicated for the Examiner’s convenience by way of underlining).

FIG. 2 is an example portion of a graph used to illustrate jumping among nodes in accordance with one variant of the invention; (Application at p.3, 2nd to last ¶).

Particular implementations make it possible to jump laterally from one vertex to another if the navigation enters a wrong branch of the tree or if the user changes his goal. The approach is accomplished through associating each vertex with a verbal description (or prompt), and matching words in users' requests and responses with these verbal descriptions to enable the selection of vertices that may not be directly connected to the user’s current location in the graph or tree by an edge. (Application at p. 5, last ¶).

Example 1 illustrates, in simplified form, how an index is used to jump among nodes with reference to FIG. 2. (Application at p. 9-11, “Example 1”).

Having illustrated a simple “node jump” a more complex (and likely) scenario can be shown. (Application at p. 11, “Example 2”).

Example 4 illustrates the addition of a simple thesaurus as an aspect of a system so that a synonym of a keyword may also be used by the system to jump to the desired nodes in the graph. Example 4 is discussed with reference to a portion 400 of an interactive television program listing system as shown in FIG. 4. (Application at p. 14-16, “Example 4”).

As a result, a subsequent use of the same term “fast food” will enable the system to jump directly to the “pizza” node 504. (Application at p. 18, “Example 5” spanning pp. 16-18).

This is advantageously made possible because of the system’s ability to “jump” among nodes. Thus, it may occur that a node within the tree is never accessed, but a child node of that node is. (Application at p. 23).

Having now described various component aspects of different variants implementing the invention, by way of the above examples, it should be understood that the “jumps” can occur from any node to any node, i.e. vertically and/or laterally and to another node that is higher, lower or on the same “level” as the node from which the jump is made. All manner of vertical and lateral jumps from multiple nodes to multiple nodes are possible. (Application at p. 24).

While it is true that some more advanced interactive voice response systems available today allow for natural language interactions, they are highly constrained natural language interactions with relatively little or no intervention by a human operator. However, unlike with systems using the invention, those systems still require direct path traversal through the hierarchy (i.e. jumping to non-connected nodes is not contemplated or possible, let alone allowed). (Application at paragraph spanning pp. 26-27).

Accordingly, it is respectfully submitted that the term “jumping” is clearly defined in the Specification and the objection should be withdrawn.

Claim Rejections – 35 USC § 103

Claims 1-7 were rejected as being unpatentable for obviousness over Lin et al. U.S. Pat. No. 6,676,159 (“Lin”) in view of Thiesson et al. U.S. Patent No. 6,408,290 (“Thiesson”). The rejections are again respectfully traversed for the following additional reasons.

First, it is reiterated that neither the Lin nor Thiesson references render any of the claims obvious, taken alone or in combination because neither of those references bear a meaningful relationship to the instant claims.

As best understood from the rejections, it appears that the Office Action is either misunderstanding the invention (presumed from the “jumping”-related objection) or misinterpreting the cited references (presumed from the fact that Bayesian causal networks have absolutely no relationship whatsoever to the claimed invention).

With respect to the invention of claims 1 and 7, the following explanation should suffice. If one looks at the simplified hierarchical network application FIG. 1 (which is generic to the

various specific applications described in the application where such a network could be used), according to the prior art, if one were to navigate through the graph, one would always start at the box labeled “1”. To get to the box labeled “5”, one would have to navigate from box “1” to box “2” to box “5”. If it turned out that the user’s intended goal really should have placed them at box “7”, they would have to back-navigate from box “5” to box “2” to box “1” then to box “3” and finally to box “7”. In contrast, with the same example, if the user had navigated to box “5” but the intended goal would have placed them at box “7”, through use of the invention of claim 1 or claim 7, the “at least one keyword” (claim 1) or the “meaningful term” (claim 7) makes it possible for the system to know, in response to the user’s input, that the intended goal would place the user at box “7” and it would cause a direct jump from box “5” to box “7” without traversal through a path containing any of the boxes in between even though there is no direct connection between box “5” and box “7”!

More concretely, assume FIG. 1 represented an Interactive Voice Response (IVR) travel reservation system where the boxes labeled “2”, “4” and “5” represent aspects involved with booking a domestic reservation and the boxes under the box labeled “3” represent aspects involved with booking an international flight. A customer wishing to book a flight to “San Jose” in Costa Rica could conceivably unintentionally navigate down through the nodes associated with a domestic booking by saying “San Jose” at an early point only to realize that fact when California hotels are mentioned. At that point, with the conventional systems of the prior art, the person would have to back-traverse through the options and try to navigate down through the international options by first mentioning “Costa Rica” at the starting point. In contrast, with the methods of claim 1 or claim 7, the person might simply say, “not California, I want San Jose, Costa Rica” at which point, the system would directly “jump” the person to the node under the

box labeled “3” associated with booking travel in Costa Rica without forcing the person to back-navigate through the options or restart.

With respect to the cited art, it appears that the Office Action is viewing the Thiesson and Lin references as disclosing hierarchically interconnected “navigable” nodes. While it is true that both Thiesson and Lin disclose “nodes” in a general computer science sense, as to both references the similarity stops there. Moreover, Applicants’ do not claim a hierarchical network per se, such networks per se well predate the instant invention, but rather a particular method for navigation within such a network. With respect to Thiesson, it discloses various Bayesian networks. In Thiesson, those networks are simply a way to represent cause and effect interrelationships among various variables. This is most clearly evident with reference to FIG. 2 of Thiesson which relates to “troubleshooting automobile problems.” (col. 2, lines 38-39). In that figure, each oval can be considered a “node” but each such “node” represents a variable that may be affected by or can effect a change in another “node.” For example, as shown, the variable represented by the oval labeled “Battery Power 212” is a function of the variable labeled “Battery 208” which is, in turn, a function of the variable labeled “Battery Age 202”. “Battery Power 212” is also a function of the variable labeled “Charge 210” which is, in turn, a function of two variables – “Alternator 204” and “Fan Belt 206”. Similarly, the variable “Battery Power 212” has a direct effect upon the variables represented by “Radio 214”, “Lights 216”, “Engine Turns Over 218”, and “Gas Gauge 222” and an indirect effect upon the “Engine Start 234” variable via the “Engine Turns Over 218” variable. In that regard, the “nodes” are not “navigable” at all, let alone as that term is used in the claims (i.e. travelable). Moreover, there is simply no jumping from any node to any other node because the nodes are simply interrelated variables.

Taken another way, the arrangement of Thiessen FIG. 2, is like a spreadsheet with each “node” (e.g. oval) representing a cell in the spreadsheet and each cell containing a formula representing the effect other cells have on its value. If one changes the value in a given spreadsheet cell, for argument sake the cell at the intersection of row 9 and column 3, all other cells having a formula that includes the value at row 9, column 3 will automatically modify to reflect that change. There is no navigation among the cells.

The other arrangements of Thiesson, illustrated for example in FIGS. 10, 11, 25, 27 and 29 are of similar character in that they all “causal” networks which represent some cause and effect relationship among variables. In short, every “network” of Thiesson is simply an abstract representation of a given system and interrelationships among its various components.

Thus, Thiesson has absolutely nothing to do with the claimed invention.

Moreover, even assuming that the arrangements of Thiesson did represent “a system having multiple navigable nodes interconnected in a hierarchical arrangement” as called for by the claims, (a point that is emphatically disputed) there is simply no way to navigate through that arrangement according to the claimed method. With reference to FIG. 2 of Thiesson, there is simply no change that can be made to the “Battery 208” variable that will have any affect on a non-connected variable (e.g. the only conceivable analog to a “jump”), for example, the “Gas 224” variable. Moreover, in Thiesson, no change can be made to the “Battery 208” variable that will affect the “Engine Start 234” variable without effecting a change to both the “Battery Power 212” and “Engine Turns Over 218” variables intervening in between. Yet, that is the very situation called for by the instant claims.

Still further, the “nodes” in certain of the “networks” in Thiesson (e.g. particularly those of FIGS. 10, 11 cited in the previous Office Action) are all directly connected. In such a case, by

definition, there is no instance where a node “is not directly connected to” another node. Thus, those networks are the antithesis of the kind of network needed for the claimed invention.

With that backdrop, the arguments made with respect to Thiesson in response to the prior Office Action are reiterated and re-emphasized without repetition, as if fully set forth herein, in the interest of brevity.

As the original Office Action and instant Final Office Action recognized, even to the extent Lin discloses “a system having multiple navigable nodes interconnected in a hierarchical arrangement” (a point disputed, but irrelevant to the argument), with the Lin reference there is no navigation from one node to another except by a traversal through every node in a path in the hierarchy leading from one to the other – the very antithesis of the instant invention. In addition, the arguments made with respect to the inapplicability of Lin, made in Applicants’ prior response, are still valid and thus are reiterated and incorporated herein by reference, for brevity, as if fully set forth herein.

In sum, it is respectfully submitted that Thiesson does not, and can not supply the disclosure attributed to it in the Final Office Action. Absent that disclosure, acknowledged by the Office Action to be missing from Lin, the obviousness rejection of the Final Office Action fails as a matter of law and the obviousness rejection should be withdrawn because neither reference alone discloses, nor in combination would achieve, the claimed invention.

For completeness, in the event an appeal is necessary, it is respectfully submitted that the Office Action does not even make a *prima facie* case of obviousness due to the absence of certain specific claim elements as set forth below. Moreover, it is respectfully urged that, to the extent the Office Action, is applying any definition of “jumping” other than that set forth in the application itself, such alternative definition be discarded because its use is improper as a matter

of law and Patent Office practice. See M.P.E.P. §2111.01(III) (“Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim.” (emphasis added) citing Toro C. v. White Consolidated Indus. Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999)).

As to claim 1, in view of the above, the cited art does not disclose “A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement” because, as described above, the “nodes” in those references are simply representative of cause and effect relationships – i.e. there are no navigable nodes. Nor does the cited art disclose “identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword” or the recited “jumping to the at least one node” as recited therein. Each such element, being wholly absent from the cited references taken alone or in combination, represents a separate, independent and distinct basis for the patentability of claim 1.

Claims 2 through 6, being dependent from claim 1 (either directly or indirectly) are allowable for the same reasons. Moreover, in view of the elements of claim 1 that are absent from the prior art, to the extent claims 2 through 6 further involve, refine or interact with those elements, claims 2 through 6 necessarily add aspects that are nonobvious over the cited art and thus provide independent bases for allowance.

Claim 7 is similarly allowable because the cited art does not disclose “A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices” for the same reasons described in connection with claim 1 nor does it disclose either “selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between

PATENT

Docket No: 4754-4000

the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex” or “jumping to the vertex.”

Accordingly, it is respectfully submitted that all of the claims are allowable and early favorable action in that regard is respectfully requested.

CONCLUSION

Based on the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims and early favorable allowance of this application.

AUTHORIZATION

Although no additional fees are believed due for consideration of this Response on the merits, the Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. 13-4500, Order No. 4754-4000.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.



Richard Straussman
Registration No. 39,847

Dated: January 27, 2005

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PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

10/299,359
~~4223-11001~~

CLAIMS AS FILED - PART I

SMALL ENTITY TYPE

OR OTHER THAN SMALL ENTITY

	(Column 1)	(Column 2)
TOTAL CLAIMS	26	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	26 minus 20 = *	6
INDEPENDENT CLAIMS	6 minus 3 = *	3
MULTIPLE DEPENDENT CLAIM PRESENT	<input type="checkbox"/>	

RATE	FEE
BASIC FEE	370.00
X\$ 9=	54
X42=	126
+140=	
TOTAL	550

RATE	FEE
BASIC FEE	740.00
X\$18=	
X84=	
+280=	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

1-2705

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* 7 Minus	** 26	=
Independent	* 2 Minus	*** 6	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	<input type="checkbox"/>		

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* Minus	**	=
Independent	* Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	<input type="checkbox"/>		

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* Minus	**	=
Independent	* Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM	<input type="checkbox"/>		

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

10/299,359
~~4428-11001~~

CLAIMS AS FILED - PART I

SMALL ENTITY TYPE

OR OTHER THAN SMALL ENTITY

	(Column 1)	(Column 2)
TOTAL CLAIMS	26	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	26 minus 20 = *	6
INDEPENDENT CLAIMS	6 minus 3 = *	3
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

RATE	FEE
BASIC FEE	370.00
X\$ 9=	54
X42=	126
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TOTAL	550

RATE	FEE
BASIC FEE	740.00
X\$18=	
X84=	
+280=	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

1-1404

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 26 Minus ** 26	=
	Independent	* 6 Minus *** 6	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

3804

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 7 Minus ** 26	=
	Independent	* 2 Minus *** 6	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

9-304

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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	Independent	* 2 Minus *** 6	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

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X42=	
+140=	
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X\$18=	
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+280=	
TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

APR



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023

27123 7590 12/03/2004
MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101

EXAMINER

WU, YICUN

ART UNIT PAPER NUMBER

2165

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/299,359	Applicant(s) PARIKH ET AL.	
Examiner Yicun Wu	Art Unit 2165	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 03 September 2004.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-7 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-7 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.



**SAM RIMELL
PRIMARY EXAMINER**

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

III. DETAILED ACTION

1. Claims 1-7 are presented for examination.
2. Applicant's arguments submitted on 9-3-2004 with respect to claims 1-7 have been reconsidered but are not deemed persuasive for the reasons set forth below.

Specification objection

3. Examiner is withdrawing the Specification objection.

Claim objection

4. As to applicant remarks page 5, "Claim Objection", Examiner maintains Claim Objection of office action dated 6-4-2004, because the claimed "jumping to the at least one node" and "jumping to the vertex" in particular "jumping" is not clearly defined in Applicant's specification. Therefore, Examiner rejected claim 2-6, using the broadest interpretation of "Jumping", therefore, Examiner's "Claim Objection" is maintained.

Response to Applicant' Remarks

5. Examiner has completed a through study of Applicant's amendment of September 3, 2004.

6. Especially, Applicant's amendments to claims 1-7 and remarks at pages 4-9 of the Amendment of 9-3-2004 has been carefully studied and reviewed.

7. Applicant's amendments to claims 1-7 further direct the claimed invention into a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement.

8. Examiner has carefully and thoroughly studied and reviewed Applicant's amendment of 9-3-2004. Examiner asserts that Lin et al. (U.S. Patent 6,675,159) in combination with Thiesson et al. (U.S. Patent 6,408,290) teaches Applicant's claimed invention of a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement.

In addition, the specially discussed feature of the claimed invention ("the input containing at least one word identifiable with at least one keyword from among multiple keywords,

Art Unit: 2165

identifying at least one node, other than the first node (Lin et al. col. 10, lines 26-40).

And in addition, Thiesson et al. teaches "not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node" (Thiesson et al. Fig. 10, from H_{a1} to O_{c1}).

9. Applicant is inaccurate for the reasons explicitly stated in the first Office Action. Examiner asserts that Lin et al. (U.S. Patent 6,676,159) in combination with Thiesson et al. (U.S. Patent 6,408,290) teaches Applicant's claimed invention of a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement.

10. These reasons have been explicitly stated in the first Office Action. Please see the next section.

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Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Patent 6,675,159) in view of Thiesson et al. (U.S. Patent 6,408,290).

As to Claims 1 and 7, Lin et al. discloses a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system (Lin et al. col. 9, lines 26-45), the input containing at least one word identifiable with at least one keyword from among multiple keywords, identifying at least one node, other than the first node (Lin et al. col. 10, lines 26-40).

Lin et al. does not teach not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

Art Unit: 2165

Thiesson et al. teaches not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node (Thiesson et al. Fig. 10-11).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. wherein not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. by the teaching of Thiesson et al. because providing the not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node allows the improvement of collaborative filtering systems as taught by Thiesson et al. (col. 7, lines 10-16).

As to Claim 2, Lin et al. as modified teaches a method wherein the searching comprising:

providing a verbal description associated with the at least one node to the user (providing a verbal description is well known in the art).

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As to Claim 3, Lin et al. as modified teaches a method wherein the searching comprising:

searching a thesaurus correlating keywords with synonyms (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 4, Lin et al. as modified teaches a method wherein the searching comprising:

identifying the at least one word as synonymous with the at least one keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 5, Lin et al. as modified teaches a method wherein the searching comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15); and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

Art Unit: 2165

As to Claim 6, Lin et al. as modified teaches a method wherein the searching comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

Conclusion

13. THIS ACTION IS MADE FINAL, Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory- period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136 (a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply-expire later than SIX MONTHS from the mailing date of this final action.

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Points of contact

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 571-272-4087. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 571-272-4083. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Yicun Wu
Patent Examiner
Technology Center 2100

November 25, 2004


SAM RIMELL
PRIMARY EXAMINER

Index of Claims



Application No.

10/299,359

Examiner

Yicun Wu

Applicant(s)

PARIKH ET AL.

Art Unit

2165

✓	Rejected
≡	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

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SEARCH

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7.3	1 2 3 4 5 6 7 8 9 10 11 12 13 14	2/18/04	bw
update search		11/25/09	yr

SEARCH NOTES

(List databases searched. Attach search strategy inside.)

	Date	Exmr.
Inventory search Double search	2/18/04	bw
WSPID WSPGMB EPO JPC Bmic h Devent Dum IEEE NPL INIA.MOT Search Strategy attached		
Consulted Per Professor	2/18/04	yr
update search	11/25/09	yr

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INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.

SEARCH

Class	Sub.	Date	Exmr.
7.1	1 2 3 4 5 6 7 8 9 10 11 12 13 14	2/18/04	by
update	Search	11/25/04	by

INTERFERENCE SEARCHED

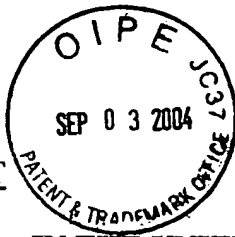
Class	Sub.	Date	Exmr.

SEARCH NOTES

(List databases searched. Attach search strategy inside.)

	Date	Exmr.
Inventory Search Double Entry WSPID WSPGPH EPO JPC BASIC Dznet Acum IEEE NPL INFORM Search Strategy with book	7/18/04	by
Consulted Doc Advisor	2/18/04	by
update search	11/25/04	by

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PATENT

Docket No: 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Prashant Parikh and Stanley Peters
Serial No. : 10/299,359 Group Art Unit: 2175
Filed : November 19, 2002 Examiner: Wu, Yicun
For : NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

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Technology Center 2100

RESPONSE TO OFFICE ACTION

Responsive to the Official Action dated June 4, 2004, Applicants respectfully request reconsideration in view of the following remarks.

The currently pending claims are reflected in the listing of claims which begins on page 2 of this paper. None of the claims have been amended.

Remarks/Arguments begin on page 4 of this paper.

LISTING OF CLAIMS

1. (original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,

identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and

jumping to the at least one node.

2. (original) The method of claim 1 further comprising:

providing a verbal description associated with the at least one node to the user.

3. (original) The method of claim 1 further comprising:

searching a thesaurus correlating keywords with synonyms.

4. (original) The method of claim 3 wherein the searching further comprises:

identifying the at least one word as synonymous with the at least one keyword.

5. (original) The method of claim 1 further comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword; and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. (original) The method of claim 5 further comprising:
adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

Claims 8-26 (canceled).

REMARKS

This responds to the Office Action mailed June 4, 2004. Claims 1-7 are currently pending. The specification has been objected to because of certain informalities. Claims 2 and 7 have also been objected to because of informalities. Claims 1-7 have been rejected as unpatentable, under 35 U.S.C. §103(a), over Lin et al. U.S. Pat. No. 6,676,159 in view of Thiesson et al. U.S. Patent No. 6,408,290. Reconsideration of the objections and rejections and allowance of the claims, in view of the following, is respectfully requested.

Specification Objection

The specification has been objected to because of certain informalities. Specifically, the Specification has been objected to because the instant specification allegedly does not conform to the preferred layout for a utility application. The objection is respectfully traversed and applicants decline to revise the application as suggested. First, the instant specification conforms to the guidelines except to the extent that it does not include inapplicable section headings and the section headings are in bold type. As to the inapplicable headings, there is simply no rational reason why applicants should be required to amend the specification to add irrelevant section headings only to follow them with the entry – “None.” As to the use of bold type for the section headings, since patents are neither typeset nor published with bold fonts, the objected to type will be dispensed with upon typesetting by the Patent Office (or contractor) for publication.

Second, the “guidelines” are permissive, not mandatory. Therefore, the specification can not be in violation to something that merely describes what an application “should include” and what headings “should appear” therein.

Accordingly, withdrawal of the objection is respectfully requested.

Claim Objections

Claims 2 and 7 have been objected to because “the Examiner is not clear about the meaning of the claim[s].” As an initial matter, although the Office Action refers to claim 2, the quoted language first appears in claim 1. Accordingly, these Remarks presume that claim 1 was intended. If this presumption is in error and the “objection is maintained”, detailed clarification in the next Office Action is respectfully requested. Moreover, even assuming that the “objection” applied to claim 1, claims 2 through 6 are dependent (directly or ultimately) from claim 1 and necessarily thereby contain the same quoted language. Accordingly, the objection to only the independent claim (if that is what was intended) does not make sense. Moreover, the “objection” is further not understood since the Office Action does not reject the identified claims as indefinite and does not provide any further information regarding what is allegedly “not clear” about the quoted claim language – particularly, since the Office Action has no problem alleging that Thiessen discloses this aspect (although, in fact, it does not). Accordingly, withdrawal of the objection to the claims is requested.

Claim Rejections – 35 USC § 103

Claims 1-7 were rejected as being unpatentable for obviousness over Lin et al. U.S. Pat. No. 6,676,159 (“Lin”) in view of Thiesson et al. U.S. Patent No. 6,408,290 (“Thiesson”). The rejections are respectfully traversed for the following reasons.

First, in overview, neither the Lin nor Thiesson references render any of the claims obvious, taken alone or in combination. Neither of those references bear a meaningful relationship to the instant claims because neither provides for anything more than direct traversal along a path of connected nodes.

The system of Lin is a search and retrieval system which enables a user to retrieve text documents in response to a natural language query. The system works by first converting each document into a predicate structure (i.e. an abstract formal representation based on the parts of speech contained in the sentences in the document – for example, a statement in the document of “The octopus has a heart” would be parsed into “the-determiner octopus-noun have-verb a-determiner heart-noun” which is further converted into “have<octopus, heart>”, a predicate structure). When the system receives an input query, it performs the same kind of conversion on the input query into a predicate structure. Finally, it attempts to match the predicate structure of an input query with the predicate structure created from the documents. If there is an exact match, the document containing the match is retrieved. When an exact match fails, the system attempts to match the query predicate structure with synonymous document predicate structures. For example, the query predicate structure may have two arguments (e.g. judge<investors, agreement>) whereas the document predicate structure in question may have three arguments (e.g. cheer<investors, agreement, lawmakers>) – in which case that predicate structure would be treated as a synonymous structure and receive a lower score. Lin also includes a Bayes classifier which classifies the set of documents and the query into topics (or domains) and then matches topics. This operates on the basis of Bayes’ rule in the theory of probability. Lin does not provide for navigation through a hierarchically arranged system whereby direct traversal through the arrangement can occur among nodes or vertices that are neither directly nor indirectly connected to each other (i.e. one need not traverse up through the hierarchy to a common ancestor but rather can jump directly to that node – even if there is no common ancestor or the only common ancestor is the root).

The system of Thiesson is set in the framework of Bayesian networks, a technique for graphically representing relationships between random variables (from the theory of probability) in directed acyclic graphs and then using network relationships to compute the values of these variables based on certain input values and specifically relates to mixing of such networks. As such, it bears no meaningful relationship to the system of Lin and the Office-Action cited figures, FIGS. 10 and 11, depict relationships among variables in a simple Bayesian Network (FIG. 10) and a “hypothesis-specific Bayesian Network (FIG. 11). Thiessen does not disclose the teaching attributed to it by the Office Action as evidenced by the discussion of those figures at col. 17, lines 40-64. Moreover, even if FIG. 10 and 11 are taken wholly out of context in the manner posited by the Office Action (i.e. that the depiction is of navigable nodes as opposed to the reality of being interrelated variables), such that every circle in the FIGS. represented a node or vertex as claimed, as clearly stated in the discussion at col. 17, every variable is connected to every other variable of a different type. Moreover, continuing with the incorrect assertion of the Office Action, there is no ability to directly jump from, for example, O_{C2} to O_{d2} .

Still further, the referenced passage of Thiessen (col. 7, lines 10-16) stating that collaborative filtering can be improved because of certain limitations is a far cry from a teaching jumping among non-connected nodes at all, let alone providing sufficient teaching that the Lin and Thiessen could be combined in a manner that would achieve the claimed invention.

In sum, neither reference alone discloses, nor in combination would achieve, the claimed invention.

Moreover, it is respectfully submitted that the Office Action does not even make a *prima facie* case of obviousness due to the absence of certain claim elements as set forth below.

As to claim 1, in view of the above, the cited art does not disclose “A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement” nor does it disclose “identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword” or the recited “jumping to the at least one node” as recited therein. Each such element, being wholly absent from the cited references taken alone or in combination, represents a separate, independent and distinct basis for the patentability of claim 1.

Claims 2 through 6, being dependent from claim 1 (either directly or indirectly) are allowable for the same reasons. Moreover, in view of the elements of claim 1 that are absent from the prior art, to the extent claims 2 through 6 further involve, refine or interact with those elements, claims 2 through 6 necessarily add aspects that are nonobvious over the cited art and which provide independent bases for allowance.

Claim 7 is similarly allowable because the cited art does not disclose “A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices” nor does it disclose either “selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex” or “jumping to the vertex.”

Accordingly, it is respectfully submitted that all of the claims are allowable and early favorable action in that regard is respectfully requested.

CONCLUSION

Based on the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims and early favorable allowance of this application.

AUTHORIZATION

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE OF THIS DOCUMENT IS ATTACHED. In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is further requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to the above Deposit Account.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

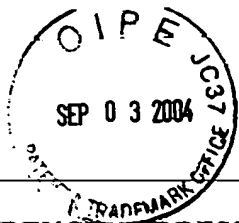
Dated: September 3, 2004

By:



Richard Straussman
Registration No. 39,847

Mailing address:
MORGAN & FINNEGAN, L.L.P.
Three World Financial Center
New York, New York 10281-2101
(212) 415-8700 (Telephone)
(212) 415-8701 (Facsimile)



CHANGE OF CORRESPONDENCE ADDRESS <i>of Application</i> Address to: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	10/299,359
	Filing Date	November 19, 2002
	First Named Inventor	Prashant Parikh
	Group Art Unit	2175
	Examiner Name	Wu, Yicun
	Attorney Docket No.	4428-4001

Please change the Correspondence Address for the above-identified application to:

Customer Number **|27123|**
Type Customer Number here

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 Technology Center 2100

<input checked="" type="checkbox"/> Firm or Individual Name	Richard Straussman Morgan & Finnegan, L.L.P.			
Address	Three World Financial Center			
Address				
City	New York	State	NY	ZIP 10281-2101
Country	USA			
Telephone	(212) 415-8700	FAX	(212) 415-8701	

I am the:

Applicant

Assignee of record of the entire interest.

Certificate under 37 CFR 3.73(b) is enclosed.

Attorney or agent of record.

Typed or Printed Name	Richard Straussman	Registration No.	39,847
Signature			
Date	September 3, 2004		



9-7-04

2175

Docket No.: 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Prashant Parikh and Stanley Peters

Serial No. : 10/299,359 **Group Art Unit:** 2175

Filed : November 19, 2002 **Examiner:** Wu, Yicun

For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

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Date of Deposit: September 3, 2004

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is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

NILBER ALVANZA

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File



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023

7590 06/04/2004
MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, NY 10154-0053

EXAMINER

WU, YICUN

ART UNIT	PAPER NUMBER
2175	6

2175

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Pf4

Office Action Summary	Application No.	Applicant(s)	
	10/299,359	PARIKH ET AL.	
	Examiner	Art Unit	
	Yicun Wu	2175	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 08 March 2004.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-7 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-7 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

DIANE T. MIZRAHI
 PRIMARY EXAMINER
 TECHNOLOGY CENTER 2100

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 5.
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

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III. DETAILED ACTION

1. Claims 1-7 are presented for examination.

Specification

2. The Specification of the disclosure is objected to for the following reasons:

A. Arrangement of the Specification of the disclosure is objected to because of the following informalities:

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
- (e) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.

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- (f) BRIEF SUMMARY OF THE INVENTION.
- (g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (h) DETAILED DESCRIPTION OF THE INVENTION.
- (i) CLAIM OR CLAIMS (commencing on a separate sheet).
- (j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (k) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Appropriate correction is required.

Claim Objections

3. Claim 2 is objected to because of the following informalities: the Examiner is not clear about the meaning of the claim. "...jumping to the at least one node ."

Claim 7 is objected to because of the following informalities: the Examiner is not clear about the meaning of the claim. "... jumping to the vertex."

Appropriate correction is required.

Claim Rejections - 35 USC § 103

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4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Patent 6,676,159) in view of Thiesson et al. (U.S. Patent 6,408,290).

As to Claims 1 and 7, Lin et al. discloses a method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system (Lin et al. col. 9, lines 26-45), the input containing at least one word identifiable with at least one keyword from among multiple keywords, identifying at least one node, other than the first node (Lin et al. col. 10, lines 26-40).

Lin et al. does not teach not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

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Thiesson et al. teaches not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node (Thiesson et al. Fig. 10-11).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. wherein not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Lin et al. by the teaching of Thiesson et al. because providing the not directly connected to the first node but is associated with the at least one keyword, and jumping to the at least one node allows the improvement of collaborative filtering systems as taught by Thiesson et al. (col. 7, lines 10-16).

As to Claim 2, Lin et al. as modified teaches a method wherein the searching comprising:

providing a verbal description associated with the at least one node to the user (providing a verbal description is well known in the art).

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As to Claim 3, Lin et al. as modified teaches a method wherein the searching comprising:

searching a thesaurus correlating keywords with synonyms (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 4, Lin et al. as modified teaches a method wherein the searching comprising:

identifying the at least one word as synonymous with the at least one keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

As to Claim 5, Lin et al. as modified teaches a method wherein the searching comprising:

determining that the at least one word is neither a keyword nor a synonym of any keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15); and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

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As to Claim 6, Lin et al. as modified teaches a method wherein the searching comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword (Lin et al. col. 8, lines 58-67 and col. 26, lines 30-42 col. 27 lines 1-15).

Prior Art Made of Record

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wical (U.S. Patent No. 6,038,560);

Mahesh (U.S. Patent No. 6,654,731);

Roux (U.S. Patent No. 6,678,677).

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Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 703-305-4889. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Yicun Wu
Patent Examiner
Technology Center 2100

May 26, 2004

DIANE D. MIZRAH
PRIMARY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Notice of References Cited

Application/Control
10/299,359

Examiner
Yicun Wu

Applicant(s)/Patent Under
Reexamination
PARIKH ET AL.

Art Unit
2175

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,038,560	03-2000	Wical, Kelly	707/5
	B	US-6,408,290	06-2002	Thiesson et al.	706/52
	C	US-6,654,731	11-2003	Mahesh, Kavi	706/45
	D	US-6,678,677	01-2004	Roux et al.	707/3
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

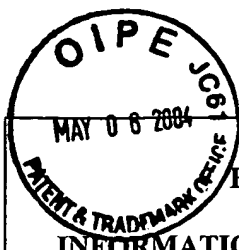
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



FORM PTO-1449

INFORMATION DISCLOSURE CITATION

Attorney Docket: 4428-4001	Serial No.: 10/299,359
Applicant: Prashant Parikh and Stanley Peters	
Filing Date: November 19, 2002	Group Art Unit: 2175

U.S. PATENT DOCUMENTS

Examiner Initial	Patent Number	Issue Date	Name	Class	Sub-Class	Filing Date
WV	6,405,188	June 11, 2002	Schwartz et al.			July 31, 1998
WV	6,675,159	January 6, 2004	Lin et al.			July 27, 2000

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FOREIGN PATENT DOCUMENTS

Examiner Initial	Patent Number	Publication Date	Country	Class	Sub-Class	Translation

OTHER DOCUMENTS

International Search Report for PCT/US03/34134, dated April 8, 2004 (1 page)

Examiner <i>WV</i>	Date Considered 5/24/04
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EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

2175



Docket No.: 4428-4001

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Applicant(s) : Prashant Parikh and Stanley Peters
Serial No. : 10/299,359 **Group Art Unit:** 2175
Filed : November 19, 2002 **Examiner:** Wu, Yicun
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

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1. Information Disclosure Statement (3 pages);
2. PTO Form 1449 (1 page);
3. Copy of 2 references cited in PTO Form 1449 and copy of International Search Report for PCT/US03/34134, dated April 8, 2004 (1 page); and
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Anita Coughlan

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PATENT

Docket No. 4428-4001

#5
5/18/04
A.W.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh and Stanley Peters

Serial No.: 10/299,359

Group Art Unit: 2175

Filed: November 19, 2002

Examiner: Wu, Yicun

For: NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

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INFORMATION DISCLOSURE STATEMENT

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Sir:

This Information Disclosure Statement is filed in accordance with 37 C.F.R. §§1.56, 1.97 and 1.98. The items listed on Form PTO-1449, a copy of which is enclosed, are made of record to assist the Patent and Trademark Office in its examination of this application. The Examiner is respectfully requested to fully consider the items and to independently ascertain their teaching.

1. For each of the following items listed on the enclosed copy of Form PTO-1449 that is not in the English language, an English language translation of that item or a portion thereof or a concise explanation of the relevance of that item is enclosed:

2. For each of the following items listed on the enclosed copy of Form PTO-1449 that is not in the English language, a concise explanation of the relevance of that item is incorporated in the specification of the above-identified application.
3. Any copy of the items listed on the enclosed copy of Form PTO-1449 that is not enclosed with this Information Disclosure Statement was previously cited by or submitted to the Patent and Trademark Office in application Serial No. _____, filed _____.
4. **No fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with:**
 - 37 C.F.R. §1.97(b)(1), within three months of the filing date of a national application other than a CPA; or
 - 37 C.F.R. §1.97(b)(2), within three months of the date of entry into the national stage as set forth in §1.491 in an international application; or

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PATENT

Docket No. 4428-4001

- 37 C.F.R. §1.97(b)(3), before the mailing date of a first Office action on the merits;
or
- 37 C.F.R. §1.97(b)(4), before the mailing date of a first office action after the filing of an RCE under §1.114.
5. No fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(c), after the period specified in paragraph 4 above but before the mailing date of a final action or a Notice of Allowance (where there has been no prior final action), and is accompanied by one of the certifications pursuant to 37 C.F.R. §1.97(e) set forth in paragraph 9 below.
6. A fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(c), after the period specified in paragraph 4 above but before the mailing date of a final action or a notice of allowance (where there has been no prior final action):
- A check in the amount of \$180.00 is enclosed in payment of the fee.
- Charge the fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
7. A fee is due under 37 C.F.R. §1.17(p) for this Information Disclosure Statement since it is being filed in compliance with 37 C.F.R. §1.97(d), after the mailing date of a final action or a notice of allowance, whichever comes first, but before payment of the issue fee, and is accompanied by:
- a. one of the certifications pursuant to 37 C.F.R. §1.97(e) set forth in paragraph 9 below;
and
- b. the fee due under 37 C.F.R. §1.17(p) which is paid as set forth in paragraph 11 below.
8. This Information Disclosure Statement is being filed in compliance with:
- a. 37 C.F.R. §1.313(b)(3) or §1.313(c)(1), after the issue fee has been paid an information cited in this Information Disclosure Statement may render at least one claim unpatentable and is accompanied by the attached Petition To Withdraw Application From Issue and fee pursuant to 37 C.F.R. §1.17(h);
- b. 37 C.F.R. §1.313(c)(2) or §1.313(c)(3), after the issue fee has been paid and information cited in this Information Disclosure Statement is to be considered in a Request for Continued Examination (RCE) or a Continuation application upon abandonment of the instant application and is accompanied by the attached Petition To Withdraw Application From Issue and fee pursuant to 37 C.F.R. §1.17(h).
- c. The fee due under 37 C.F.R. §§1.17(h) is paid as set forth in paragraph 11 below.

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PATENT

Docket No. 4428-4001

9. I hereby certify that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Second Information Disclosure Statement.
- I hereby certify that no item of information in the Information Disclosure Statement filed herewith was cited in a communication from a foreign patent office in a counterpart foreign application or, to my knowledge after making reasonable inquiry, was known to any individual designated in §1.56(c) more than three months prior to the filing of this Information Disclosure Statement.
10. This document is accompanied by a Search Report Communication which was cited in a corresponding PCT or Foreign counterpart application
11. A check in the amount of \$ _____ is enclosed in payment of the fees due under 37 C.F.R. §§1.17(h) and 1.17(p).
- Charge the fees due under 37 C.F.R. §§1.17(h) and 1.17(p) to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- The Commissioner is hereby authorized to charge any additional fees which may be required for this Second Information Disclosure Statement, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: May 6, 2004

By: _____

Richard Straussman
Registration No. 39,847

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3-10-04

2175

Docket No.: 4428-4001

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Filed : November 19, 2002 **Examiner :** Wu, Yicun
For : NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

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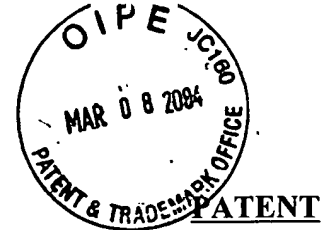
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(212) 751-6849 Facsimile



#4B
3/8/04
A.W.

Docket No: 4428-4001

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AMENDMENT AND RESPONSE TO RESTRICTION REQUIREMENT

This responds to the Restriction Requirement mailed on February 24, 2004.

Amendments to the Claims are reflected in the listing of claims which begins on page 2
of this paper.

Remarks begin on page 4 of this paper.

LISTING OF CLAIMS

1. (original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:
at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,
identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and
jumping to the at least one node.

2. (original) The method of claim 1 further comprising:
providing a verbal description associated with the at least one node to the user.

B. 3. (original) The method of claim 1 further comprising:
searching a thesaurus correlating keywords with synonyms.

4. (original) The method of claim 3 wherein the searching further comprises:
identifying the at least one word as synonymous with the at least one keyword.

5. (original) The method of claim 1 further comprising:
determining that the at least one word is neither a keyword nor a synonym of any keyword; and
learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. (original) The method of claim 5 further comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

Claims 8-26 (canceled).

REMARKS

In response to the 3-way Restriction Requirement mailed February 24, 2004, applicants respectfully provisionally elect the invention of Group I without traverse and without prejudice to continue prosecution of Groups II and III inventions in divisional applications

AUTHORIZATION

No extension of time is believed to be necessary for consideration of this Response. The Commissioner is authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4428-4001.

A DUPLICATE COPY OF THIS PAPER IS ENCLOSED.

Respectfully submitted,

MORGAN & FINNEGAN, L.L.P.

By:



Richard Straussman
Registration No. 39,847

Dated: March 8, 2004

Mailing address:
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/299,359	11/19/2002	Prashant Parikh	4428-4001	5023

7590 02/24/2004
MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, NY 10154-0053

EXAMINER

WU, YICUN

ART UNIT	PAPER NUMBER
2175	3

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/299,359

Applicant(s)

PARIKH ET AL.

Examiner

Yicun Wu

Art Unit

2175

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 14 January 2004.
- 2a) This action is FINAL.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-26 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) _____ is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) 1-26 are subject to restriction and/or election requirement.

DIANE D. MZRAHI
PRIMARY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

Art Unit: 2175

III. DETAILED ACTION

1. Claims 1-26 are presented for examination.

Election/Restriction

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-7 drawn to A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement, classified in class 707, subclass 3.

II. Claims 8-20 drawn to A method performed in connection with an arrangement of nodes representable as a graph, classified in class 707, subclass 101.

III. Claims 21-26 drawn to A method performed by a program executed by a processor to navigate among an arranged group of nodes, each of the nodes having an associated verbal description, classified in class 707, subclass 2.

3. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has

Art Unit: 2175

separate utility such as not directly connected to the first node but is associated with without requiring inverted index of invention II. See MPEP § 806.05 (d).

Inventions I and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has separate utility such as not directly connected to the first node but is associated with without requiring eliminating stop words and duplicates from the verbal descriptions to create a list of keywords of invention III. See MPEP § 806.05 (d).

Inventions II and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention II has separate utility such as inverted index without requiring eliminating stop words and duplicates from the verbal descriptions to create a list of keywords of invention III. See MPEP § 806.05 (d).

Art Unit: 2175

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Examiner attempted to contact Attorney Richard Straussman February 18, 2004 to request an oral election to the above restriction requirements, but did not result in an election being made because Attorney Straussman was unavailable.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Art Unit: 2175

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 703-305-4889. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

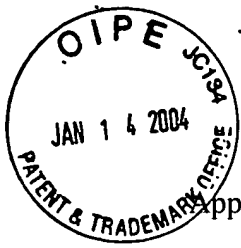
Yicun Wu
Patent Examiner
Technology Center 2100

~~DIANE S. MIZRAHI
PRIMARY PATENT EXAMINER
TECHNOLOGY CENTER 2100~~

February 18, 2004

01-16-04

2186



Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant PARIKH, Stanley PETERS
 Group Art Unit: 2186
 Serial No.: 10/299,359
 Examiner: To Be Assigned
 Filed: November 19, 2002
 For: NAVIGATION IN A HEIRARCHICAL STRUCTURED TRANSACTION
 PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

RECEIVED
 JAN 21 2004
 Technology Center 2100

Express Mail Label No.: EV245494173US

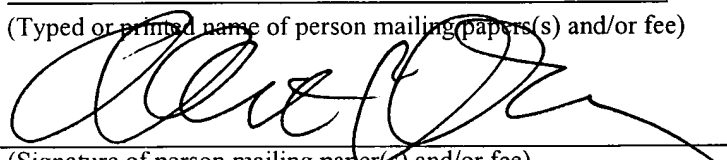
Date of Deposit: January 14, 2004

I hereby certify that the following attached paper(s) and/or fee

1. Preliminary Amendment (9 pages);
2. Amendment Fee Transmittal (2 pages); and
3. Return receipt postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to the Mail Stop Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

ALBERT ISLES
 (Typed or printed name of person mailing paper(s) and/or fee)


 (Signature of person mailing paper(s) and/or fee)

Correspondence Address:
 MORGAN & FINNEGAN, L.L.P.
 345 Park Avenue
 New York, NY 10154-0053
 (212) 758-4800 Telephone
 (212) 751-6849 Facsimile



Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant PARIKH, Stanley PETERS

Group Art Unit: 2186

Serial No.: 10/299,359

Examiner:

Filed: November 19, 2002

For: NAVIGATION IN A HEIRARCHICAL STRUCTURED TRANSACTION
PROCESSING SYSTEM

AMENDMENT FEE TRANSMITTAL

RECEIVED

JAN 21 2004

Technology Center 2100

Mail Stop Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an Amendment for the above-identified application.

- No additional fee is required.
- The additional fee has been calculated as shown below:

CLAIMS AS AMENDED

	Claims Remaining After Amendment	Highest No. Covered by Previous Payments	Extra	Rate	Additional Fee
Total Claims*	26-	26	0	\$18.00/ \$9.00	\$ 0
Independent Claims	6-	6	0	\$86.00/ \$43.00	\$ 0
Multiple Dependent Claims	(If claims added by amendment include Multiple Dependent Claim(s) and there was no Multiple Dependent Claim(s) in application before amendment add \$290.00 to additional fee (\$145.00 for small entity).				\$ 0
TOTAL					\$ 0


*Includes all independent and single dependent claims and all claims referred to in multiple dependent claims. See 37 C.F.R. §1.75(c).

- Small entity status is or has been claimed.
Reduced Fees Under 37 C.F.R. §1.9(f) paid herewith \$ _____
- _____ Pages Sequence Listing
- _____ Computer disk(s) containing substitute Sequence Listing
- Statement under 37 C.F.R. §1.825(b) that the computer and paper copies of the substitute Sequence Listing are the same.
- A check in the amount of \$ _____ to cover the filing fee is attached.
- Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- The Commissioner is hereby authorized to charge any additional fees which may be required for filing this amendment, including all fees pursuant to 37 CFR §1.17 for its timely consideration, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: January 14, 2004

By: _____


Richard Straussman
Registration No. 39,847

Correspondence Address:

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(212) 758-4800 Telephone
(212) 751-6849 Facsimile



Docket No. 4428-4001

#2A
2/5/04
AW.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant PARIKH, Stanley PETERS

Group Art Unit: 2186 2175

Serial No.: 10/299,359

Examiner: *William W.*

Filed: November 19, 2002

For: Navigation in a Heirarchical Structured Transaction Processing System

PRELIMINARY AMENDMENT

RECEIVED
JAN 21 2004
Technology Center 2100

Mail Stop Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Prior to examining this application on the merits please enter this Preliminary Amendment.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 9 of this paper.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- SUB B17**
1. (Original) A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:
 - at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,
 - identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and
 - jumping to the at least one node.
 2. (Original) The method of claim 1 further comprising:
 - providing a verbal description associated with the at least one node to the user.
 3. (Original) The method of claim 1 further comprising:
 - searching a thesaurus correlating keywords with synonyms.
 4. (Original) The method of claim 3 wherein the searching further comprises:
 - identifying the at least one word as synonymous with the at least one keyword.
 5. (Original) The method of claim 1 further comprising:
 - determining that the at least one word is neither a keyword nor a synonym of any keyword; and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. (Original) The method of claim 5 further comprising:

adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. (Original) A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

8. (Currently Amended) A method performed in connection with an arrangement of nodes representable as a hierarchical graph comprising:

correlating keywords with nodes in which the keywords appear to create an inverted index so that the keywords each appear only once and all nodes containing each of the keywords are indexed to those keywords;

maintaining a thesaurus of synonyms for at least some of the keywords;
receiving an input from a user containing a meaningful word;
searching the inverted index to determine whether the meaningful word is a keyword and,
if the meaningful word is a keyword, jumping to a node identified in the inverted index as
correlated to that keyword, otherwise,
searching the thesaurus to determine if the meaningful word is a synonym for at least one
particular keyword and, if the meaningful word is the synonym, using the synonym to identify
the at least one particular keyword, and
jumping to at least one node correlated to the at least one particular keyword.

9. (Original) The method of claim 8 further comprising:

creating the thesaurus by analyzing at least two files and determining synonymy among
application meaningful words contained therein based upon a frequency of co-occurrence among
the application meaningful words.

10. (Currently Amended) A system comprising:

~~a hierarchically arranged series of nodes;~~
an inverted index correlating keywords with the nodes;
a thesaurus correlating at least some keywords with synonyms for those keywords;
a processor executable learning procedure configured to, upon receipt of a term that is
identified as neither a synonym nor a keyword based upon a search of both the inverted index
and the thesaurus,

(a) identify the term as at least one particular synonym for at least one particular keyword and

(b) correlate the term with the at least one particular keyword, so that when a subsequent user provides the term the system will operate as if the term was synonymous with the at least one particular keyword.

11. (Original) The system of claim 10 further comprising:
a set of verbal descriptions for at least some of the nodes.
12. (Original) The system of claim 10 wherein at least one of the nodes is a service node.
13. (Currently Amended) The system of claim 10 further comprising an interactive voice response system and wherein the ~~hierarchically arranged~~ series of nodes is part of the interactive voice response system.
14. (Currently Amended) The system of claim 10 wherein the ~~hierarchically arranged~~ series of nodes is part of a file system browser application.
15. (Currently Amended) The system of claim 10 wherein the ~~hierarchically arranged~~ series of nodes is part of a navigation system for television listings.
16. (Currently Amended) The system of claim 10 wherein the ~~hierarchically arranged~~ series of nodes is part of one of a document navigation or a document retrieval system.

17. (Currently Amended) The system of claim 10 wherein the ~~hierarchically arranged~~ series of nodes is part of a geographic information system.

18. (Currently Amended) A transaction processing system, having a ~~hierarchical~~ an arrangement of nodes and configured to interact with a user so that the user can navigate among the nodes ~~in the hierarchy~~, the system comprising:

an inverted index correlating keywords with at least some of the nodes in the ~~hierarchical~~ arrangement so that when the user interacts with the system and provides an input in response to a verbal description from one node ~~in the hierarchy~~ and the response includes a meaningful word correlatable with a keyword, ~~the system will identify at least one node that is correlated to the meaningful word by the inverted index and jump to that at least one node without first traversing any other node.~~

AI

19. (Original) The system of claim 18 further comprising:

a thesaurus correlating at least some of the keywords with synonyms for the at least some keywords.

20. (Original) The system of claim 18 further comprising:

at least one stored learned word correlated to a keyword.

21. (Currently Amended) A method performed by a program executed by a processor to navigate among a hierarchically an arranged group of nodes, each of the nodes having an associated verbal description, the method comprising:

eliminating stop words and duplicates from the verbal descriptions to create a list of keywords;

creating a list of thesaurus words;

creating a first matrix comprising a correlation of at least some thesaurus words with at least some keywords;

creating a second matrix by calculating cosine values from a co-occurrence analysis of the entries in the first matrix;

determining a synonymy among the at least some thesaurus words and the at least some keywords; and

creating a thesaurus configured as an inverted index based upon the synonymy.

22. (Original) The method of claim 21 further comprising:
tracking frequency of use of the nodes.

23. (Original) The method of claim 22 further comprising:
ranking the nodes based upon a result of the tracking.

24. (Original) The method of claim 21 further comprising:
pruning a node from the group of nodes based upon a frequency of usage criterion.

25. (Original) The method of claim 21 further comprising:
adding a synonym entry into the thesaurus based upon a result of an unknown word
analysis.

~~B~~

26. (Original) The method of claim 21 wherein the thesaurus further comprises at least some
learned entries, the method further comprising:
deleting a learned entry based upon satisfaction of a frequency of use criterion.

REMARKS

The foregoing amendments are made to more clearly define that which the inventors consider to be the invention as opposed to a specific implementation thereof and are fully supported by the specification.

AUTHORIZATION

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE OF THIS DOCUMENT IS ATTACHED.

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE OF THIS DOCUMENT IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: January 14, 2004

By: 

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11/19/02
J131 U.S. PTO

AL0299 4428-4001



27123

Docket No. **4428-4001** PATENT TRADEMARK OFFICE

Express Mail No. **EV062749235US**

J1011 U.S. PTO
10/299359
11/19/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

UTILITY APPLICATION AND FEE TRANSMITTAL §(1.53(b))

Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s) names and addresses:

- (1) Prashant Parikh, 254 East 68th Street, Apartment 21D, New York, New York 10021
Stanley Peters, 128 Hillside Avenue, Menlo Park, California 94025

Additional inventors are listed on a separate sheet

For: **NAVIGATION IN A HIERARCHICAL**
STRUCTURED TRANSACTION PROCESSING SYSTEM

Enclosed Are:

- 147 page(s) of specification**
- 1 page(s) of Abstract**
- 7 page(s) of claims (numbered 1-26)**
- 11 sheets of Formal Drawings, (FIGS. 16, 7A, 7B and 8-14)**
- 9 page(s) of Declaration and Power of Attorney**

- Unsigned
- Newly Executed**
- Copy from prior application
- Deletion of inventors including Signed Statement under 37 C.F.R. §1.63(d)(2)

REQUEST AND CERTIFICATION UNDER 35 U.S.C. §122(b)(2)(B)(i) (form PTO/SB/35)

As indicated on the attached Request and Certification, Applicant(s) certify that the invention disclosed in the attached application HAS NOT and WILL NOT be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing. Applicant(s) therefore request(s) that the attached application NOT be published under 35 U.S.C. §122(b).

Docket No. 4428-4001

- Incorporation by Reference:
- The entire disclosure of the prior application, from which a copy of the combined Declaration and Power of Attorney is supplied herein, is considered as being part of the disclosure of the accompanying application and is incorporated herein by reference.
- Deletion of Inventors (37 C.F.R. §1.63(d) and §1.33(b))
Signed statement attached deleting inventor(s) named in the prior application serial no. _____, filed _____.
- Microfiche Computer Program (Appendix)
- page(s) of Sequence Listing
- computer readable disk containing Sequence Listing
- Statement under 37 C.F.R. §1.821(f) that computer and paper copies of the Sequence Listing are the same
- Assignment Papers (assignment cover sheet and assignment documents)**
- A check in the amount of \$40.00 for recording the Assignment**
- Charge the Assignment Recordation Fee to Deposit Account No. 13-4500, Order No. _____.
- Assignment Papers filed in the parent provisional application Serial No. _____.
- Executed Associate Power of Attorney**
- Certification of chain of title pursuant to 37 C.F.R. §3.73(b)
- Priority is claimed under 35 U.S.C. §119 for:
Application No(s). _____, filed _____, in _____ (country).
- Certified Copy of Priority Document(s) [_____]
- filed herewith
- filed in application Serial No. _____, filed _____.
- English translation document(s) [_____]
- filed herewith
- filed in application Serial No. _____, filed _____.
- Priority is claimed under 35 U.S.C. §119(e) for _____, filed _____.
- Information Disclosure Statement
- Copy of [_____] cited references
- PTO Form-1449
- References cited in parent application Serial No. _____, filed _____.

Docket No. 4428-4001

- Related Case Statement under 37 C.F.R. §1.98(a)(2)(iii)
 - A copy of related pending U.S. Application(s) Serial No(s): _____, filed _____, respectively, is attached hereto.
 - A copy of related pending U.S. Application(s) entitled, _____, filed _____ to inventor(s) _____, respectively, is attached hereto.
 - A copy of each related application(s) was submitted in parent application serial no. _____, filed _____.
- Preliminary Amendment
- Return receipt postcard (MPEP 503)**
- This is a continuation divisional continuation-in-part of prior application serial no. _____, filed _____, to which priority under 35 U.S.C. §120 is claimed.
 - Cancel in this application original claims _____ of the parent application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
 - A Preliminary Amendment is enclosed. (Claims added by this Amendment have been properly numbered consecutively beginning with the number following the highest numbered original claim in the prior application).
- The status of the parent application is as follows:
 - A Petition for Extension of Time and a Fee therefor has been or is being filed in the parent application to extend the term for action in the parent application until _____.
 - A copy of the Petition for Extension of Time in the co-pending parent application is attached.
 - No Petition for Extension of Time and Fee therefor are necessary in the co-pending parent application.
- Please abandon the parent application at a time while the parent application is pending or at a time when the petition for extension of time in that application is granted and while this application is pending has been granted a filing date, so as to make this application co-pending.
- Transfer the drawing(s) from the parent application to this application
- Amend the specification by inserting before the first line the sentence: This is continuation divisional continuation-in-part of co-pending application Serial No. _____, filed _____.

Docket No. 4428-4001

I. CALCULATION OF APPLICATION FEE				
	Number Filed	Number Extra	Rate	Basic Fee \$740.00/370.00
Total Claims	26-20 =	6 x	\$18.00/ \$9.00	\$ 54.00
Independent Claims	6-3 =	3 x	\$84.00/ \$42.00	\$ 126.00
<input type="checkbox"/> Multiple Dependent Claims		If marked, add fee of \$270.00 (\$135.00)		\$0
TOTAL:				\$550.00

- Small entity status is or has been claimed. Reduced fees under 37 C.F.R. §1.9 (f) paid herewith \$550.00.
- A check in the amount of \$550.00 in payment of the application filing fees is attached.
- Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- The Commissioner is hereby authorized to charge any additional fees which may be required for filing this application pursuant to 37 CFR §1.16, including all extension of time fees pursuant to 37 C.F.R. § 1.17 for maintaining copendency with the parent application, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: November 19, 2002

By: 

Richard Straussman
Registration No. 39,847

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
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(212) 758-4800 Telephone
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11-20-02 4428-4001-111902A

11/19/02
1131 U.S. PTO

Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

11011 U.S. PTO
10/29/02
11/19/02

Applicant(s): Prashant Parikh and Stanley Peters

Serial No.: To Be Assigned

Filed: Herewith

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Express Mail Label No.: EV062749235US

Date of Deposit: November 19, 2002

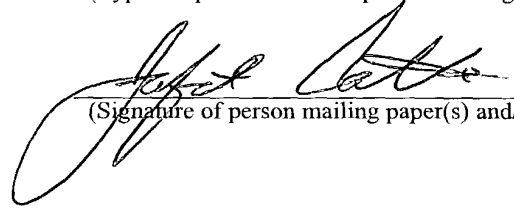
I hereby certify that the following attached paper(s) and/or fee

1. Utility Application and Application Fee Transmittal (in duplicate); enclosing Specification (147 pages), claims 1-26 (7 pages), abstract (1 page), 11 sheets of drawings (FIGS. 1-6, 7A, 7B and 8-14);
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UNITED STATES
PATENT APPLICATION
FOR
NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

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PATENT
Docket No.: 4428-4001

**NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM**

FIELD OF THE INVENTION

The present invention relates to information processing and, more particularly, computer based transaction processing.

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BACKGROUND OF THE INVENTION

In everyday life, networks of choices set forth in a particular order or hierarchy are encountered with increasing frequency. Usually, it is desired to traverse the network in the most efficient manner possible to accomplish a particular goal.

In modern mathematics, graph theory is used to study networks of hierarchical choices. The hierarchical networks can be represented as a graph structure. Graph theory finds practical applications in chemistry, computer science, economics, electronics and linguistics.

A graph structure is a collection of points, called "vertices", and a collection of lines, called "edges". Each edge joins a pair of vertices or a single point to itself.

A simple example of a network represented by a graph structure is a road map. The vertices represent towns or cities. The edges represent the roads that connect the towns and cities.

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Another type of network familiar to anyone who has a telephone is an automated telephone voice response system, such as commonly utilized by many large companies, to direct incoming calls to particular individuals or departments or to assist the caller in performing a transaction, such as making a purchase.

That type of telephone network can also be represented as a graph structure. When the system answers an incoming call, it transmits a verbal description or prompt to the caller: "If you would like to speak to Harry, press 1; if you would like to speak to Fred, press 2". (In general, we will use "verbal description" to mean a set of words relating to the subject matter whether presented audibly or in written form. The verbal descriptions may range from a few words to an entire document worth of text). A first vertex on the graph represents the initial prompt, which a caller hears upon reaching the telephone response system. If the user's response is pressing 1, calls are directed along a first edge to Harry, represented by a second vertex. If the response is pressing 2, the call is directed along a second edge to Fred, represented by a third vertex. Then, if the chosen person is not available, the caller is asked whether the caller wishes to leave a message. If the response is positive, the caller is directed along another edge to the selected person's voice mail, which would be represented by another vertex of the graph.

In general, whether for a telephone response network or for any other application representable by a graph structure, the caller or user of the system will have some goal. By "goal" we mean a combination of transactions and information accesses which the user seeks to accomplish. By "transaction" we mean an operation performed electronically with a user. In general, there will also be a combination of vertices or nodes in the graph that best represent or are closest to the goal the user is trying to accomplish. We call these vertices the "goal vertices".

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For the user, the object in navigating the graph is to get from the first vertex to the goal vertices. If this is not done as quickly and efficiently as possible the user may become frustrated and give up. Moreover, as the number of possible choices or nodes in the network becomes larger, the number of possible pathways between the first vertex and the goal vertices multiplies rapidly. Therefore, the ability to reach the goal vertex can become more difficult, require navigation of an excessive number of choices or nodes, or discourage a user before the goal vertex is even reached.

SUMMARY OF THE INVENTION

The present invention creates a method for navigating efficiently and naturally through a series of choices to obtain information, perform transactions, or accomplish some similar goal. The invention is implemented in a programmed computer that has a hierarchically configured decisional network that must be navigated as part of the processing and is constructed to accept inputs or data and process them in a manner that facilitates navigation of the network vertices more efficiently.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an example graph representing a simple, generic hierarchically arranged transaction processing or decisional system suitable for use with the invention;

FIG. 2 is an example portion of a graph used to illustrate jumping among nodes in accordance with one variant of the invention;

FIG. 3 is an example portion of a graph in a simple interactive voice response ("IVR") system used to illustrate grouping in accordance with one variant of the invention;

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hierarchy they are, thereby causing a “jump” to a particular node without necessarily traversing the tree in the rigid hierarchical manner.

Various examples will now be presented to illustrate certain concepts related to the invention. It should be understood that while these examples are presented in the context of things and likely experiences of ordinary people, the same approach can be applied to other forms of transaction processing including navigating through hierarchically nested data files in a computer system, pattern analysis or image processing, etc. the term “transaction” as used herein relating to traversal through a hierarchy to a goal, not mathematical calculation per se.

Moreover, the specific formats used and presented in these examples are purely for illustration purposes. It should be understood that that other techniques for interrelating data, such as hash tables, direct or indirect indexing, etc. can be substituted in a straightforward manner. Thus, for example, the relationship between the word and a node could be configured such that the location of the word in a list as the “n-th” item could be used as an index into another list containing the nodes correlated to the list. A similar approach could be used for the thesaurus, the important aspect relative to the invention being the relationship among certain words and the node(s) in which they occur and, where applicable, the relationship between certain words and “synonyms” for those words, not the data structure or its form or format whereby that information is kept or maintained.

Example 1

Example 1 illustrates, in simplified form, how an index is used to jump among nodes with reference to FIG. 2. In this example, the hierarchical tree 200 represents a portion of a more

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complex tree specifically involving possible decision relating to fruit and a decision between two specific types of fruits, an apple and an orange.

In prior art hierarchical trees, navigation of this graph 200 would necessarily involve going through the “fruit” node 202 in order to reach the “apple” 204 or “orange” 206 nodes. As a result, assuming this simple tree was part of a larger tree for an on-line supermarket that prompted the user for what they wanted to purchase, the exchange would be both rigid and time consuming. For example, in response to a prompt “What do you want to purchase?” if the response was anything other than “fruit” traversal to the “fruit” node 202 could not occur. At the point in the tree that would lead to the “fruit” node 202, neither apple nor orange would be an acceptable response.

In accordance with the invention, assuming the only relevant keywords for that portion of the tree were “fruit”, “apple” and “orange”, an inverted index would be created that includes an association of “Fruit” with the top node 202, “Apple” with the bottom left node 204, and “Orange” with the bottom right node 206. As shown above, that association can be created using node identifiers, in this example, the node identifiers 1A01, 1A02 and 1A03 are arbitrarily assigned and used. Thus, the information can be stored in a file, for example, as follows:

Fruit, 1A01
Apple, 1A02
Orange, 1A03

Accordingly, to navigate the system 200, when a response to a verbal description is provided by a user, possible keywords are identified in the response and used to search the index and identify any node to which the response may be directed, irrespective of the hierarchy.

Thus, a user response of “an orange” to a verbal description located above the “fruit” node 202 in

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the hierarchy, for example, “What would you like to buy today?” would cause the system to identify “orange” as a key word from the response, search the index, and directly identify node 1A03 (206) as the node whose verbal description should be presented next, thereby avoiding the need to traverse intervening nodes, for example, through the “fruit” node (202) 1A01, at all. This illustrates an example of a simple jump according to the invention.

Example 2

Having illustrated a simple “node jump” a more complex (and likely) scenario can be shown. In this example, the Example 1 graph of FIG. 2 applies, but relevant portion of the index is as follows:

Fruit, 1A01
Apple, 1A02, 2F09
Orange, 1A03

As a result, there are two nodes relevant to the keyword “apple” one being the node 204 in the portion of the graph shown in FIG. 2 and one in the node uniquely identified as 2F09 located somewhere else in the hierarchy (not shown).

In this example, a user response containing the keyword “apple” would identify nodes with identifiers 1A02 and 2F09. In this case, and unlike the prior art, the verbal descriptions from both nodes would be presented to the user, likely in alternative fashion. Thus, if the user did not want an apple, they wanted apple cider, node 2F09 might be more appropriate because it is part of the “drinks” portion of the overall hierarchy.

Thus, presenting the user with the verbal description from both nodes would likely result in a jump to the portion of the graph nearer to node 2F09 since it is closer to the user’s goal thereby speeding up the process and avoiding potentially confusing or frustrating the user.

Example 3

While the verbal descriptions associated with various nodes will generally be chosen to accurately represent the node, in accordance with certain variants of the invention, it is possible to create a situation where a user response takes them away from their ultimate desired goal. Nevertheless, by using the teachings of the present invention, the user can often still be brought to their goal quicker than possible with the prior art because the user need not rigidly trace through the hierarchy. This is accomplished by virtue of the “grouping” aspect inherent in some implementations of the invention.

This example illustrates the “grouping” aspect using a simplified graph 300 representing a portion of an airline reservation system as shown in FIG. 3.

In particular, the graph of FIG.3 can be thought of as part of a very simple interactive voice response (“IVR”) system.

As described above, each node is uniquely identified, for example, by the numbers 1 through 7 and the identified terms “Reservation”, “Domestic”, “International”, “Business Class”, “Economy Class” are deemed the relevant keywords. Note, there is no requirement for a the “keyword” to be a single word, in some implementations, keywords could be single words, phrases of two or more words, or even some other form of information like a specific data pattern.

Again, an inverted index is created as described above associating those keywords with the nodes, in this case:

Reservation, 1
Domestic, 2
International, 3

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Business Class, 4, 6
 Economy Class, 5, 7

Assuming that the top node is assigned the number 1, its two child nodes (Domestic and International) are assigned the numbers 2 and 3, and the grandchild nodes (i.e. at the lowest level in the hierarchy) have been assigned numbers 4, 5, 6, and 7 taken from left to right each node can be uniquely located. Note that the last two entries in the inverted index are each associated with two nodes, 4 and 6 in the first case, and 5 and 7 in the second.

Using the above, the concept of grouping of nodes from different parts of the graph (i.e. nodes that are not siblings or nodes that do not have a common parent) can be explained.

Presume that the response to a verbal description presented as an initial query of “What do you want to do?” was “Make a business class reservation.” In this case there are two keywords present, “reservation” and “business class”.

Depending upon the particular implementation, as noted previously, the verbal descriptions associated with each identified node could be presented together or in sequence. Alternatively, and as is the case here, a set of rules can be established, for example, such that if an identified node is a sub-node of another identified node, only the verbal description of the sub-node(s) is provided because of inherent redundancy. Thus, since both “business class” nodes 310, 314 are sub-nodes of the “reservation” node 302, the verbal description associated with the “reservations” node can be suppressed if it can be determined that business class necessarily implies reservations.

In this example, a search of the inverted index would identify nodes 4 and 6 (310, 314) from different parts of the tree are associated with the keywords in the query, and thus the

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system, in presenting the verbal descriptions from each, in effect, alters the tree structure and groups these nodes in the result. Thus, the combination of result nodes presented depends upon the user query or response, not that predetermined by the graph structure itself.

Of course, the goal would still not be reached because of the ambiguity caused by "Business Class" being under both "Domestic" and "International". However, that ambiguity can be handled by suitable wording of the following verbal descriptions and whether they are combined or provided sequentially or by other nodes.

Example 4

A persistent and further drawback present in the prior art is the inability to operate if any term other than the specific allowed terms are provided. Thus, in an IVR of the prior art, providing anything other than the recognized term(s) will likely result in meaningless repeat of the same inquiry by the IVR or an error.

Advantageously, the teachings of the present invention allow for construction of a more flexible system than available in the prior art. Specifically, we can incorporate a thesaurus to accommodate synonyms for the keywords.

Example 4 illustrates the addition of a simple thesaurus as an aspect of a system so that a synonym of a keyword may also be used by the system to jump to the desired nodes in the graph. Example 4 is discussed with reference to a portion 400 of an interactive television program listing system as shown in FIG. 4.

Such a system implementing the invention will allow a user to speak to or interact with a device to look for programs of his choice by time slot, genre, favorite actor or actress, etc.

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This example, as with the other examples above, use an inverted index, in this case one where each node 402, 404, 406 is uniquely identified by a string of six characters, the portion of which corresponding to FIG. 4 is shown as follows.

Programs; acgyct
Sitcoms; ifgnxh
Films; vnymos

Since a common synonym for “Films” is “Movies” a thesaurus can be created associating the two. Depending upon the particular implementation, thesaurus terms to be equated to the keywords can be taken from a standard thesaurus or can be custom created for the particular application. In addition, the equating of terms can be done in any of a myriad of different ways, the exact implementation details of which however re irrelevant to the invention, but a few representative examples of which however are contained herein for purposes of illustration.

In one example case, the equating can be done on a purely word basis. For example, a file can be constructed such that one or more single word synonyms are directly associated with an index word, for example as follows:

Movies, Flicks – Films

Alternatively, the synonyms can be equated with the node identifier(s) corresponding to the index term, for example as follows:

Movies, Flicks – vnymos

In the former case, the system would still have to search the index after the thesaurus has provided the proper index term(s). In the latter case, the thesaurus provides a direct link to the respective node(s) so that re-searching is not required.

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In the system of Example 4, a user who provides the input “Movies” would cause the processing to occur as follows.

The system would search the inverted index of keywords and fail to locate “Movies” as a keyword. As a result, it would search the thesaurus and find that the word “Movies” is a synonym that can be correlated with a keyword. At this point, depending upon the particular thesaurus, it would either return to the inverted index and search using the synonym keyword “Films” and return the result as the node 406 identified by “vnymos”, or go directly to the node 406 identified by “vnymos” based upon the thesaurus entry.

Of course, it is possible (and likely) that in actual usage a synonym will be associated with more than one keyword. For example, “Comedies” may be associated with both the keywords “Sitcoms” and “Films”, resulting in, for example, the following entry in a thesaurus:

Comedies – Sitcoms, Films

In this case, a search for “Comedies” would result in the system identifying that the synonym was associated with nodes 404, 406 for both “Sitcoms” and “Films”, and it would return both terms or node identifiers corresponding to the two keywords as the result.

Example 5

Advantageously, the thesaurus concept can be extended further so that an initially unknown word (i.e. a word that is neither a keyword nor a thesaurus word) can be learned by the system and added to a thesaurus for future use.

This example is described with reference to FIG. 5 which is a portion 500 of a larger system graph as part of a very simple “geographic information system” found in some automobiles, kiosks and elsewhere today. Such a system enables a user to, among other things,

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identify and get information about different locations in an environment. For example, information about particular types of restaurants in an area.

In this example, the inverted index for the portion 500 shown in FIG. 5 could look as follows:

Restaurants, 1
Pizza, 2
Burgers, 3
Chinese, 4

A user issues the following query to the system “fast food” in order to find a quick meal.

The system’s search of both the index and thesaurus would result in the “term”, in this case a phrase, not being found in either. In this case, it is an unknown phrase, and the system has to learn the “meaning” of the term.

To do this, the system first offers the verbal description from the top level node(s) 502 to the user – in this example, just “Restaurants”. The user presumably provides a positive response. (Of course, in a real system, it is possible and likely there are more top level nodes than just one. In that case, the user would be offered two or more of these nodes, and would have to select “Restaurants” to match his intended request.)

Continuing on, once the user has responded affirmatively, the system moves down the tree and offers the verbal description from each of the child nodes: “Pizza” (504), “Burgers” (506), and “Chinese” (508). Presuming that the user picks “Pizza”, the transaction interaction would look something like this:

User: Fast food

System: Restaurants?

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User: Yes

System: Pizza, Burgers, or Chinese?

User: Pizza

At this point, the system has “learned” for the time being that it can equate “fast food” with “pizza” and can add “fast food” as a synonym to “pizza” in the thesaurus.

This user, who first used the unknown term “fast food”, had to trace a path down the tree. However, now the system is able to associate “pizza” with “fast food” and create or add a thesaurus entry to reflect this association, for example as follows:

Fast food – Pizza

Thus, the system has learned a meaning of the initially unknown term “fast food” and has added it to the thesaurus for future use.

As a result, a subsequent uses of the same term “fast food” will enable the system to jump directly to the “pizza” node 504.

Example 6

This example illustrates how additional meanings for an existing thesaurus term or phrase can be learned by the system for future use, whether the existing thesaurus term or phrase was an original thesaurus term or one previously learned with continuing reference to FIG. 5.

At this point, the inverted index is unchanged as:

Restaurants, 1

Pizza, 2

Burgers, 3

Chinese, 4

Additionally, presume the following entry now exists in the thesaurus.

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Fast food – Pizza

Suppose a new user now issues the query “fast food” as above, but with “Burgers” rather than “Pizza” in mind.

Based upon the thesaurus, the system would go directly to the “Pizza” node. However, the user will reject “Pizza”, having “burgers” in mind. By rejecting the “Pizza” node 504 description, the user indicates that the “Pizza” node 504 is not of interest. The system is therefore configured with a further set of rules, in this case one in which the system goes up in the hierarchy to a higher node, the top node 502 in this portion of the example, and provides the verbal descriptions for the other nodes 502, 504, 506, 508 so as to cause a tracing down the tree. This can be illustrated by the following “dialog”:

User: Fast food

System: Pizza?

User: No

System: Restaurants?

User: Yes

System: Pizza, Burgers, or Chinese?

User: Burgers

This time, although this user has had to trace through at least a portion of the path from a higher-level node 502 of the tree 500, the system has learned yet another meaning for “fast food”. It now adds this meaning to the earlier entry in the thesaurus, for example as:

Fast food – Pizza, Burgers

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criterion can be based upon usage relative to time, usage of a particular term relative to some other term(s), term usage relative to overall thesaurus usage, or simply elimination of all added terms not used since the last purge.

Thus, presuming that the system has kept track of the frequency of use of different meanings of “fast food”, and that “Pizza” does not meet the criterion for a sufficiently high frequency, the meaning “Pizza” can be dropped as a synonym for “Fast food” and the entry (after purging) would look as follows:

Fast food – Burgers

Thus, a further enhanced implementation can be constructed so the system is dynamically updating the thesaurus, either adding meanings or dropping meanings for existing and/or initially unknown words.

Example 8

A further advantage to the invention is that, in some implementations, it can be configured so that, when there are multiple relevant nodes to be presented, an associated ranking can be used to determine the type, method or order of presentation. For example, the ranking can be based upon the frequency of use of particular nodes, which is tracked in these implementations, so that the most frequently selected or used nodes are presented first, more prominently, or in a particular manner.

For example, this can be illustrated by continuing from Example 7, where the thesaurus entry was as follows:

Fast food – Pizza, Burgers

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Under the assumption that the system has been tracking the frequency of usage of the “Pizza” node and the “Burgers” node and each has been accessed an identical number of times. When a user enters the query “Fast food”, as above, the system presents the user with both the “Pizza” node 504 and the “Burgers” node 506, but because it tracks usage and the usage is the same, it presents them in the order they are listed, i.e. “Pizza” and then “Burgers”. However, at this point, the user’s selection will cause one entry to have a greater frequency of usage relative to the other entry, for example a selection of “Burgers” will make it have a higher frequency of usage and, accordingly, a higher ranking for the next instance of use.

Thus, the next time the system will be presenting both the “Pizza” and “Burgers” nodes to a user, the “Burgers” node 506 will have the higher frequency of usage and, accordingly, will be presented first, or more prominently, or in some other specified manner because of its ranking. If the frequency reverses with use so that the “Pizza” node 504 outranks “Burgers” node 506, then the “Pizza” node 504 will supplant the “Burgers” node 506.

Example 9

A further variant of Example 8 allows the node rankings to be used to prune the nodes themselves. In this variant, a criterion can be specified, typically zero usage over a long specified period of time, that is used to remove an entire node. This is advantageously made possible because of the system’s ability to “jump” among nodes. Thus, it may occur that a node within the tree is never accessed, but a child node of that node is. In some variants therefore, when this state exists for a sufficiently long period of time, the system is constructed to delete that node. It should be understood that, if handled properly, this process will not even affect the “learning” process because, even if no user action ever directly causes the node to be presented,

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if the learning process causes the node to be presented the node's access frequency will be non-zero and it will not be "pruned".

In addition, by tracking access frequency on a node basis, a qualitative evaluation of the hierarchical system can be made and visualized. This makes it possible to review the overall hierarchy after some period of time and periodically optimize it based upon the result instead of relying purely upon the dynamic optimization that inherently and naturally flows from use of the teachings of the invention.

Having now described various component aspects of different variants implementing the invention, by way of the above examples, it should be understood that the "jumps" can occur from any node to any node, i.e. vertically and/or laterally and to another node that is higher, lower or on the same "level" as the node from which the jump is made. All manner of vertical and lateral jumps from multiple nodes to multiple nodes are possible.

In addition, it should be understood that in some applications (like document retrieval systems) the verbal description from the identified node may be the one issued whereas, in others (like an IVR system), the verbal descriptions for the children of the identified nodes may be what is presented. Nevertheless, in both cases, the process as described above by way of example will be the same or directly analogous.

Having described the various aspects individually a more commercially suitable example, employing a combination of the above examples, can now be presented with reference to FIG. 6 which illustrates a simplified example of an "interactive voice response unit" (IVR) hierarchy 600 that might be used in the airline industry. Of course, a real menu tree used in an IVR may have any number of nodes from several, up to a thousand, or more. For example, a tree with 4

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branches from each node and which has 5 levels uniformly would have 1365 nodes. As shown in FIG. 6, the tree 600 is a hierarchical tree and consists of the following nodes and branches:

- Initial start (node a0) 602
- domestic flight arrival information (node a1) 604
- domestic reservations (node a2) 606
- international flight arrival information (node a3) 608
- international reservations (node a4) 610

The node 604 identified by a1 is a service node with pre-recorded information.

The node 606 has two child node a 2, first/business class (node a5) and economy (node a6).

The node 608 identified by a3 is service node with pre-recorded information.

The node identified as a4 has three child nodes identified as first class (node a7), business class (node a8), and economy (node a9).

The nodes 612, 614, 616, 618, 620 identified as a5, a6, a7, a8, a9 are all service nodes (i.e. terminal nodes) where a respective customer service representative will interact with the caller.

Of course, a real system may also have a choice at the top level or at each level for a live operator and may even have a choice to go back to the previous menu.

Even for such a simple example, in a traditional interactive voice response system, the caller would have to listen to several choices and then traverse a path down to a service node. Someone interested in business class reservations on a domestic flight would have to traverse the path (a0, a2, a5) for example. This involves listening to multiple choices at each level of the tree (e.g. first a prompt at a0, then four prompts offering a1, a2, a3, and a4 at the next level, at which the caller would choose a2, and finally two prompts offering a5 and a6, at which level the caller

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would choose a5 and then wait for the operator) and then making a choice by pressing an appropriate number on the telephone dial pad or alternatively saying the appropriate number. In certain cases, he may make a mistake: he may choose international reservations when he is interested in domestic reservations or something similar (simply by pressing the wrong number on his touch-tone telephone or saying the wrong number). If he does, then he has no choice but to disconnect the phone and redial the number (or if the system has a backtracking option, then he can backtrack, but even here he has wasted valuable time).

In contrast, in accordance with a system implementing the invention, the caller would be able to say what he was looking for (e.g. "I want to make a domestic business class reservation") and the system would identify and respond with the appropriate node 612 (e.g. a5 in this case or the relevant customer service representative directly). In other words, it would enable the caller to skip to the correct node(s) without having to trace through the entire path. If the user makes a mistake, he could ask for something different wherever he finds himself in the tree, and skip laterally or vertically to his preferred choice.

The system implementing the invention can further include an option that the entire transaction (e.g. the making of the reservation) would be carried out through natural language interactions with the system without the intervention of a human customer service representative. In other words, all the details of his domestic reservation are obtained by the system and the system updates a database accordingly and issues whatever commands are required (e.g. the mailing of a ticket) to be carried out by some human representative later.

While it is true that some more advanced interactive voice response systems available today allow for natural language interactions, they are highly constrained natural language

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interactions with relatively little or no intervention by a human operator. However, unlike with systems using the invention, those systems still require direct path traversal through the hierarchy (i.e. jumping to non-connected nodes is not contemplated or possible, let alone allowed).

Moreover, such systems still typically use a limited list of keywords, which the caller is required to use to correctly traverse to the next connected node.

In contrast, variants of a system implemented in accordance with the invention can incorporate an automatically generated or updated thesaurus, which greatly expands the range of words or terms a caller can use. In these variants, the user is not restricted to parroting the highly constrained script as required by other interactive voice response systems, nor is the user limited to traversal to a connected node. In these more complex implementations of the invention, a system can be constructed that is able to learn new words or terms that it may not have understood the first time. For example, if a user asks for “coach class” and the system does not have the word “coach” or the phrase “coach class” in its keyword list or in its current thesaurus, then on this first occasion, it offers the user a traditional path down the conventional tree. But it tracks what the user did, what node of the tree the user went to, and on this basis, it learns a new response to “coach class”. The next time a caller (either the same person or a different person) uses the words “coach class” the system does not offer the traditional path as it did the first time, but instead it offers a new set of nodes based on what it learned the first time. Thus, in such implementations, the thesaurus is a dynamically changing entity, continually updating itself by learning new words and terms and learning new “meanings” (i.e. new actions or responses) for existing terms.

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Implementations according to the invention can also allow novel groupings of nodes to be presented to the caller based on his query. If he asks for “economy class” without specifying whether he wants an international or domestic reservation, then the system would offer him the nodes a6 and a9 (appropriately phrased in natural language), and allow him to further choose whether he wants international or domestic reservations, something current systems do not offer. In other words, the system can pick out the relevant responses from different branches of the tree and pool them together and offer them to the caller.

This functioning of the system, by which it is able to skip around laterally or vertically in the tree, is enabled by the associating of natural language (i.e. human language) verbal descriptions with each node, and then using these as an initial basis for the navigation, augmented, in some variants, by a dynamically changing thesaurus that greatly expands its range and comprehension.

Thus, based upon a conceptual understanding of the above examples, further details of the process will now be presented.

The flowcharts of FIGS. 7 through 14 are illustrative of a functional example of the general method of a more complex variant the invention as would be implemented in software according to the flowcharts in this case for a newspaper subscription application. It should be understood that particular details are provided in the description below merely for completeness or because they are necessary or helpful for forming an understanding of the particular implementation. They are not to be considered essential for implementing the invention. Similarly, details unrelated to or unnecessary for understanding the invention have been omitted to avoid confusion.

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An example implementation is described and contains two programs, a preparatory program, illustrated in FIGS. 7-10 and a transaction or query processing program, illustrated in FIGS. 11-14. In addition, a particular software implementation fairly corresponding to the flowcharts of FIGS. 7 - 14 appears in the Appendix A that follows. The program contained therein, is written in the "C" programming language for execution on any personal computer having a processor, memory , input-output, etc. capabilities to run the particular application in its intended environment.

Broadly, the first program process of FIGS. 7-10 constructs an inverted index and an application-specific thesaurus and the second program process of FIGS. 11-14 uses those constructs in a transaction processing system to interact with a user.

In the preparatory program of FIGS. 7A, 7B and 8-10, the shorthand names of files that the program uses and the contents of the corresponding files are as follows. Notably, both the process parts shown in FIG. 7A and 7B as well as the process part shown in FIG. 8 are indicated as start points. This is because they are each independent of each other in that any of the three could start before any other or two or more could be run concurrently. Thus, it should not be presumed that they are mutually exclusive or any one is per se required for the invention. Moreover, it should be understood that any one or more could have been undertaken at a different time, by a different entity, or for a different application. Whether one or more of the portions shown in FIG. 7A, FIG. 7B or FIG. 8 are the starting points, the starting point for actual operational processing will be the same.

The file named 'p' contains a list of prompts or verbal descriptions in a hierarchical relationship (i.e. they can be visualized or arranged in a tree-type graph).

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The file named 'w' contains documents that are related to the prompts or verbal descriptions in 'p'. For example, 'w' could contain a training manual for customer service personnel or a website document that is likely to contain material that is related to the queries customers may have. This file is used to create a thesaurus.

The file named 'f' contains forms that are used to elicit relevant information from customers. They have fields like 'name', for example, which would be used by the system to ask and record a caller's name.

The file named 'x' contains an index associating the forms in 'f' with terminal prompts or descriptions in 'p'. Once a terminal prompt is reached in the process, the corresponding form from the file 'x' is activated, and the system proceeds to elicit information from the user.

The file named 's' contains a list of application-specific stop words, many of which are high-occurrence and/or generally uninformative words like 'a', 'an', 'the' or 'from' or words with a high-occurrence in for the particular application such that they have little meaning, for example, 'fly' in an airline reservation system, 'street' in a navigation system, 'file' in a computer search tool. These are eliminated from 'p' and 'w' and 'f' before processing, because they don't carry any useful information for the application.

The file 't.cfg' contains the thesaurus and inverted index that will be constructed by the program. Of course, in alternative variants, the thesaurus could be a separate file from the inverted index file and either or both could be made up of multiple files.

The file 'l.cfg' is a file that is used to store newly learned words. As with the 't.cfg' file, the 'l.cfg' file need not be a separate file, it could be part of 't.cfg', or part of a separate thesaurus and/or inverted index file. Similarly, the 'l.cfg' file could be made up of several files.

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With reference to FIGS. 7A, 7B and 8 through 10, the processes as carried out by the first program are as follows. It bears noting that, although the process and its components are presented by way of example in a particular order, unless a specific process component is expressly stated to necessarily have to occur at a particular time or after some other particular process component, or two process components must necessarily occur in sequence because one relies upon completion of the other before it can start, no order should be implied or considered required since the order in different implementations may be different and may vary based upon the particular programmer, programming language and/or computer involved.

The files p, w, f, x, and s are each read and processed as follows. It should be understood that the order of processing of file 'p' relative to file 'f' or their respective sub-processing components, although shown sequentially, could be done in a myriad of ways including doing each of the reading extracting and storing concurrently or as a common operation (i.e. reading for both is done before extracting for both, etc.).

Specifically, keywords are extracted from p ___ and from f ____. These are initially just all the words or terms contained in the prompts in p. The keywords are stored, for example, in a temporary file.

Similarly, thesaurus words are extracted from w. These are initially just all the words or terms in w. They are also stored, for example, in a temporary file.

Stop words are loaded from s (902) and stop words and duplicate words are eliminated from keywords and thesaurus words stored in the temporary files.

The thesaurus is constructed in accordance with FIGS. 9 and 10 described in overview as follows:

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- a. Increment the file of thesaurus words with keywords from p and f remaining after elimination of stop words.
- b. Create a matrix of thesaurus words as row words (or words listed along the rows of the matrix) against keywords as column words (or words listed along the columns of the matrix).
- c. Count the number of co-occurrences of each row word with each column word of the matrix in the documents contained in w and fill in that number in the corresponding matrix cell. (For example, a co-occurrence of a pair of words may be defined as that pair occurring in the same paragraph. If w is made up of a hundred paragraphs, then take each pair of row word and column word and count the number of times this pair occurs within the space of each of the hundred paragraphs in w. For each pair, the pair may co-occur zero or more times in a paragraph and add up the number of co-occurrences in all the paragraphs in w.)

This process yields a matrix filled with nonnegative integers in each cell. It is then possible to consider each row of numbers as a vector associated with the corresponding row word. When viewed geometrically, these vectors, one for each row word, form angles with each other in a multi-dimensional space. As a result, we can calculate the cosine of each such angle by computing scalar products for the angles. Thus, we compute the cosines of the angles formed by the vectors associated with each pair of row words.

The cosine values for all pairs of row words and column words are calculated and stored, for example, in a new matrix.

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For each row word, the top 'n' cosine values are identified as are the corresponding keywords. For example, in an airline system context, if there are two row words 'coach' and 'economy', where 'economy' is also a keyword (originally from p and/or f), and if the cosine value of this pair or words is among the top 'n' cosines for the word 'coach', then 'economy' is identified as a synonymous keyword for coach.

A new file can then be created, formatted for example, by listing thesaurus words on the left (e.g. coach), and against each thesaurus word, its associated keywords (e.g. economy). This is referred to as an inverted index (i.e. the thesaurus) of row words and their keyword synonyms. Essentially, this file will now contain words like 'coach' coupled with its particular alternative meanings, one of which may be 'economy'. The user interactive transaction processing program, the second program, will later use this thesaurus file when a caller uses a word like 'coach' in his query to determine the relevant keywords (like 'economy'). This will enable the program to find the relevant prompt with which to respond to the user.

Optionally, to provide the system with a set of prompts or verbal descriptions with which to respond to a user, another inverted index is created using the files p, f, and x. This index will contain a list of keywords from p and/or f associated with the prompts in which they occur. Thus, when a user uses a synonym like 'coach' in a query, the second program will look up the thesaurus, find the keywords corresponding to it (e.g. 'economy'), and then look up the inverted index to find the prompts corresponding to 'economy' and other corresponding keywords.

Once both the inverted index and thesaurus files have been created, the file t.cfg can be created from them for use by the second program.

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The program opens the interaction with a greeting (1106) and an elicitation of the first query from the caller (1108). This might be: "Thank you for calling the New Herald. How may we help you?"

The caller then utters his or her statement: "I want to subscribe".

The stop words in the statement are first eliminated, leaving behind just the word "subscribe".

The statement is then processed in the following way:

The keywords and the thesaurus words remaining in the query are identified (1202, 1204) by comparing with the list in t.cfg and l.cfg. As we have assumed that "subscribe" is neither, we have none.

The prompts that best match the identified keywords and thesaurus words are selected (1206). As there are no such words identified, there are no prompts selected.

The program arrives at a decision in the flowchart: are any nodes selected? (1208). Since the answer is in the negative, the program will follow the branch and select the top level node (1218). (Note: These top level prompts are the ones at the top level of the menu tree.) This completes the prompt selection process. The process then proceeds to the second part of the query process.

The process proceeds with another decision: has a single leaf prompt been selected? (1210). Since the top level prompts are selected (of which there are more than one and also none is a leaf prompt), a negative answer is the result.

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These prompts or verbal descriptions are issued to the user (caller) and elicit another response. Assume that the offered verbal descriptions are as follows:

- System: Are you calling about subscriptions?
- System: Is there a problem with your paper or delivery?
- System: Would you like information about the New York Times website?
- System: Are you calling about advertisements?
- System: Are you calling about something else?

Assume further that the caller responds as follows:

User: I am calling about subscriptions.

As a result, the program returns to selecting verbal descriptions by identifying the keywords and the thesaurus words remaining in the query by comparing with the list in t.cfg and l.cfg (1202, 1204). "Subscriptions" is now synonymous with a keyword and it is identified.

The program will again select verbal description(s) that best match the identified keywords and thesaurus words (1206).

For example, assume these are:

- System: Would you like to order a subscription?
- System: Would you like to give a gift subscription?
- System: Would you like to change your address or change any other information?

The program then arrives at a decision branch (1208) in the flowchart: are any nodes selected? Since the answer is affirmative, it follows that branch and exits the prompt selection process and returns to the query process.

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This begins with another decision box: is a single leaf node selected? (1210). The answer is no, since three prompts have been selected.

Next, these verbal descriptions are issued to the caller and the system will await his response (1220). We assume the caller responds as follows:

User: I want to order a subscription

The program will again return through a loop to the prompt selection process (1202, 1204, 1206) where the program will identify the keywords and the thesaurus words remaining in the query by comparing with the list in t.cfg and l.cfg. "Order" and "subscription" are now identified.

Verbal descriptions are selected that best match the identified keywords and thesaurus words. Now assume this is just the prompt "Would you like to order a subscription?" from the three descriptions above.

The program will then arrive at a decision branch (1208) in the flowchart: are any nodes selected? Since the answer is affirmative, it follows that branch and exits the prompt selection process and returns to the query process to again arrive at a decision: has a single leaf node been selected? (1210). This time the answer is yes, a single prompt has been reached, which is also a leaf prompt, since it is at the bottom of the menu tree.

This is followed by another decision: any verbal description corresponding to the node? (1212). The program checks t.cfg and finds the answer is no.

The branch then leads to yet another decision (1214): is a form for verbal description available? The answer by checking the index x is the yes branch. This leads to the portion of the flowchart of FIG. 13.

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The form is processed in the following way:

The first part is a decision: is it a response form? (1302). The answer is no.

The system then issues questions to the caller based on the form and accepts information back (1304). The questions are of the form "Please tell us your name", "Where do you live?", "Do you want an annual or half-yearly subscription?" etc. The caller provides the information to the system.

It repeats the information the caller has given the system and asks if the information is correct. Let us assume the user confirms that the information is correct.

The system then calls an external routine to store the information in a database. The routine returns another form to the system (1306) and returns in a loop to the question: is it a response form? (1302). Since the form contains questions about the payment, based on the type and period of subscription selected by the caller, the answer will be negative.

The system then issues these questions to the caller and the caller provides the required information (1304).

The system then repeats the information and gets a confirmation from the caller.

The information is passed to another routine (mentioned in the form) to update the database. This routine (1306) then returns a response form and again returns in the loop to the question: is it a response form? (1302). This time the answer is yes. The system then issues a response (1308) thanking the caller for the subscription, and exits this process returning to FIG.

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System: Would you like information about the New York Times website?

System: Are you calling about advertisements?

System: Are you calling about something else?

Caller: I am calling about subscriptions

System: Would you like to order a subscription?

System: Would you like to give a gift subscription?

System: Would you like to change your address or change any other information?

Caller: I want to order a subscription

System: Please tell us your name

Caller: Bertrand Russell

System: Where do you live?

The dialogue continues in this way with the system eliciting the required information from the caller.

Having demonstrated traversal in a system where the system was constructed to learn when an unknown word is used, what happens the second time a caller uses the same word “subscribe” in a query after it has been learned by the system can now be demonstrated. This demonstrates the power of including the optional feature of learning in the program.

In this case, the dialogue that occurs when a new caller uses the word “subscribe” following the above is now presented.

Dialogue:

Caller: I want to subscribe

System: Please tell us your name

Caller: J. L. Austin

System: Where do you live?

Thereafter, the process continues. Notably, the system has now learned the correct response to the query “I want to subscribe”.

Other Variants

Having described several simple and more complex examples that make it possible to use the invention, other variants can now be presented. Examples of such optional functions that can be incorporated into other variants, individually or collectively, include:

- a) creating the thesaurus by providing access to a collection of multiple documents and determining synonymy based on sufficient similarity of meaning with the keywords as measured by the frequency of co-occurrence of the keywords in the collection of documents;
- b) identifying words in the user’s response by recording the response for future learning;
- c) parsing out of a response all non-stop word unknown terms or keywords;
- d) identifying synonyms for all non-stop terms in the user’s response;
- e) cycling between user and system responses until the user reaches a vertex (i.e. verbal description) that enables him to carry out his goal and updating the thesaurus when the goal vertex is reached by associating the recorded previously unknown words in the user’s response with the keywords that are associated with the verbal description reached by the user;
- f) recording, when the goal vertex is reached, the pairs of synonyms in the user’s responses and the keywords that are associated with the verbal description reached by the user;

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g) removing associations between keywords and their synonyms from the thesaurus that have not been accessed more than a specified amount of times within a specified period (this can be based upon a parameter set in the system by the system's administrator or can occur as part of program maintenance or updates);

h) selecting the verbal descriptions that best meet the user's goal as indicated by the keywords and synonyms in the user's response by identifying the keywords in the user's response and/or the keywords corresponding to synonyms in the user's response and computing a degree of match between each verbal description and the identified keywords, in accordance with conventional linguistic processing techniques;

i) computing the degree of match between verbal descriptions and identified keywords by utilizing the pairs of synonyms in user's response and the keywords associated with the verbal descriptions reached by users as previously recorded;

j) responding to the user on the basis of verbal descriptions selected by presenting the user with verbal descriptions that best match the user's previous response;

k) for "best match" variants, in the event that even the best matches have a low degree of match, the best "n" verbal descriptions are presented to the user ("n" being a number representing a predetermined system parameter);

l) for "best match" variants, in the event that the best matches have a low degree of match, the user is automatically connected to a human operator, when or if a human operator is available;

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- m) for “best match” variants in the event that the best matches have a low degree of match, the best “n” verbal descriptions are presented to the user, along with an option of being connected to a human operator when or if a human operator is available;
- n) presenting the user with those verbal descriptions that best match the user’s previous response in order to elicit any information from the user that may be required to accomplish the user’s goal;
- o) recording information elicited from a user in a database for future use;
- p) selecting multiple vertices in the graph structure that are not connected to a previously selected vertex, based upon parameters associated with nodes correlated to keywords and synonyms in a user’s response;
- q) selecting a vertex in the graph structure in the same row as the previously selected vertex based upon the keywords and synonyms in the user’s response; and/or
- r) updating the thesaurus by adding words from a user’s response that are not in the thesaurus.

Finally, it is to be understood that various variants of the invention including representative embodiments have been presented to assist in understanding the invention. It should be understood that they are not to be considered limitations on the invention as defined by the claims, or limitations on equivalents to the claims. For instance, some of these variants are mutually contradictory, in that they cannot be simultaneously present in a single embodiment. Similarly, some advantages are applicable to one aspect of the invention, and inapplicable to others. Thus, no particular features or advantages should be considered dispositive in determining equivalence.

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It should therefore be understood that the above description is only representative of illustrative embodiments. For the convenience of the reader, the above description has focused on a representative sample of all possible embodiments, a sample that teaches the principles of the invention. The description has not attempted to exhaustively enumerate all possible combinations or variations, for example, those arising out of the use of particular hardware or software, or the vast number of different types of applications in which the invention can be used. That alternate embodiments may not have been presented for a specific portion of the invention, or that further undescribed alternate embodiments may be available for a portion of the invention, is not to be considered a disclaimer of those alternate embodiments. One of ordinary skill will appreciate that many of those undescribed embodiments incorporate the minimum essential aspects of the invention and others incorporate one or more equivalent aspects.

APPENDIX A

FILE IDENTIFICATION

Main Source Files

main.c, process.c, arraylib.c, stemlib.c, dialog.c, interactive.c, formlib.c

Header Files

globalvar.h, process.h, arraylib.h, forms.h

Make Files

Makefile

Parameter Files

t.ini, d.ini

Data Files

p, w, s, f, x, a

Configuration Files

t.cfg, l.cfg

Shell Script Files

acct_info, add_acct, chg_acct, get_pymt, updt_pymt, susp_deli, updt_acct, prefer

MAIN SOURCE CODE (in C)

main.c: Main Program to process p and w to create the thesaurus

SOURCE CODE DOCUMENTATION

*****/

```
#include <stdio.h>
#include <string.h>
#include "process.h"
#include "arraylib.h"
#include "forms.h"
```

```
int numColumn = 0, numRows = 0, numIndex = 0, numMenu;
int topValues = 5;
char **rowTerms, **columnTerms, **prompts, **stopWords;
double **matrix, **cosine;
float phoneThreshold = 0.02, webThreshold = 0.0006;
int **indexList, **menuList, **thesaurus, **promptKeys;
int numStopWord = 0;
int numForms, numPF;
struct form **formlist;
char ***Fprompts, *wdoc, *pdoc, *sdoc, *fdoc, *xdoc, *cfg;
```

```
main(int argc, char *argv[]) {
```

```
int i, j;
```

*****/

PRINT THESAURUS PROGRAM INFO

*****/

```
/* if (argc != 5) {
    printf("Usage Instructions: t p w f x\n");
    printf("Parses w for matrix row terms and p for matrix column terms.\n");
    printf("**** Exiting, goodbye.\n");
    exit(1);
} */
```

```
if (argc != 2) {
    printf("Usage Instructions: t <ini-file>\n");
```

```
printf("*** Exiting, goodbye.\n");
exit(1);
}
/*****
```

OPEN INPUT FILES

```
*****/
readini(argv[1]);
loadStopWords(sdoc);
numPF = loadFormsList(xdoc);
numForms = loadForms(fdoc);

/*****
```

PREPARATION FOR PHONEDOC PARSING

```
*****/
printf("\nReading files ...\n");
numColumn = processFile(pdock, &columnTerms, phoneThreshold);
// printf("The document contains %d relevant terms.\n\n", numColumn);

// This routine will add the keywords from the Forms into ColumnTerms.
numColumn = addFormKeys(&columnTerms, numColumn);

// printf("The document contains %d relevant terms.\n\n", numColumn);

/*****
```

PREPARATION FOR WEBDOC PARSING

```
*****/

numRow = processFile(wdoc, &rowTerms, webThreshold);

/*****
```

MERGE COLUMNTERMS & FINALTERMS INTO ROWTERMS

```
*****/

numRow = mergeArray(&rowTerms, columnTerms, numRow, numColumn);
sortArray(rowTerms, numRow);
```

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```
// printf("The document contains %d relevant terms.\n\n", numRows);
/*****
```

MATRIX CONSTRUCTIONS

```
*****/
```

```
printf("loading prompts ...\n", numIndex);
numIndex = loadPrompts(pdock);
printf("processing words ...\n", numIndex);
createMatrix(wdock);
numRow = eraseZeroes();
calcCosine();
fillIndex();
// This function will add leaf prompts to the index keywords from Forms.
// appendIndex(argv[3]);
createThesaurus();
// printf("created thesaurus .\n\n", numIndex);
printf("saving data ...\n");
saveData(cfg);
printf("done.\n");
}
```

```
readini(char * filename)
{
    FILE * fp;
    char buf[80], key[80], value[80], comment[80];
    int cnt;
    if ((fp=fopen(filename,"r"))==NULL)
    {
        perror(filename);
        exit(1);
    }
    while (fgets(buf,79,fp)!=NULL)
    {
        sscanf(buf,"%s %s %s",key,value, comment);
        if (!strcmp(key, "pdock"))
            pdock=strdup(value);
        if (!strcmp(key, "wdock"))
            wdock=strdup(value);
        if (!strcmp(key, "sdock"))
            sdoc=strdup(value);
    }
}
```

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```

    if (!strcmp(key, "fdoc"))
        fdoc=strdup(value);
    if (!strcmp(key, "xdoc"))
        xdoc=strdup(value);
    if (!strcmp(key, "cfg"))
        cfg=strdup(value);
    if (!strcmp(key, "pt"))
        sscanf(buf,"%s %f %s",key,&phoneThreshold,value);
        //phoneThreshold=(float)atof(value);
    if (!strcmp(key, "wt"))
        sscanf(buf,"%s %f %s",key,&webThreshold,value);
    if (!strcmp(key, "tv"))
        topValues=atoi(value);
}
}

```

process.c: This program contains various functions called from Main

```

#include <stdio.h>
#include <string.h>
#include <math.h>
#include "globalvar.h"
#include "arraylib.h"
#include "forms.h"
#define min(x, y) (x < y) ? x : y

int *rowcount, *colcount;

int processFile(char *filename, char ***cArray, float threshold) {
FILE * fp;
char tmpWord[50], paraFlag;
int i, numWords = 0, wordLen = 0, totWords = 0;
float *freqArray;

fp = fopen(filename,"r");
*cArray = NULL;
freqArray = NULL;

while((wordLen = fetchWord(fp, tmpWord)) != 0) {
    totWords++;
    if (! inArray(stopWords, tmpWord, numStopWord)) { // ignore stopwords

```

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```

stemWord(tmpWord);
if (i = inArray(*cArray, tmpWord, numWords)) {
    freqArray[i - 1]++;
}
else {
    addWord(cArray, tmpWord, ++numWords);
    freqArray = (float *) realloc(freqArray, numWords * sizeof(float));
    freqArray[numWords - 1] = 1;
}
}
}
// printf("Totwords = %d, numWords = %d\n",totWords, numWords);
for ( i = 0; i < numWords; i++)
{
    if ((float)(freqArray[i] / totWords) >= threshold)
        (*cArray)[i] = NULL;
}

numWords = removeNulls(*cArray, numWords);
sortArray(*cArray, numWords);

return numWords;
}

/*****
Prompts Processing
*****/

int loadPrompts(char *filename)
{
    char buffer[256];
    int i = 0, j, len, nc;
    int level[10], tabs, m = 0;
    FILE * fp;

    for (i = 0; i < 10; i++)
        level[i] = 0;

    fp = fopen(filename, "r");
    prompts = NULL;
    menuList = NULL;
    j = i = 0;
    while (fgets(buffer, 256, fp) != NULL)

```


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```

{
tabs = allTrim(buffer);
if ((len = strlen(buffer)) == 0)
    continue;
if ((j = inArray(prompts, buffer, i)) == 0)
    j = i;
else
    j--;
level[tabs + 1] = j + 1;
menuList = (int **)realloc(menuList, ++m * sizeof(int *));
menuList[m - 1] = (int *)malloc(3 * sizeof(int));
menuList[m - 1][0] = level[tabs];
menuList[m - 1][1] = level[tabs + 1];
menuList[m - 1][2] = 0;
if (j == i)
    addWord(&prompts, buffer, ++i);
}
numMenu = m;
for (j = 0; j < numMenu; j++)
{
for (m = 0; m < numMenu; m++)
    if (menuList[j][1] == menuList[m][0])
        break;
if (m != numMenu) /* Leaf Node */
    continue;
nc = 0;
for (m = 0; m < numMenu; m++)
    if (menuList[m][0] == menuList[j][0])
        nc++;
if (nc != 1)
{
    menuList[j][2] = 99;
    continue;
}
len = strlen(prompts[menuList[j][1] - 1]);
if (prompts[menuList[j][1] - 1][len - 1] == '?')
    menuList[j][2] = 99;
else
{
    for (m = 0; m < numMenu; m++)
        if (menuList[m][1] == menuList[j][0])
            menuList[m][2] = menuList[j][1];
    menuList[j][2] = 100;
}
}

```

```

    }
}
return i;
}

```

```

void fillIndex()
{
int i, j, k;

indexList = (int **)malloc(numColumn * sizeof(int *));
for (i = 0; i < numColumn; i++) {
    indexList[i] = (int *)malloc(numIndex * sizeof(int));
    for (j = 0; j < numIndex; j++)
        indexList[i][j] = 0;
}

for (i = 0; i < numIndex; i++)
    updateThesaurus(prompts[i], i + 1);
updateFrmForms();

}

updateThesaurus( char *str, int pmpt)
{
char tmpstr[256];
char *sarray[50];
int i, j, k, wrds;
int iflag = 0, dflag = 0;

strcpy(tmpstr, str);
wrds = readValues(tmpstr, sarray);
stemArray(sarray, wrds);
for (i = 0; i < wrds; i++)
{
    for (j = 0; j < numColumn; j++)
    {
        if (!strcmp(columnTerms[j], sarray[i]))
        {
            iflag = 1;
            dflag = 0;
            for (k = 0; indexList[j][k] && k < numIndex; k++)
                if (indexList[j][k] == pmpt)

```

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```

                                dflag = 1;
                                if (k < numIndex && dflag == 0)
                                    indexList[j][k] = pmpt;
                                break;
                                }
                            }
if (iflag == 0)
{
    printf("** warning the following prompt does not contain index word\n");
    printf("\t\t%s\n", str);
}
}

/*****
Create Matrix here
*****/
void createMatrix(char * filename) {
    int i, j, nwp = 0, k = 0;
    int minv;
    FILE * fp;

    /* allocate memory for matrix */
    matrix = (double **)malloc(numRow * sizeof(double *));
    for (i = 0; i < numRow; ++i) {
        matrix[i] = (double *)malloc(numColumn * sizeof(double));
        for (j = 0; j < numColumn; j++)
            matrix[i][j] = 0;
    }

    /* allocate memory for rowcount and column count */
    rowcount = (int *)malloc(numRow * sizeof(int));
    colcount = (int *)malloc(numColumn * sizeof(int));

    /* Go to start of document */

    fp = fileOpen(filename,"r");

    while (!feof(fp))
    {
        /* initialize rowcount array */
        for (j = 0; j < numRow; j++)

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```

        rowcount[j] = 0;
/* initialize columncount array */
for (j = 0; j < numColumn; j++)
    colcount[j] = 0;

nwp = readPara(fp);
if (feof(fp))
    break;
if (nwp == 0)
    continue;

/* add co-occurrence of rowword & colword to the matrix */
for (j = 0; j < numRows; j++)
    for (k = 0; k < numColumn; k++) {
        minv = min(rowcount[j], colcount[k]);
        matrix[j][k] += minv;
    }
}

int readPara(FILE *fp )
{
int i, j, k, wcount = 0, m = 0;
int nextpara, currpara, wordLen;
char tmpword[50];

currpara = ftell(fp);
wcount = wordsInPara(fp);
if (feof(fp)) {
    if (wcount == 0)
        return 0;
}

nextpara = ftell(fp);
fseek(fp, currpara, 0);
for (i = 0; i < wcount; ++i) {
    wordLen = fetchWord(fp, tmpword);
    if (inArray(stopWords,tmpword,numStopWord))
        continue;
    stemWord(tmpword);

/* count the occurrence of each word from the row in para */

```

```

        for (j = 0; j < numRows; j++)
            if (!strcmp(rowTerms[j], tmpword)) {
                rowcount[j]++;
                break;
            }
        /* count the occurrence of each word from the column in para */
        for (j = 0; j < numColumn; j++)
            if (!strcmp(columnTerms[j], tmpword)) {
                colcount[j]++;
                break;
            }
    }
    fseek(fp, nextpara, 0);
    return wcount;
}

```

```

int wordsInPara (FILE *fp)
{
    int c, count = 0;
    int state;
    const int out = 0, in = 1;

    state = out;
    while ((c = getc(fp)) != EOF) {
        if (!isalpha(c)) {
            if (c == '\n' || c == EOF)
                break;
            state = out;
        }
        else
            if (state == out) {
                state = in;
                count++;
            }
    }
    return count;
}

```

```

/*****
Calculate Cosine Function
*****/
void calcCosine()

```

```

{
int i, j, k, sum;

/* memory allocation for the cosine matrix */

cosine = (double **)malloc(numRow * sizeof(double *));
for (i = 0; i < numRow; ++i) {
    cosine[i] = (double *)malloc(((numRow) * sizeof(double)));
    for (j = 0; j < numRow; j++)
        cosine[i][j] = 0;
}

/*Normalization*/

for (i = 0; i < numRow; ++i)
{
    sum = 0;
    for (k = 0; k < numColumn; ++k)
        sum += matrix[i][k] * matrix[i][k];
    if (sum != 0)
    {
        for (j = 0; j < numColumn; ++j)
            matrix[i][j] = matrix[i][j] / sqrt(sum);
    }
}

/*Cosines*/

for (i = 0; i < numRow; ++i)
{
    for (k = i + 1; k < numRow; ++k)
    {
        cosine[i][k] = 0;
        for (j = 0; j < numColumn; ++j)
            cosine[i][k] += matrix[i][j] * matrix[k][j];
    }
}

}

/*****
eraseZeroes : removes the row with all zero column in the matrix
*****/
int eraseZeroes() {

```



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```

int j, k;
int cond;

/* Free and nullify the rowTerms and matrix row for all zeroes */
for (j = 0; j < numRows; ++j) {
    cond = 1;
    for (k = 0; k < numColumn; ++k) {
        if (matrix[j][k] != 0) {
            cond = 0;
            break;
        }
    }
    if (cond == 1) {
        rowTerms[j] = NULL;
        matrix[j] = NULL;
    }
}

/* Push NULL rows at the end of arrays */
for (j = 0; j < numRows; j++)
{
    if (rowTerms[j] == NULL)
    {
        for (k = j + 1; k < numRows; k++)
            if (rowTerms[k] != NULL)
                break;
        if (k < numRows)
        {
            rowTerms[j] = rowTerms[k];
            matrix[j] = matrix[k];
            rowTerms[k] = NULL;
            matrix[k] = NULL;
        }
    }
}

/* count new numRows */
for (j = 0; (rowTerms[j] != NULL) && j < numRows; j++);

return j;
}

```

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```

/*****
createThesaurus: Function to Create Thesaurus of rowTerms by taking the
index words matching the top 5 cosine values.
*****/
void createThesaurus()
{
int i, j, k, l;
int m, numword;
double *tmpcos, prevcosine = 0;
int *colnum;

tmpcos = (double *)malloc(numRow * sizeof(double));
colnum = (int *)malloc(numRow * sizeof(int));

thesaurus = (int **)malloc(numRow * sizeof(int *));
for (i = 0; i < numRow; i++) {
    thesaurus[i] = (int *)malloc(numColumn * sizeof(int));
    for (j = 0; j < numColumn; j++)
        thesaurus[i][j] = 0;
}

/* initialization of thesaurus */

for (i = 0; i < numRow; i++) {
    for (j = 0; j < numRow; j++) {
        if (i > j)
            tmpcos[j] = cosine[j][i];
        else
            if (i < j)
                tmpcos[j] = cosine[i][j];
            else
                tmpcos[j] = 0;
        colnum[j] = j;
    }
    floatSort(colnum, tmpcos, numRow);

    numword = prevcosine = 0;

    /* count top 'topValues' of cosine */
    for (m = 0; m < numColumn; m++) {
        if (prevcosine != tmpcos[m])
            numword++;
    }
}

```


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```

printArray(fp, "PROMPTS", prompts, NULL, numIndex, 0); // Write Prompts to the file

/***** Write Menu-Tree to the file *****/
// printArray(fp, "MENUTREE", NULL, menuList, numMenu, 2);
fprintf(fp, "[%s]\n", "MENUTREE");
for (i = 0; i < numMenu; i++)
    fprintf(fp, "%d,%d,%d\n", menuList[i][0], menuList[i][1], menuList[i][2]);
fprintf(fp, "\n");

printArray(fp, "INDEX", columnTerms, indexList, numColumn, numIndex); // Write Index to
the file
printArray(fp, "THESAURUS", rowTerms, thesaurus, numRows, numColumn); // Write
Thesaurus to the file

fclose(fp);
printf("Data saved in %s\n", filename);
}

printArray(FILE *fp, char *head, char **cArray, int **iArray, int cNum, int iNum)
{
int i,j;
fprintf(fp, "[%s]\n", head);
for (i = 0; i < cNum; i++)
    {
    fprintf(fp, "%s ", cArray[i]);
    for (j = 0; j < iNum && iArray[i][j] != 0; j++)
        fprintf(fp, "%d,", iArray[i][j]);
    fprintf(fp, "\n");
    }
fprintf(fp, "\n");
}

int addFormKeys(char ***cArray, int count)
{
char **wordList, *tmparray[20];
int i, j, k, words;
int l, tmpcount;

wordList = NULL;
words = 0;
for(i = 0; i < numForms; i++)

```

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```

for (j = 0; j < formlist[i]->numFields; j++)
    {
        if (!strcmp("MChoice", formlist[i]->fields[j]->Type))
            for(k = 0; k < formlist[i]->fields[j]->numChoice; k++)
                {
                    tmpcount = createArray(formlist[i]->fields[j]->Choice[k],
tmparray);
                    for(l = 0; l < tmpcount; l++)
                        addWord(&wordList, tmparray[l], ++words);
                }
    }

i = mergeArray(cArray, wordList, count, words);
sortArray(*cArray, i);
return i;

}

```

```

updateFrmForms()
{
int i, j, k, l;
int m, n, x, tmpcount;
int pmpt;
char *tmpstr, *tmparray[20];

for (i = 0; i < numPF; i++)
    {
        pmpt = inArray(prompts, Fprompts[i][1], numIndex);
        if (pmpt == 0)
            {
                printf("Unknown prompt encountered for form %s\n", Fprompts[i][0]);
                exit(1);
            }
        for(j = 0; j < numForms; j++)
            if (!strcmp(Fprompts[i][0], formlist[j]->name))
                break;
        if (j == numForms)
            continue;
        for(k = 0; k < formlist[j]->numFields; k++)
            {
                if (strcmp(formlist[j]->fields[k]->Type, "MChoice"))

```

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```

        continue;
    for(l = 0; l < formlist[j]->fields[k]->numChoice; l++)
    {
        tmpcount = createArray(formlist[j]->fields[k]->Choice[l], tmparray);
        for(m = 0; m < tmpcount; m++)
        {
            n = inArray(columnTerms, tmparray[m], numColumn);
            n--;
            for (x = 0; indexList[n][x] && x < numIndex; x++)
                if (indexList[n][x] == pmpt)
                    break;
            if (x < numIndex && indexList[n][x] == 0)
                indexList[n][x] = pmpt;
        }
    }
}
}
}
}
}

```

arraylib.c: This program contains general purpose functions

```

#include <stdio.h>
#include <string.h>
#include "globalvar.h"
#include "forms.h"

FILE * fileOpen(char *, char *);

int fetchWord(FILE *f, char * wrd) {
    int i = 0, c;
    wrd[0] = 0;
    if (feof(f))
        return 0;
    while(!isalpha(c = fgetc(f)))
        if (c == EOF)
            return 0;
    do {
        wrd[i++] = tolower(c);
    } while(isalpha(c = fgetc(f)));
    wrd[i] = 0;
    return i;
}

```

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```

int inArray(char **array, char *word, int length)
{
int i;

for (i = 0; i < length; i++)
    if (array[i] != NULL && !strcmp(array[i], word))
        return i + 1;

return 0;
}

int removeNulls(char **strarray, int numWords)
{
int i, j;

for (i = 0; i < numWords; i++)
    {
    if (strarray[i] == NULL)
        {
        for (j = i + 1; j < numWords; j++)
            if (strarray[j] != NULL)
                {
                strarray[i] = strarray[j];
                strarray[j] = NULL;
                break;
                }
            }
        }

/* get count of filtered words */
for (j = 0; (strarray[j] != NULL) && (j < numWords); j++);
return j;
}

int mergeArray(char ***Array1, char **Array2, int numArray1, int numArray2) {
int i;

for (i = 0; i < numArray2; i++)
    if (! inArray>(*Array1, Array2[i], numArray1))
        addWord(Array1, Array2[i], ++numArray1);

return numArray1;
}

```

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```

int readValues(char *str, char **array)
{
int i, j = 0, c;
int state;
const int out = 0, in = 1;

state = out;
for (i = 0; (c = str[i]) != 0; i++)
    {
        if (!isalnum(c)) /* alfa-numeric to read numbers also */
            {
                state = out;
                str[i] = 0; /* word is over end it with null */
            }
        else
            {
                str[i] = tolower(c);
                if (state == out)
                    {
                        state = in;
                        array[j++] = str + i; /* word started, store the ptr.*/
                    }
            }
    }
return j;
}

```

```

void sortArray(char *allwords[], int numwords) {
int i = 0;
int j = 0;
char *tmp;

for (i = 0; i < numwords; ++i)
    for (j = i + 1; j < numwords; ++j)
        if (strcmp(allwords[i], allwords[j]) > 0) {
            tmp = allwords[i];
            allwords[i] = allwords[j];
            allwords[j] = tmp;
        }
}

```

```

loadStopWords( char * filename) {

```

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```

FILE * fp;
char tmpWord[50];
int wordLen = 0;

numStopWord = 0;
fp = fopen(filename,"r");
stopWords = NULL;
while((wordLen = fetchWord(fp, tmpWord)) != 0)
    addWord(&stopWords, tmpWord, ++numStopWord);
}

FILE * fopen(char *filename, char *mode)
{
FILE * fp;

if((fp = fopen(filename, mode)) == NULL) {
    perror(filename);
    exit(1);
}

return fp;
}

addWord(char ***cArray, char * word, int c)
{
*cArray = (char **) realloc(*cArray, c * sizeof(char *));
(*cArray)[c - 1] = strdup(word);
}

int removeZeros(int *intArray, int numInt)
{
int i, j;

for (i = 0; i < numInt; i++)
    {
    if (intArray[i] == 0)
        {
        for (j = i + 1; j < numInt; j++)
            if (intArray[j] != 0)
                {
                intArray[i] = intArray[j];
                intArray[j] = 0;
                break;
                }
        }
    }
}

```

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```

    }
}

/* get count of filtered integers */
for (j = 0; (intArray[j] != 0) && (j < numInt); j++);
return j;
}

/*****88
Newly added functions ( for further reducing the code )
*****/
int breakStr(char * str, char **strarray)
{
char c, *tmpstr;
int i, j = 0;
int state;
const int out = 0, in = 1;
/* Seperate the sentence into individual words */
tmpstr = strdup(str);
state = out;
for (i = 0; (c = tmpstr[i]) != 0; i++)
    {
        if (!isalpha(c))
            {
                state = out;
                tmpstr[i] = 0;
            }
        else
            {
                tmpstr[i] = tolower(c);
                if (state == out)
                    {
                        state = in;
                        strarray[j++] = tmpstr + i;
                    }
            }
    }
return j;
}

/* remove stopWords */
filterStopWords(char ** strarray, int numWords)
{

```


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```

    Fprompts = (char ***)realloc(Fprompts, (++numPF)*sizeof(char **));
    Fprompts[numPF-1] = (char **)malloc(2 * sizeof(char *));
    Fprompts[numPF-1][0] = strdup(buf);
    Fprompts[numPF-1][1] = strdup(buf + i + 1);
}
fclose(fp);
return numPF;
}

int loadForms(char * filename)
{
    int i, j, formcount = 0;
    FILE *fp;
    char buf[80], **namelist = NULL;
    formlist = NULL;
    numForms = 0;

    fp = fopen(filename, "r");
    while(fgets(buf,79,fp) != NULL)
    {
        if (buf[0] == '[')
        {
            for(i = 0; buf[i]; i++)
                if (buf[i] == '[' || buf[i] == ']')
                    buf[i] = ' ';
            allTrim(buf);
            addWord(&namelist, buf, ++formcount);
        }
    }

    for ( i = 0; i < formcount; i++)
    {
        formlist = (struct form **)realloc(formlist, (++numForms) * sizeof(struct form *));
        formlist[numForms - 1] = (struct form*)malloc(sizeof(struct form));
        loadForm(fp , formlist[numForms - 1], namelist[i]);
    }
    fclose(fp);
    return numForms;
}

int allTrim (char * str)
{
    int i, j, sf, tabs;

```

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```
    for (i = tabs = 0; isspace(str[i]) && str[i]; i++)
        tabs += (str[i] == '\t')? 1: 0;
    for (j = sf = 0; str[i]; i++, j++)
        str[j] = iscntrl(str[i])? ' ': str[i];
    for(str[j--] = 0; isspace(str[j]) && j > 0; str[j--] = 0);
    return tabs;
}

int createArray (char * str, char ** array)
{
    int count;
    count = breakStr(str, array);
    return processArray(array, count, 1);
}

int processArray(char ** array, int count, int sflag)
{
    if (sflag)
        filterStopWords(array, count);
    stemArray(array, count);
    filterDuplicates(array, count);
    return removeNulls(array, count);
}
```

stemlib.c: This program contains functions related to stemming algorithm

/* This is the Porter stemming algorithm, coded up in ANSI C by the author. It may be regarded as cononical, in that it follows the algorithm presented in Porter, 1980, An algorithm for suffix stripping, Program, Vol. 14, no. 3, pp 130-137, only differing from it at the points made --DEPARTURE-- below.

See also <http://www.tartarus.org/~martin/PorterStemmer>

The algorithm as described in the paper could be exactly replicated by adjusting the points of DEPARTURE, but this is barely necessary, because (a) the points of DEPARTURE are definitely improvements, and (b) no encoding of the Porter stemmer I have seen is anything like as exact as this version, even with the points of DEPARTURE!

You can compile it on Unix with 'gcc -O3 -o stem stem.c' after which 'stem' takes a list of inputs and sends the stemmed equivalent to

stdout.

The algorithm as encoded here is particularly fast.

```

Release 1
*/

#include <string.h> /* for memmove */

#define TRUE 1
#define FALSE 0

/* The main part of the stemming algorithm starts here. b is a buffer
   holding a word to be stemmed. The letters are in b[k0], b[k0+1] ...
   ending at b[k]. In fact k0 = 0 in this demo program. k is readjusted
   downwards as the stemming progresses. Zero termination is not in fact
   used in the algorithm.

   Note that only lower case sequences are stemmed. Forcing to lower case
   should be done before stem(...) is called.
*/

static char * b; /* buffer for word to be stemmed */
static int k,k0,j; /* j is a general offset into the string */

/* cons(i) is TRUE <=> b[i] is a consonant. */

int cons(int i)
{ switch (b[i])
  { case 'a': case 'e': case 'i': case 'o': case 'u': return FALSE;
    case 'y': return (i==k0) ? TRUE : !cons(i-1);
    default: return TRUE;
  }
}

/* m() measures the number of consonant sequences between k0 and j. if c is
   a consonant sequence and v a vowel sequence, and <.> indicates arbitrary
   presence,

   <c><v> gives 0
   <c>vc<v> gives 1
   <c>vcvc<v> gives 2
   <c>vcvcvc<v> gives 3

```

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```

    */
int m()
{ int n = 0;
  int i = k0;
  while(TRUE)
  { if (i > j) return n;
    if (! cons(i)) break; i++;
  }
  i++;
  while(TRUE)
  { while(TRUE)
    { if (i > j) return n;
      if (cons(i)) break;
      i++;
    }
    i++;
    n++;
    while(TRUE)
    { if (i > j) return n;
      if (! cons(i)) break;
      i++;
    }
    i++;
  }
}

/* vowelinstem() is TRUE <=> k0,...j contains a vowel */

int vowelinstem()
{ int i; for (i = k0; i <= j; i++) if (! cons(i)) return TRUE;
  return FALSE;
}

/* doublec(j) is TRUE <=> j,(j-1) contain a double consonant. */

int doublec(int j)
{ if (j < k0+1) return FALSE;
  if (b[j] != b[j-1]) return FALSE;
  return cons(j);
}

```

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/* cvc(i) is TRUE <=> i-2,i-1,i has the form consonant - vowel - consonant
and also if the second c is not w,x or y. this is used when trying to
restore an e at the end of a short word. e.g.

cav(e), lov(e), hop(e), crim(e), but
snow, box, tray.

*/

```
int cvc(int i)
{ if (i < k0+2 || !cons(i) || cons(i-1) || !cons(i-2)) return FALSE;
  { int ch = b[i];
    if (ch == 'w' || ch == 'x' || ch == 'y') return FALSE;
  }
  return TRUE;
}
```

/* ends(s) is TRUE <=> k0,...k ends with the string s. */

```
int ends(char * s)
{ int length = s[0];
  if (s[length] != b[k]) return FALSE; /* tiny speed-up */
  if (length > k-k0+1) return FALSE;
  if (memcmp(b+k-length+1,s+1,length) != 0) return FALSE;
  j = k-length;
  return TRUE;
}
```

/* setto(s) sets (j+1),...k to the characters in the string s, readjusting
k. */

```
void setto(char * s)
{ int length = s[0];
  memmove(b+j+1,s+1,length);
  k = j+length;
}
```

/* r(s) is used further down. */

```
void r(char * s) { if (m() > 0) setto(s); }
```

/* step1ab() gets rid of plurals and -ed or -ing. e.g.

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caresses -> caress
ponies -> poni
ties -> ti
caress -> caress
cats -> cat

feed -> feed
agreed -> agree
disabled -> disable

matting -> mat
mating -> mate
meeting -> meet
milling -> mill
messaging -> mess

meetings -> meet

*/

```
void step1ab()
{ if (b[k] == 's')
  { if (ends("\04" "sses")) k -= 2; else
    if (ends("\03" "ies")) setto("\01" "i"); else
    if (b[k-1] != 's') k--;
  }
  if (ends("\03" "eed")) { if (m() > 0) k--; } else
  if ((ends("\02" "ed") || ends("\03" "ing")) && vowelinstem())
  { k = j;
    if (ends("\02" "at")) setto("\03" "ate"); else
    if (ends("\02" "bl")) setto("\03" "ble"); else
    if (ends("\02" "iz")) setto("\03" "ize"); else
    if (doublec(k))
    { k--;
      { int ch = b[k];
        if (ch == 'l' || ch == 's' || ch == 'z') k++;
      }
    }
  }
  else if (m() == 1 && cvc(k)) setto("\01" "e");
}
}
```

/* step1c() turns terminal y to i when there is another vowel in the stem. */

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/* To match the published algorithm, delete this line */

}}

/* step3() deals with -ic-, -full, -ness etc. similar strategy to step2. */

```
void step3() { switch (b[k])
{
  case 'e': if (ends("\05" "icate")) { r("\02" "ic"); break; }
            if (ends("\05" "ative")) { r("\00" ""); break; }
            if (ends("\05" "alize")) { r("\02" "al"); break; }
            break;
  case 'i': if (ends("\05" "iciti")) { r("\02" "ic"); break; }
            break;
  case 'l': if (ends("\04" "ical")) { r("\02" "ic"); break; }
            if (ends("\03" "ful")) { r("\00" ""); break; }
            break;
  case 's': if (ends("\04" "ness")) { r("\00" ""); break; }
            break;
}}

```

/* step4() takes off -ant, -ence etc., in context <c>vcvc<v>. */

```
void step4()
{ switch (b[k-1])
  { case 'a': if (ends("\02" "al")) break; return;
    case 'c': if (ends("\04" "ance")) break;
              if (ends("\04" "ence")) break; return;
    case 'e': if (ends("\02" "er")) break; return;
    case 'i': if (ends("\02" "ic")) break; return;
    case 'l': if (ends("\04" "able")) break;
              if (ends("\04" "ible")) break; return;
    case 'n': if (ends("\03" "ant")) break;
              if (ends("\05" "ement")) break;
              if (ends("\04" "ment")) break;
              if (ends("\03" "ent")) break; return;
    case 'o': if (ends("\03" "ion") && (b[j] == 's' || b[j] == 't')) break;
              if (ends("\02" "ou")) break; return;
              /* takes care of -ous */
    case 's': if (ends("\03" "ism")) break; return;
    case 't': if (ends("\03" "ate")) break;
              if (ends("\03" "iti")) break; return;
    case 'u': if (ends("\03" "ous")) break; return;
  }
}

```

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```

    case 'v': if (ends("\03" "ive")) break; return;
    case 'z': if (ends("\03" "ize")) break; return;
    default: return;
}
if (m() > 1) k = j;
}

/* step5() removes a final -e if m() > 1, and changes -ll to -l if
   m() > 1. */

void step5()
{ j = k;
  if (b[k] == 'e')
  { int a = m();
    if (a > 1 || a == 1 && !cvc(k-1)) k--;
  }
  if (b[k] == 'l' && doublec(k) && m() > 1) k--;
}

/* In stem(p,i,j), p is a char pointer, and the string to be stemmed is from
   p[i] to p[j] inclusive. Typically i is zero and j is the offset to the last
   character of a string, (p[j+1] == '\0'). The stemmer adjusts the
   characters p[i] ... p[j] and returns the new end-point of the string, k.
   Stemming never increases word length, so i <= k <= j. To turn the stemmer
   into a module, declare 'stem' as extern, and delete the remainder of this
   file.
*/

int stem(char * p, int i, int j)
{ b = p; k = j; k0 = i; /* copy the parameters into statics */
  if (k <= k0+1) return k; /*-DEPARTURE-*/

  /* With this line, strings of length 1 or 2 don't go through the
     stemming process, although no mention is made of this in the
     published algorithm. Remove the line to match the published
     algorithm. */

  step1ab(); step1c(); step2(); step3(); step4(); step5();
  return k;
}

/*-----stemmer definition ends here-----*/

```

```

stemArray(char **list, int arrayLen)
{
int i;
for (i = 0; i < arrayLen; i++)
    if (list[i] != NULL)
        stemWord(list[i]);
}

stemWord( char * s)
{
s[stem(s,0, strlen(s) - 1) + 1] = 0;
}
    
```

dialog.c: This is main program of dialog module

/******

dialog.c : The main function for the interactive dialog program. loads all the global arrays and variables before calling the interactivte function.

Arguments are:

1. The Configuration file for Thesaurus. contains Prompts, index, basic thesaurus etc.
2. The Learning Thesaurus. - used to store learnt words and to refer to them.

```

#include <stdio.h>
#include <string.h>
#include "arraylib.h"
    
```

```

int numColumn, numRows, numIndex, numMenu;
int startPoint, cofFlag, topValues;
char **rowTerms, **columnTerms, **prompts, **stopWords;
float **matrix, **cosine, phoneThreshold, webThreshold;
int **indexList, **menuList, **thesaurus;
int numStopWord, numOrgRow;
int numForms, numPF;
struct form **formlist;
char ***Fprompts, *formfile;
int **scoring, numScore = 0;
char *cfg, *lcfg, *fdoc, *xdoc, *sdoc;
int minPromptCount = 1, timeout = 30;
    
```

```

void Interactive(char *);
    
```

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```

main(int argc, char *argv[])
{
int i = 0;

/*if (argc != 5)
    {
        printf("Usage Instructions: dialog config_file learn_file\n");
        printf("*** Exiting, goodbye.\n");
        exit(1);
    }*/
if (argc != 2)
    {
        printf("Usage Instructions: d <ini-file>\n");
        printf("*** Exiting, goodbye.\n");
        exit(1);
    }
readini(argv[1]);
formfile = fdoc;
loadStopWords(sdoc);
numPF = loadFormsList(xdoc);
numForms = loadForms(fdoc);
loadData(cfg, lcfg);
Interactive(lcfg);
}

/*****
loaddata : This function will read the configuration files and load the
            information into the relevant global arrays.
*****/
loadData(char *filem, char *file2)
{
char buf[256], word[20];
int i, j, k, l;
int numext;
FILE *fp, *f2;

/***** open configuration file *****/
fp = fopen(filem, "r");

/***** open learn(extended thesaurus) file *****/
f2 = fopen(file2, "r");

```

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```
prompts = columnTerms = rowTerms = NULL;
scoring = thesaurus = indexList = menuList = NULL;
```

```
/* read data in the arrays */
numMenu = loadMenuTree(fp, "[MENUTREE]");
numIndex = readArray(fp, "[PROMPTS]", &prompts, 1, NULL, 0, 0);
numColumn = readArray(fp, "[INDEX]", &columnTerms, 1, &indexList, numIndex, 0);
numOrgRow = readArray(fp, "[THESAURUS]", &rowTerms, 1, &thesaurus, numColumn, 0);
numRow = readArray(f2, "[EXT-THESAURUS]", &rowTerms, 1, &thesaurus, numColumn,
numOrgRow);
numScore = readArray(f2, "[SCORING]", NULL, 0, &scoring, numColumn + 1, 0);
```

```
fclose(fp);
fclose(f2);
}
```

```
/******
readArray : Reads the file and fills the rows and columns of the given arrays
******/
```

```
int readArray(FILE *fp, char *head, char ***ch_array, int ccount, int ***int_array, int icount, int
sp)
{
char buf[256];
int i, j, start = 0, wc = 0;
int k, c;
char **tmparray; /*To store the pointers to the words/numbers from the string*/
c = sp;
```

```
if (icount != 0)
    tmparray = (char **)malloc((icount + 1) * sizeof(char *));
```

```
fseek(fp, 0, 0); /* Go to Top */
```

```
while (fgets(buf, 255, fp) != NULL) /* read lines till end of file */
{
allTrim(buf);
j = strlen(buf);
if (buf[j - 1] == '\n') buf[j - 1] = 0;
if (start)
{
if (strlen(buf) == 0) /* if blank line, stop reading */
break;
if (icount == 0) /* i.e. no integer array */
```

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```

else
    addWord(ch_array, buf, ++c);
    /* read first word string */
    { /* rest are columns of int array */
    wc = readValues(buf, tmparray);
    c++;
    (*int_array) = (int **)realloc(*int_array, c * sizeof(int *));
    (*int_array)[c - 1] = (int *)malloc(ccount * sizeof(int));
    if (ccount != 0)
        addWord(ch_array, tmparray[0], c);
    else
        (*int_array)[c - 1][0] = atoi(tmparray[0]);
    for (k = 1; k < ccount; k++)
        if (k < wc)
            (*int_array)[c - 1][k - ccount] = atoi(tmparray[k]);
        else
            (*int_array)[c - 1][k - ccount] = 0;
    }
}
else
    if (!strcmp(head, buf))
        start = 1;
}
return c;
}

```

```

/*****
loadMenuTree : loads the menutree from file to menuList array
*****/
int loadMenuTree (FILE *fp, char *head)
{
char buf[256];
int i, j, start = 0, count = 0;
fseek(fp, 0, 0);
while (fgets(buf, 255, fp) != NULL)
{
j = strlen(buf);
if (buf[j - 1] == '\n')
    buf[j - 1] = 0;
if (start)
{
if (strlen(buf) == 0)
    break;
menuList = (int **)realloc(menuList, (count + 1) * sizeof(int *));

```

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```

    menuList[count] = (int *)malloc(3 * sizeof(int));
    sscanf(buf, "%d,%d,%d\n", &menuList[count][0],
&menuList[count][1],&menuList[count][2]);
    count++;
}
else
    if (!strcmp(head, buf))
        start = 1;
}
return count ;
}

```

```

readini(char * filenm)
{
    FILE * fp;
    char buf[80], key[80], value[80], comment[80];
    int cnt;
    if ((fp=fopen(filenm,"r"))==NULL)
    {
        perror(filenm);
        exit(1);
    }
    while (fgets(buf,79,fp)!=NULL)
    {
        sscanf(buf,"%s %s %s",key,value, comment);
        if (!strcmp(key, "sdoc"))
            sdoc=strdup(value);
        if (!strcmp(key, "fdoc"))
            fdoc=strdup(value);
        if (!strcmp(key, "xdoc"))
            xdoc=strdup(value);
        if (!strcmp(key, "cfg"))
            cfg=strdup(value);
        if (!strcmp(key, "lcfg"))
            lcfg=strdup(value);
        if (!strcmp(key, "minprompt"))
            minPromptCount=atoi(value);
        if (!strcmp(key, "timeout"))
            timeout=atoi(value);
    }
}
}

```

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interactive.c: This program contains funtions related to user interaction

/******

Interactive : function to accept a sentence from the user and then
generate the response.

thesaurusFlag = is 1 if there is atleast 1 thesaurus/learned word in query
updateFlag = is set to 1 if the program needs to learn (i.e. main menu was
selected during the prompt navigation)
interPrompts = Intersection of prompts
unionPrompts = Union of prompts
interUnionPrompts = Intersection of Union
numInter = number of prompts in InterPrompts
numInterUnion = num of prompts in Intersection of Union
numUnion = num of prompts in Union
numUnknown = num of unknown words
*****/

#include <stdio.h>
#include <signal.h>
#include <string.h>
#include <unistd.h>
#include "globalvar.h"
#include "arraylib.h"
#include "forms.h"

#define max(a,b) (a > b)? a: b
#define min(a,b) (a < b)? a: b
#define swap(a,b) (a ^= b, b ^= a, a ^= b)

extern int numScore, **scoring;
int updateFlag = 0, learnFlag, numQueryList = 0;
FILE *lf, *pf;
char ** uWList=NULL, *queryTerms[50];
int uWNum;
extern int minPromptCount, timeout;
char query[256], **queryList = NULL;
char *affrmWords[] = { "yes", "right", "correct"};
char *negWords[] = { "no", "neither"};
extern char * fdoc;
int otheFlag = 0;
int unknownWords[20], numQuery = 0, numUnknown;
char **uWords; // Added this array to facilitate learning wven if lateral shift
int numUW; // Added this to facilitate learning wven if lateral shift
void sayOther();

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```

void Interactive(char *flnm)
{
    int InterPrompts[20], unionPrompts[20], t1Prompts[20];
    int interUnionPrompts[20], numInterUnion, t2Prompts[20], numT2;
    int i, j, k, l;
    int start, numUnion, numInter, numT1;
    int n, selectedPrompt, thesaurusFlag = 0;
    char *interlog, *processlog, c;

    numUnknown = numUW = 0;
    for(i=0; i < 20; i++)
        unknownWords[i] = 0;
    uWords=NULL;

    if((interlog = (char *)getenv("TIMEOUT")) != NULL)
        timeout = atoi(interlog);

    if((interlog = (char *)getenv("MINPROMPT")) != NULL)
        minPromptCount = atoi(interlog);

    if((interlog = (char *)getenv("INTERLOG")) == NULL)
        interlog = "test.html";

    if((processlog = (char *)getenv("PROCESSLOG")) == NULL)
        processlog = "process.html";

    signal(SIGALRM, &sayOther);
    lf = fopen(interlog, "w");

    pf = fopen(processlog, "w");
    fprintf(lf, "<HTML>\n<TITLE>%s</TITLE>\n<BODY><FONT SIZE=5>\n", interlog);
    fprintf(pf, "<HTML>\n<TITLE>%s</TITLE>\n<BODY><FONT SIZE=5>\n", processlog);

    system("clear");
    printf("Thank you for calling the New Herald.\n");
    printf("How may we help you?\n\n");
    fprintf(lf, "\nThank you for calling the New Herald.<BR>");
    fprintf(lf, "How may we help you. <P>");
    fgets(query, 255, stdin); /* accept the user input */

    while (1)
        {

```

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```

addWord(&queryList, query, ++numQueryList);
numQuery = thesaurusFlag = 0;
if (strlen(query) == 0)
    break;
fprintf(lf, "<I> %s</I> <P>", query);

numQuery = createArray(query, queryTerms);

/*****
fprintf(pf, "Terms in Query: ");
for (j = 0; j < numQuery; j++)
    fprintf(pf, " %s", queryTerms[j]);
fprintf(pf, "<BR>");
*****/

/* initialize InterPrompts and unionPrompts array */
for (i = 0; i < 20; i++)
    {
        t2Prompts[i] = t1Prompts[i] = 0;
        InterPrompts[i] = unionPrompts[i] = interUnionPrompts[i] = 0;
    }
start = 1;
numInterUnion = numT2 = numT1 = numInter = numUnion = 0;

/* Scan thru all the words to generate union/intersection of prompts*/
for (i = 0; i < numQuery; i++)
    {
        /* if not in index words check thesaurus */
        if (!inArray(columnTerms, queryTerms[i], numColumn))
            {
                learnFlag = numT1 = numT2 = 0;
                scanThesaurus(queryTerms[i], t1Prompts, t2Prompts, &numT1,
&numT2);

                /* if unknown/learned word save it to array */
                if (learnFlag)
                    {
                        unknownWords[numUnknown] = i, numUnknown++;
                        addWord(&uWords, queryTerms[i], ++numUW);
                        if (numT1 == 0 && numT2 == 0)
                            continue;
                        else
                            thesaurusFlag = 1;
                    }
            }
    }

```

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```

else
    thesaurusFlag = 1;
}
else
{
    numT1 = fetchPrompts(queryTerms[i], t1Prompts);
    numT2 = fetchPrompts(queryTerms[i], t2Prompts);
    /*****
    fprintf(pf, "%s (index) :", queryTerms[i]);
    for (j = 0; j < numT1; j++)
        fprintf(pf, " %d", t1Prompts[j]);
    fprintf(pf, "<BR>");
    fflush(pf);
    *****/
}

if (start) /* if first word */
{
    numInter = PromptUnion(InterPrompts, t2Prompts, numInter, numT2);
    numUnion = PromptUnion(unionPrompts, t1Prompts, numUnion,
numT1);
    numInterUnion = PromptUnion(interUnionPrompts, t1Prompts,
numInterUnion, numT1);
    start = 0;
}
else
{
    numInter = PromptIntersection(InterPrompts, t2Prompts, numInter,
numT2);
    numUnion = PromptUnion(unionPrompts, t1Prompts, numUnion,
numT1);
    numInterUnion = PromptIntersection(interUnionPrompts, t1Prompts,
numInterUnion, numT1);
}
}
/*****/
fprintf(pf, "Final Intersection Result: ");
for (j = 0; j < numInter; j++)
    fprintf(pf, " %d", InterPrompts[j]);
fprintf(pf, "<BR>");
fprintf(pf, "Final Intersection of Union Result: ");
for (j = 0; j < numInterUnion; j++)

```

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```

        fprintf(pf, " %d", interUnionPrompts[j]);
        fprintf(pf, "<BR>");
        fprintf(pf, "Final Union Result: ");
        for (j = 0; j < numUnion; j++)
            fprintf(pf, " %d", unionPrompts[j]);
        fprintf(pf, "<BR>");
        fflush(pf);
        /*****

if (numInter < minPromptCount && thesaurusFlag)
    {
        if (numInterUnion < minPromptCount)
            numInter = PromptUnion(InterPrompts, unionPrompts, numInter,
numUnion);
        else
            numInter = PromptUnion(InterPrompts, interUnionPrompts,
numInter, numInterUnion);
    }

        fprintf(pf, "Final Selection : ");
        fflush(pf);
        for (j = 0; j < numInter; j++)
            fprintf(pf, " %d", InterPrompts[j]);
        fprintf(pf, "<BR>");
        fflush(pf);
        numInter = orderPrompts(InterPrompts, numInter);
        numInter = removeChild(InterPrompts, numInter);
        // eliminate prompts > 3
        for (j = 3; j < numInter; j++)
            InterPrompts[j] = 0;
        numInter = min(numInter, 3);
        fprintf(pf, "Selection After Elimination of descendants: ");
        fflush(pf);
        for (j = 0; j < numInter; j++)
            fprintf(pf, " %d", InterPrompts[j]);
        fprintf(pf, "<BR>");
        fflush(pf);
        selectedPrompt = GetPrompt(InterPrompts, numInter);
        if (selectedPrompt == 100)
            continue;

// if (updateFlag)
learnThesaurus(selectedPrompt, unknownWords, numUnknown, flnm);

```

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```

        updateFlag = 0;
        for(j = 0; (j < numMenu) && (menuList[j][1] != selectedPrompt); j++);
        if (menuList[j][2] >= 99)
        {
            for (i = 0; i < numPF; i++)
            {
                if (!strcmp(Fprompts[i][1],prompts[selectedPrompt - 1]))
                {
                    for(k = 0; k < numForms; k++)
                    if (!strcmp(Fprompts[i][0],formlist[k]->name))
                    {
                        fillForm(formlist[k], queryList, numQueryList);
                        processForm(formlist[k]);
                        break;
                    }
                    break;
                }
            }
            if (i == numPF)
            {
                system("clear");
                printf("\nYour query has been understood.\n");
                printf("Please wait to be transferred to the relevant department.\n\n");
                fprintf(If,"<P>Your query has been understood.<LI>");
                fprintf(If,"Please wait to be transferred to the relevant department.<HR>");
                break;
            }
        }
        else
        {
            printf("\n%s\n\n",prompts[menuList[j][2] - 1]);
            fprintf(If, "\n<P>%s<HR>",prompts[menuList[j][2] - 1]);
        }
        // modified for the loop
        printf("Do you have another query?\n\n");
        fgets(query,80,stdin);
        if (!chkNegtn(query))
        {
            for(i = 0; i < numQueryList; i++)
            free(queryList[i]);
            for(i = 0; i < numForms; i++)
                free(formlist[i]);
            free(formlist);
        }
    
```


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```

        learnFlag = 1;
    }
else
    fprintf(pf, "%s (thesaurus):<BR>", word);

for (j = 0; thesaurus[l][j] && j < numRows; j++)
    {
    m = fetchPrompts(columnTerms[thesaurus[l][j] - 1], tp);
    /*****
    fprintf(pf, "<LI>%s (index) :", columnTerms[thesaurus[l][j] - 1]);
    for (k = 0; k < m; k++)
        fprintf(pf, " %d", tp[k]);
    fprintf(pf, "<BR>");
    /*****

    *n1 = PromptUnion(t1Prompts, tp, *n1, m);
    if (sflg)
        {
        *n2 = PromptUnion(t2Prompts, tp, *n2, m);
        sflg = 0;
        }
    else
        {
        *n2 = PromptIntersection(t2Prompts, tp, *n2, m);
        }
    }
    fprintf(pf, "Union Result: ");
    for (k = 0; k < *n1; k++)
        fprintf(pf, " %d", t1Prompts[k]);
    fprintf(pf, "<BR>");
    fprintf(pf, "Intersection Result: ");
    for (k = 0; k < *n2; k++)
        fprintf(pf, " %d", t2Prompts[k]);
    fprintf(pf, "<BR>");
    }

return k;

}
/*****
PromptUnion : does a union of arrays pointed by p1 and p2 and
stores in p1. returns the total elements in result
*****/

```


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```
int fetchPrompts(char *word, int *t1Prompts)
{
int i, j, k, l;
for (i = 0; i < 20; i++)
    t1Prompts[i] = 0;
if ((i = inArray(columnTerms, word, numColumn)) == 0)
    return 0;
i--;
for (j = 0; (t1Prompts[j] = indexList[i][j]) && (j < numIndex); j++);
return j;
}
```

GetPrompt: Returns the final prompt selected by user
*****/

```
int GetPrompt(int *Parray, int pcnt)
{
int i, j, k, l;
int mmflag = 0, af = 0;
char ans[80];

while (1)
{
system("clear");
printf("\n");
fprintf(1f, "<P>");
// Removed the comments to reintroduce last prompt
if (pcnt == 1 && isLeaf(Parray[0]) && numUnknown > 0)
    af = 1;
// -----
if ((pcnt > 1) || (pcnt == 1 && af == 1))
{
// sortPrompts(Parray, pcnt);
orderPrompts(Parray, pcnt);
for (i = 0; i < pcnt; i++)
{
printf("%s\n\n", prompts[Parray[i] - 1]);
fprintf(1f, "<LI>%s", prompts[Parray[i] - 1]);
}
}
if (!mmflag)
{
otheFlag = 0;
alarm(timeout);
}
```

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```

    }
    fgets(ans, 80, stdin); /* accept the user input */
    alarm(0);
    fprintf(lf, "<P><I>%s</I><P>", ans);
    fflush(lf);
    if (otheFlag == 1 && chkAfrm(ans))
        j = 0;
    else
    {
        if (chkNegtn(ans) && otheFlag != 1)
            j = 0;
        else
        {
            addWord(&queryList, ans, ++numQueryList);
            j = chkAns(ans, Parray, pcnt);
        }
        otheFlag = 0;
    }
    if (j == -99)
    {
        updateFlag = 1;
        return 100;
    }
    if (j < 0)
    {
        pcnt = removeZeros(Parray,pcnt);
        continue;
    }
    mmflag = 0;
}
else
    j = pcnt;
if (j == 0)
{
    pcnt = getNodes(j, Parray);
    mmflag = updateFlag = 1;
}
else
{
    if (isLeaf(Parray[j - 1]))
    {
        return Parray[j - 1];
    }
}

```

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```

        else
            pcnt = getNodes(Parray[j - 1], Parray);
    }
    af = 1;
}
}

```

/******

isLeaf: Returns 1 if 'node' is a leaf in the menutree, else 0

*****/

int isLeaf(int node)

```

{
int i;
for (i = 0; i < numMenu; i++)
    if (menuList[i][1] == node)
        break;
if (i == numMenu)
    return 0;
return menuList[i][2];
}

```

int getNodes(int pnode, int *parray)

```

{
int i, j;
for (i = 0, j = 0; i < numMenu; i++)
    if (menuList[i][0] == pnode)
        {
            parray[j] = menuList[i][1];
            j++;
        }
parray[j] = 0;
return j;
}

```

/******

learnThesaurus : re-writes the thesaurus with relearned pattern and newly learned word.

*****/

learnThesaurus(int pmpt, int unknownWords[], int numUnknown, char *flnm)

```

{
int i, j, k, l;
FILE *fp;
int *tmpList, tmpCount;

```

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```

/* create and initialize a tmp Array */
tmpList = (int *)calloc(numColumn, sizeof(int));
for (i = tmpCount = 0; i < numColumn; i++)
    tmpList[i] = 0;

/* scan thru the query words and gather a list of unique keywords in tmp array*/
tmpCount = getKeyWords(queryTerms, numQuery, tmpList);
/* Locate the row for select prompt. if not create new row */
for (k = 0; k < numScore && scoring[k][0] != pmpt; k++);
if (k >= numScore)
{
    scoring = (int **)realloc(scoring, (k + 1) * sizeof(int *));
    scoring[k] = (int *) malloc((numColumn + 1) * sizeof(int));
    for (j = 0; j <= numColumn; j++)
        scoring[k][j] = 0;
    numScore++;
}

scoring[k][0] = pmpt;
for (j = 0; j < tmpCount; j++)
    scoring[k][tmpList[j]]++;

/*****/
for (i = tmpCount = 0; i < numColumn; i++)
    tmpList[i] = 0;

for (j = i = 0; j < numColumn; j++)
{
    for (k = 0; k < numIndex && indexList[j][k] != 0; k++)
        if (indexList[j][k] == pmpt)
            break;
    if (k < numIndex && indexList[j][k] != 0)
    {
        tmpList[i] = j + 1;
        i++;
    }
}

tmpCount = i;
fp = fopen(flnm, "w");
fprintf(pf, "<BR><B>Learned words</B><BR>");
fprintf(fp, "[%s]\n", "EXT-THESAURUS");

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```

for (i = numOrgRow; i < numRows; i++)
    {
    fprintf(fp, "%s: ", rowTerms[i]);

    if (updateFlag && inArray(uWords, rowTerms[i], numUW))
        {
        fprintf(pf, "%s (relearned)<BR>original: ", queryTerms[unknownWords[j]]);
        for (k = 0; k < numColumn; k++)
            {
            if (thesaurus[i][k] != 0)
                fprintf(pf, " %d", thesaurus[i][k]);
            if (thesaurus[i][k] == 0)
                break;
            }
            fprintf(pf, "<BR>");
            k = PromptUnion(thesaurus[i], tmpList, k, tmpCount);
            fprintf(pf, "new :");
            for (j = 0; j < k; j++)
                fprintf(pf, " %d", thesaurus[i][j]);
            fprintf(pf, "<BR><BR>");
        }

    for (j = 0; j < numColumn; j++)
        {
        if (thesaurus[i][j] == 0)
            break;
        fprintf(fp, "%d,", thesaurus[i][j]);
        }
    fprintf(fp, "\n");
    }
for (i = 0; updateFlag && i < numUW; i++)
    {
    if (inArray(rowTerms, uWords[i], numRows))
        continue;

    fprintf(fp, "%s: ", uWords[i]);
    fprintf(pf, "%s(new-learned) :", uWords[i]);
    addWord(&rowTerms, uWords[i], ++numRow);
    thesaurus = (int **)realloc(thesaurus, numRows * sizeof(int *));
    thesaurus[numRow - 1] = (int *)malloc(numColumn * sizeof(int));
    for (j = 0; j < numColumn; j++) thesaurus[numRow - 1][j] = 0;
    for (j = 0; j < tmpCount; j++)
        {

```

```

        thesaurus[numRow - 1][j] = tmpList[j];
        fprintf(fp, "%d,", tmpList[j]);
        fprintf(pf, " %d", tmpList[j]);
    }
    fprintf(fp, "\n");
    fprintf(pf, "<BR><BR>");
}

fprintf(fp, "\n");

/* write the scoring in the file */
fprintf(fp, "[%s]\n", "SCORING");
for (i = 0; i < numScore; i++)
    {
        fprintf(fp, "%d,", scoring[i][0]);
        for(j = 1; j <= numColumn; j++)
            fprintf(fp, "%d,", scoring[i][j]);
        fprintf(fp, "\n");
    }
fprintf(fp, "\n");
fclose(fp);
}

/*****
removeChild: removes descendents of all the elements from the list
*****/
int removeChild(int *array, int tot)
{
    int i, j, k, cnt = 0;
    int *tmparray, rn = 99;

    tmparray = (int *)calloc(numIndex, sizeof(int));

    /* Remove any prompts that are responses rather than choices */
    for (i = 0; i < tot; i++)
        {
            for(j = 0; j < numMenu; j++)
                if (menuList[j][1] == array[i] && menuList[j][2] == 100)
                    array[i] = 0;
        }

    /* Remove any prompts that are root node and have a child which is not a leaf rather than
    choices */

```

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```

for (i = 0; i < tot; i++)
    {
        if (array[i] == 0) /* already removed so go to next */
            continue;

        /* if (isLeaf(array[i]))
            continue; */

        m = array[i];
        while(1)
            {
                for(j = 0; j < numMenu; j++)
                    if (menuList[j][1] == m)
                        break;
                if (menuList[j][0] == 0)
                    break;
                m = menuList[j][0];
            }
        if ( m != array[i])
            {
                for (j = 0; j < tot; j++)
                    {
                        if (array[j] == m)
                            array[j] = 0;
                    }
            }
    }

for (i = 0; i < tot; i++)
    {
        if (array[i] == 0) /* already removed so go to next */
            continue;
        for (j = 0; j < numIndex; j++) /* initialize tmparray */
            tmparray[j] = 0;
        cnt = getChildren(array[i], tmparray); /* get children & grand-children of i */
        for (j = 0; j < tot; j++) /* scan thru the array to check for child */
            if (j != i) /* ignore self from checking */
                for (k = 0; k < cnt; k++)
                    if (array[j] == tmparray[k])
                        {
                            array[j] = 0; /* if j is child of i, make it 0 */
                            break;
                        }
    }

```

```

    }
}
/* Shift All non-zeroes upwards */
for (i = 0; i < tot; i++)
{
    if (array[i] == 0)
    {
        for (j = i + 1; j < tot; j++)
            if (array[j] != 0)
                break;
        if (j < tot)
        {
            array[i] = array[j];
            array[j] = 0;
        }
    }
}
/* count no of elements */
for (j = 0; j < tot; j++)
{
    if (array[j] == 0)
        break;
}
return j;
}

/*****
getChildren: fetches all the descendents of pmpt into array
*****/
int getChildren(int pmpt, int *array)
{
    int i, j, k, l;
    int t, t1, t2;
    int *tmparray1, *tmparray2;

    if (isLeaf(pmpt)) /* if node is leaf no children so return 0 */
        return 0;

    tmparray1 = (int *)calloc(numIndex, sizeof(int)); /* child of child in every loop */
    tmparray2 = (int *)calloc(numIndex, sizeof(int)); /* union of all scanned children */
    t = t1 = t2 = 0;
    for (i = 0; i < numMenu; i++)
    {

```


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```

    if (menuList[i][0] == pmpt && menuList[i][2] != 100)
        {
            array[t] = menuList[i][1];
            t1 = getChildren(array[t], tmparray1);
            t2 = PromptUnion(tmparray2, tmparray1, t2, t1);
            t++;
        }
    t = PromptUnion(array, tmparray2, t, t2);
    return t;
}

int chkAns (char * ans, int * Parray, int pcnt)
{
    char locquery[256];
    int i, j, tmp1cnt = 0, tmp2cnt = 0;
    char *resWords[50], start = 'Y';
    int numWords, tmpArray1[20], tmpArray2[20];
    int uwFlag = 0, rowOrColWord = 0;

    strcpy(locquery,ans);
    numWords = breakStr(ans, resWords);
    if ( strcmp(resWords[0],"other") == 0 && strcmp(resWords[1],"options") == 0)
        {
            return 0;
        }
    numWords = processArray(resWords, numWords, 1);
    for (i = 0; i < 20; i++)
        tmpArray1[i] = tmpArray2[i] = 0;
    fprintf(pf,"<i>Initialized Temp Array\n"); fflush(pf);

    for (i = 0; i < numWords; i++)
        {
            if (!inArray(columnTerms, resWords[i], numColumn))
                {
                    if (!inArray(rowTerms,resWords[i],numColumn))
                        {
                            if (!inArray(uWList, resWords[i], uWNum))
                                {
                                    addWord(&uWList, resWords[i], ++uWNum);
                                    fflush(lf);
                                }
                        }
                }
        }
}

```

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```

        else
            {
                fprintf(pf,"<li>Unknown Word: %s\n",resWords[i]);
                fflush(pf);
                uwFlag = 1; /* unKnown word encountered twice */
            }
        }
    else
        rowOrColWord++;
    continue;
}
else
    rowOrColWord++;
tmp1cnt = fetchPrompts(resWords[i], tmpArray1);
if (start == 'Y')
    {
        tmp2cnt = PromptUnion(tmpArray2, tmpArray1, tmp2cnt, tmp1cnt);
        start='N';
    }
else
    tmp2cnt = PromptIntersection(tmpArray2, tmpArray1, tmp2cnt, tmp1cnt);

tmp2cnt = PromptIntersection(tmpArray2, Parray, tmp2cnt, pcnt);
}
if (tmp2cnt != 1)
    {
        not selected
        if (tmp2cnt == 0 && pcnt == 1 && numWords == 1) // i.e. only one prompt &
        {
            strcpy(ans, locquery);
            if (chkAfrm(ans))
                return 1;
        }
        if (tmp2cnt > 1) // i.e. multiple prompt selection then do score
        {
            strcpy(ans, locquery);
            return checkscore(ans, Parray, pcnt);
        }
    }

if (uwFlag)
    if (AskforOp())
        return -99;

```

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```

        else
            return -1;
    else
        if (rowOrColWord)
            {
                strcpy(query,locquery);
                return -99;
            }
    }
    for (i = 0; Parray[i]; i++)
        if (Parray[i] == tmpArray2[0])
            return i + 1;
}

int AskforOp()
{
    int i, j ;
    char *resWords[50];
    int numWords ;

    system("clear");
    printf("Your request was not understood.\n");
    printf("Would you prefer to speak to an operator or try again with a new request?\n");
    fprintf(lf, "<P>Your request was not understood.<LI>");
    fprintf(lf, "Would you prefer to speak to an operator or try again with a new request?\n");
    fflush(lf);
    fgets(query, 255, stdin); /* accept the user input */
    addWord(&queryList, query, ++numQueryList);
    fprintf(lf, "<P><I> %s</I>", query);
    numWords = breakStr(query, resWords);
    if ( inArray(resWords,"operator",numWords))
        {
            printf("\n\nPlease wait for the operator ...\n");
            fprintf(lf,"<P>Please wait for the operator ...");
            fflush(lf);
            exit(0);
        }
    if( inArray(resWords,"try",numWords) && inArray(resWords,"again",numWords))
        {
            system("clear");
            printf("Please tell us your new request\n");
            fprintf(lf, "<P>Please tell us your new request\n");
            fflush(lf);

```

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```

    fgets(query, 255, stdin); /* accept the user input */
    addWord(&queryList, query, ++numQueryList);
}
return 1;
}

void sayOther()
{
printf("\nWould you like to hear other options?\n\n");
fprintf(If, "<LI>Would you like to hear other options?<P>");
otheFlag = 1;
}

int checkscore(char *ans, int *Parray, int pcnt)
{
    char * resWords[50], *pmptWords[50];
    int i, j, *score, *score1;
    int numWords, numpWords, maxscore;

    score = (int *)malloc(pcnt * sizeof(int));
    score1 = (int *)malloc(pcnt * sizeof(int));
    for (i = 0; i < pcnt; i++)
        score[i] = score1[i] = 0;

    numWords = breakStr(ans, resWords);
    for (i = 0; i < pcnt; i++)
    {
        numpWords = breakStr(prompts[Parray[i]-1], pmptWords);
        for (j = 0; j < numWords; j++)
            if (inArray(pmptWords, resWords[j], numpWords))
                score[i]++;
    }
    for (i = maxscore = 0; i < pcnt; i++)
        maxscore = (maxscore < score[i])?score[i]:maxscore;
    for (i = j = 0; i < pcnt; i++)
        j += (score[i] == maxscore)?1:0;

    if (j == 1) /* single prompt selection */
    {
        for (i = 0; i < pcnt; i++)
            if (score[i] == maxscore)
                return i + 1;
    }
}

```

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```

else
{
    for (i = 0; i < pcnt; i++)
    {
        numWords = breakStr(prompts[Parray[i] - 1], pmptWords);
        score1[i] = getscore1(resWords, numWords, pmptWords, numWords);
    }
    maxscore = 0;
    for (i = 0; i < pcnt; i++)
        maxscore = (score1[i] > maxscore)?score1[i]:maxscore;
    for (i = j = 0; i < pcnt; i++)
        j += (score1[i] == maxscore)?1:0;
    if (j == 1) /* single prompt selection */
    {
        for (i = 0; i < pcnt; i++)
            if (score1[i] == maxscore)
                return i + 1;
    }
    else
    {
        for (i = 0; i < pcnt; i++)
            if (score[i] != maxscore)
                Parray[i] = 0;
        return -1;
    }
}

}

int chkAfrm( char * str)
{
    int i,j, numWords;
    char * resWords[50];

    numWords = breakStr(str, resWords);
    for (i = 0; i < numWords; i++)
        if (inArray(affrmWords, resWords[i], 3))
            return 1;

    return 0;
}

int chkNegtn( char * str)
{

```

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```

int i,j, numWords;
char * resWords[50];

numWords = breakStr(str, resWords);
for (i = 0; i < numWords; i++)
    if (inArray(negWords, resWords[i], 2))
        return 1;
return 0;
}

int getscore1(char **Word1, int num1, char **Word2, int num2)
{
    int i, j, scr = 0;
    int lsmatch = 0;

    for(i = 0; i < num1; i++)
    {
        for(j = lsmatch; j < num2; j++)
            if (!strcmp(Word1[i], Word2[j]))
            {
                scr++;
                break;
            }
        if (j < num2)
            lsmatch = j + 1;
    }

    return scr;
}

int orderPrompts(int *InterPrompts, int numInter)
{
    int i, j, k, l;
    int *tmpArray[2]; /* 0 - score ; 1 - level; 3 - menu order */
    int *tmpList, tmpCount;

    tmpArray[0] = (int *)malloc(numInter * sizeof(int));
    tmpArray[1] = (int *)malloc(numInter * sizeof(int));

    tmpList = (int *)malloc(numColumn * sizeof(int));
    for (i = 0; i < numColumn; i++)
        tmpList[i] = 0;
    // get the list of keywords from queryTerms

```

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tmpCount = getKeyWords(queryTerms, numQuery, tmpList);

for (i = 0; i < numInter; i++)
{
    /* get the maxscore for the prompt */
    tmpArray[0][i] = 0;
    for (j = 0; (j < numScore) && (scoring[j][0] != InterPrompts[i]); j++);
    /* if any previous scoring present */
    if ((j < numScore) && (scoring[j][0] == InterPrompts[i]))
    {
        // get the max score
        for (k = 0; k < tmpCount; k++)
            tmpArray[0][i] = max(tmpArray[0][i] , scoring[j][tmpList[k]]);
    }
    tmpArray[1][i] = getLevel(InterPrompts[i]);
}

// sort the array in order of score, level and menu-order
for (i = 0; i < (numInter - 1); i++)
{
    for (j = i + 1; j < numInter; j++)
        if (!gThan(tmpArray[0][i], tmpArray[1][i], InterPrompts[i],
tmpArray[0][j], tmpArray[1][j], InterPrompts[j]))
            {
                swap(tmpArray[0][i], tmpArray[0][j]);
                swap(tmpArray[1][i], tmpArray[1][j]);
                swap(InterPrompts[i], InterPrompts[j]);
            }
}

return numInter;
}

int getKeyWords(char **queryTerms, int numQuery, int *tmpList)
{
    int i, j, k, l;
    int count = 0;

    for (j = 0; j < numQuery; j++)
    {
        /* Check if the word is keyword */
        if ((k = inArray(columnTerms, queryTerms[j], numColumn)) != 0)
        {

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```

        /* add in temp list only if not present */
        for (i = 0; i < count && tmpList[i] != k ; i++);
        if (i >= count)
            tmpList[count++] = k;
        continue;
    }

    /* check if the word is Thesaurus/Learned Word */
    if ((k = inArray(rowTerms, queryTerms[j], numRows)) != 0)
    {
        /* pick-up all keywords for that word */
        for (i = 0; thesaurus[k - 1][i] != 0; i++)
        {
            for (l = 0; l < count && tmpList[l] != thesaurus[k - 1][i] ; l++);
            if (l >= count)
                tmpList[count++] = thesaurus[k - 1][i];
        }
    }
}

return count;
}

int getLevel(int pmpt)
{
    int i, k, l;

    for (i = 0; i < numMenu && menuList[i][1] != pmpt; i++);
    k = menuList[i][0];
    for (l = 0; k > 0; l++)
    {
        for (i = 0; i < numMenu && menuList[i][1] != k; i++);
        k = menuList[i][0];
    }
    return l;
}

int gThan(int a, int b, int c, int p, int q, int r)
{
    if (a > p) return 1; // Desc order here
    if (a < p) return 0; // Desc order here
    if (b > q) return 0; // Asc order here
}

```


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```

if (b < q) return 1; // Asc order here
if (c > r) return 0; // Asc order here
return 1; // Asc order here

```

```

}

```

formlib.c: This program contains functions for forms processing

```

#include <stdio.h>
#include <string.h>
#include "arraylib.h"

```

```

struct input {
char *Type;
char *APrompt;
char *RPrompt;
char *Name;
char *Value;
char **Choice;
int numChoice;
};

```

```

struct form {
char * name;
struct input **fields;
int numFields;
};

```

```

char * split(char * , char );

```

```

int loadForm(FILE *f, struct form *frm, char *name)
{
int j, start=0;
char buf[512];
char fname[20];

```

```

sprintf(fname,"[%s]",name);
fseek(f,SEEK_SET,0);
while(fgets(buf,512,f) != NULL) {
j = strlen(buf);
if (buf[j - 1] == '\n') buf[j - 1] = 0;
if (start)
{

```

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```

        if (strlen(buf) == 0) /* if blank line, stop reading */
            break;
        frm->numFields++;
        frm->fields = (struct input **)realloc(frm->fields, (frm->numFields) *
sizeof(struct input *));
        frm->fields[frm->numFields-1] = (struct input *)malloc(sizeof(struct input));
        loadInput(frm->fields[frm->numFields-1], buf);
    }
    else
        if (!strcmp(fname, buf)) {
            start = 1;
            frm->name = strdup(name);
            frm->numFields=0;
            frm->fields=NULL;
        }
    }
    return start;
}

```

```

loadInput(struct input *inp, char * str)

```

```

{
char ***list, *tmpstr1, *tmpstr2;
int i, j, len;

```

```

inp->Type = inp->APrompt = inp->RPrompt = inp->Name = inp->Value = NULL;

```

```

list = (char ***)malloc(2 * sizeof(char **));

```

```

list[0] = (char **)malloc(2 * sizeof(char *));

```

```

list[1] = (char **)malloc(2 * sizeof(char *));

```

```

list[0][0] = str;

```

```

for(i=0;(list[i+1][0] = split(list[i][0],':'))!=NULL;i++)

```

```

    {
        list[i][1] = split(list[i][0],'=');

```

```

        list = (char ***)realloc(list,(i+3)*sizeof(char**));

```

```

        list[i+2] = (char **)malloc(2 * sizeof(char *));

```

```

    }

```

```

    list[i][1] = split(list[i][0],'=');

```

```

len = i + 1;

```

```

for(i=0; i < len; i++)

```

```

    {

```

```

        if (!strcmp("Type",list[i][0]))

```

```

            mystrep(&inp->Type,list[i][1]);

```

```

        if (!strcmp("APrompt",list[i][0]))

```

```

            mystrep(&inp->APrompt,list[i][1]);
    }

```

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```

if (!strcmp("RPrompt",list[i][0]))
    mystrcp(&inp->RPrompt,list[i][1]);
if (!strcmp("Name",list[i][0]))
    mystrcp(&inp->Name,list[i][1]);
if (!strcmp("Value",list[i][0]))
    mystrcp(&inp->Value,list[i][1]);
if (!strcmp("Choice",list[i][0]))
    {
        mystrcp(&tmpstr1, list[i][1]);
        tmpstr2 = tmpstr1;
        inp->Choice = NULL;
        inp->numChoice=0;
        for(j=0;tmpstr1[j];j++)
            {
                if (tmpstr1[j]==' ')
                    {
                        tmpstr1[j]=0;
                        inp->Choice = (char **)realloc(inp->Choice,(inp-
>numChoice+1)*sizeof(char *));
                        inp->Choice[inp->numChoice++] = strdup(tmpstr2);
                        allTrim(inp->Choice[inp->numChoice-1]);
                        tmpstr2=tmpstr1+j+1;
                    }
                }
            inp->Choice = (char **)realloc(inp->Choice,(inp-
>numChoice+1)*sizeof(char *));
            inp->Choice[inp->numChoice++] = strdup(tmpstr2);
            allTrim(inp->Choice[inp->numChoice-1]);
        }
    }
}

mystrcp(char **str1, char *str2)
{
int len, i, j;

len = strlen(str2);
if(str2[0]==" " && str2[len-1]==" ") // i.e. quoted string;
    for (i = str2[--len] = 0; (str2[i] = str2[i + 1]); i++);
*str1 = (strlen(str2)==0)?NULL:strdup(str2);
}

```

```

char * split(char * str, char dlm)

```

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```

{
int i;
for (i = 0; str[i]; i++)
    if (str[i] == dlm)
        {
            str[i] = 0;
            return str + i + 1;
        }
return NULL;
}

acceptForm(struct form *frm)
{
int i;
char ans[256];
struct input cnfm;

cnfm.Type = "MChoice";
cnfm.APrompt = strdup("Is this information correct?");
cnfm.numChoice = 4;
cnfm.Choice = (char **)malloc(2 * sizeof(char *));
cnfm.Choice[0] = strdup("no");
cnfm.Choice[1] = strdup("yes");
cnfm.Choice[2] = strdup("right");
cnfm.Choice[3] = strdup("correct");
cnfm.Value = NULL;

system("clear");
printf("\n");
for(i = 0; i<frm->numFields; i++)
    {
        if (!strcmp(frm->fields[i]->Type, "Say"))
            sayText(frm->fields[i]);
        if (frm->fields[i]->Value != NULL)
            continue;
        if (!strcmp(frm->fields[i]->Type, "AcceptResponse"))
            getText(frm->fields[i]);
        if (!strcmp(frm->fields[i]->Type, "MChoice"))
            getChoice(frm->fields[i]);
    }
while (1)
    {
        system("clear");

```

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```

printf("\n");
for(i = 0; i<frm->numFields; i++)
{
    if (!strcmp(frm->fields[i]->Type,"AcceptResponse"))
        sayText(frm->fields[i]);
    if (!strcmp(frm->fields[i]->Type,"MChoice"))
        sayText(frm->fields[i]);
}
printf("\n");
getChoice(&cnfm);
if (strcmp(cnfm.Value,"no"))
    return 1;
system("clear");
printf("\n");
for(i = 0; i<frm->numFields; i++)
{
    if (!strcmp(frm->fields[i]->Type,"AcceptResponse"))
        getText(frm->fields[i]);
    if (!strcmp(frm->fields[i]->Type,"MChoice"))
        getChoice(frm->fields[i]);
}
}
}

```

```

getText(struct input * inp)
{
char buf[256];
printf("\n%s\n\n",inp->APrompt);
fgets(buf,255,stdin);
allTrim(buf);
inp->Value = strdup(buf);
}

```

```

sayText(struct input * inp)
{
if (inp->RPrompt != NULL)
    printf("%s",inp->RPrompt);
if (inp->Value != NULL)
    printf("%s",inp->Value);
if (inp->RPrompt != NULL || inp->Value != NULL)
printf(".\n");
}

```

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```
fillForm(struct form * frm, char ** Array, int arrCount)
{
int i, j, wrdCount = 0, tmpCount = 0;
char **wordList = NULL;
char *tmparray[50];
for(i = 0; i < arrCount; i++)
    {
        tmpCount = breakStr(Array[i], tmparray);
        wrdCount = mergeArray(&wordList,tmparray, wrdCount, tmpCount);
    }
wrdCount = processArray(wordList, wrdCount, 1);
for(i = 0; i < frm->numFields; i++)
    if(!strcmp(frm->fields[i]->Type,"MChoice"))
        selectValue(frm->fields[i], wordList, wrdCount);
}
```

```
int selectValue(struct input * inp, char **array, int arrCount)
{
int i, j, *score;
char *tmparray[20] ;
int max, maxcount, tmpCount;

score = (int *) malloc(inp->numChoice * sizeof(int));
for (i = 0; i < inp->numChoice; i++)
    {
        score[i] = 0;
        tmpCount = breakStr(inp->Choice[i], tmparray);
        if (tmpCount > 1) // Basically to avoid filtering of 'yes', 'no' etc
            filterStopWords(tmparray, tmpCount);
        tmpCount = processArray(tmparray, tmpCount, 0);
        for(j = 0; j < tmpCount; j++)
            if (inArray(array, tmparray[j], arrCount))
                score[i]++;
    }
for(i = max = 0; i < inp->numChoice; i++)
    if (score[i] > max) max = score[i];
for(i = maxcount = 0; i < inp->numChoice; i++)
    if (score[i] == max) maxcount++;
if (maxcount != 1)
    return 0;
for(i = 0; i < inp->numChoice; i++)
    if (score[i] == max)
        {
```

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```
        inp->Value = strdup(inp->Choice[i]);
        break;
    }
return 1;
}

processForm (struct form *frm)
{
int i, j;
char *formType = NULL, *formAction = NULL;

for(i = 0; i<frm->numFields; i++)
    {
    if (frm->fields[i]->Value == NULL)
        continue;
    if (!strcmp(frm->fields[i]->Type, "FormType"))
        formType = strdup(frm->fields[i]->Value);
    if (!strcmp(frm->fields[i]->Type, "FormAction"))
        formAction = strdup(frm->fields[i]->Value);
    }

// If not defined the form type use 'AcceptForm' as default.
if (formType == NULL)
    formType = strdup("AcceptForm");

if (!strcmp(formType, "AcceptForm"))
    j = acceptForm(frm);

if (!strcmp(formType, "ResponseForm"))
    j = responseForm(frm);

if (j != 0 && formAction != NULL)
    performAction(frm, formAction);
}

responseForm(struct form *frm)
{
int i;

system("clear");
printf("\n");
for (i = 0; i < frm->numFields; i++)
    {
```


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```
        strcat(cmd, buf);
    }
    sprintf(buf, "EOD\n");
    len1 = strlen(buf);
    len2 = strlen(cmd);
    cmd = (char *) realloc(cmd, (len1 + len2 + 1) * sizeof(char));
    strcat(cmd, buf);
    if ((pd = popen(cmd, "r")) == NULL)
    {
        fprintf(stderr, "Error in command execution\n");
        exit(1);
    }
    f.name = NULL;
    f.numFields = 0;
    f.fields = NULL;
    while ((fgets(buf, 255, pd) != NULL))
    {
        j = strlen(buf);
        if (buf[j - 1] == '\n') buf[j - 1] = 0;
        if (strlen(buf) == 0) /* if blank line, stop reading */
            continue;
        f.numFields++;
        f.fields = (struct input **)realloc(f.fields, (f.numFields) * sizeof(struct input *));
        f.fields[f.numFields-1] = (struct input *)malloc(sizeof(struct input));
        loadInput(f.fields[f.numFields-1], buf);
    }
    pclose(pd);
    processForm(&f);
}
```

HEADER FILES (C)

globalvar.h: Header file for global variables

```
extern FILE *webDoc, *phoneDoc;
extern int numColumn, numRows, numIndex, numMenu;
extern int startPoint, eofFlag, topValues;
extern char **rowTerms, **columnTerms, **prompts, **stopWords;
extern double **matrix, **cosine;
float phoneThreshold, webThreshold;
extern int **indexList, **menuList, **thesaurus;
```

```
extern int numStopWord, numOrgRow;
void stemArray(char **list, int arrayLen);
extern int numForms, numPF;
int stemWord(char *);
extern char ***Fprompts;
extern int numForms, numPF;
extern struct form **formlist;
```

process.h: Header file declaring functions in process.c

```

/*****\
* Process.h:                                     *
\*****/

int processFile(char *filename, char ***cArray, float threshold);
void loadStopWords( char * filename) ;
// int allTrim( char *str);
void fillIndex();
void updateThesaurus( char *str, int pmpt);
void createMatrix(char * filename);
// int readPara(FILE *fp );
// int wordsInPara (FILE *fp);
void calcCosine();
int eraseZeroes();
void createThesaurus();
// void floatSort(int *colnum, float *tmpcos, int numRows);
void saveData(char *filenm);

```

arraylib.h: Header file declaring functions in arraylib.c

```

/*****\
* ArrayLib.h                                     *
\*****/

int fetchWord(FILE *f, char * wrd);
int inArray(char **array, char *word, int length);
int removeNulls(char **strarray, int numWords);
int mergeArray(char ***Array1, char **Array2, int numArray1, int numArray2);
int readValues(char *str, char **array);
void sortArray(char *allwords[], int numwords);
int loadPrompts(char *filename);
void loadStopWords(char *);

```

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```
FILE * fileOpen( char *filename, char *mode);
void addWord(char *** cArray, char * word, int c);
int breakStr(char * str, char **strarray);
void filterStopWords(char ** strarray, int numWords);
void filterDuplicates(char ** strarray, int numWords);
int loadFormsList( char *filename);
int loadForms(char * filename);
int allTrim( char *str);
int createArray(char *, char **);
int processArray( char **, int, int);
```

forms.h: Header file declaring functions in formlib.c

```
#include <stdio.h>

extern struct input {
char *Type;
char *APrompt;
char *RPrompt;
char *Name;
char *Value;
char **Choice;
int numChoice;
} a;

extern struct form {
char * name;
struct input **fields;
int numFields;
} b;

char * split(char * , char );
int loadForm(FILE *, struct form *, char *);

void loadInput(struct input *, char * );
void mystrcp(char **, char *);
void dumpInput(FILE *, struct input *);
void dumpForm(FILE *, struct form *);
void acceptForm(struct form *);
void getText(struct input * );
void fillForm(struct form * frm, char ** Array, int arrCount);
```

MAKE FILE

makefile: Makefile for compiling the source code.

```
all: t d demorun
t: main.o process.o arraylib.o stemlib.o formlib.o
    cc -g main.o process.o arraylib.o stemlib.o formlib.o -o t -lm
d: dialog.o interactive.o arraylib.o stemlib.o formlib.o
    cc -g dialog.o interactive.o arraylib.o stemlib.o formlib.o -o d
demorun: demorun.c
    cc demorun.c -o demorun
main.o: main.c process.h arraylib.h forms.h
    cc -c -g main.c
process.o: process.c globalvar.h forms.h
    cc -c -g process.c
arraylib.o: arraylib.c globalvar.h
    cc -c -g arraylib.c
dialog.o: dialog.c arraylib.h
    cc -c -g dialog.c
interactive.o: interactive.c globalvar.h
    cc -c -g interactive.c
stemlib.o: stemlib.c
    cc -c -g stemlib.c
formlib.o: formlib.c
    cc -c -g formlib.c
clean:
    rm -f *.o t d core demorun
bkup: clean
    tar cvzf ../stem`date "+%d%m"` .tgz .
```

PARAMETER FILES

t.ini: This file contains parameters required for program 't'

```
pdoc p # phonedoc
wdoc w # webdoc
sdoc s # stopwords
fdoc f # forms
xdoc x # link of forms & prompts
cfg z.cfg # config file
pt 0.02 # phoneThreshold
wt 0.0006 # webThreshold
tv 5 # topValues for cosine
```

d.ini: This file contains parameters required for program 'd'

cfg t.cfg # config file
lcfg l.cfg # learn file
sdoc s # stopwords
fdoc f # forms
xdoc x # x
minprompt 2 # minimum no of prompts
timeout 30 # timeout secs for other options

DATA FILES

p: Document 'p'

Are you calling about subscriptions?
 Would you like to order a subscription?
 Would you like to pay your subscription fees?
 Would you like to give a gift subscription?
 Would you like to change your address or change any other information?
 Do you have any billing enquiries or concerns?
 Would you like information about your account balance or your payments?
 Would you like to speak to a customer care representative?
 Would you like to temporarily suspend your delivery?
 Is there a problem with your paper or delivery?
 Did you miss today's paper?
 Did you miss yesterday's newspaper and would you like credit for yesterday?
 Did you receive a wet paper?
 Would you like information about the New Herald website?
 Would you like to obtain your New Herald website password?
 The website address is www.newherald.com. Would you like any other information about the website?
 Are you calling about advertisements?
 Would you like to advertise in the New Herald?
 Is it a classified ad?
 Is it a full-page, half-page, or quarter-page ad?
 Would you like to place an ad?
 Is it a classified ad?
 Is it a full-page, half-page, or quarter-page ad?
 Are you calling about something else?
 Would you like to write to the New Herald?
 Would you like to submit an article to the op-ed page?
 Please email your article to oped@newherald.com.
 Would you like to send a letter to the editor?

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Please email your letter to letters@newherald.com.

Would you like to work for the New Herald?

Would you like to write for the New Herald?

Would you like to work for the editorial division or for the administrative
division?

w: Document 'w'

Now, it's easier than ever to manage your Herald. Welcome to The New Herald Subscription & Customer Care Web site. You expect all the news that's fit to print in each issue of The New Herald. And you can expect responsive, round-the-clock on-line customer care that allows you to review and update your delivery and billing information, stop delivery of your newspaper when you're away, discover special promotions and notify us of any questions or comments you have. And if you're not a subscriber, browse our Web site and consider subscribing to home delivery. Please enjoy your visit.

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You can handle most of your subscription service requests online, including:

- * Suspending your delivery while you're away

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- * Reporting missed deliveries
- * Checking the status of your account

- * Checking your billing history
- * Changing your delivery or billing address
- * Changing your method of payment

To subscribe

Customer care:

Account Summary

Update Account

Activity History

Billing History

Paper not received

Suspend delivery

Complaints

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The New Herald Book Review

Get a head start on the latest book reviews, the acclaimed New Herald Best Sellers lists and everything new and noteworthy in the literary world. When you order a mail subscription to The New Herald Sunday Book Review, you'll receive it days in advance of the Sunday New Herald.

To order, select a country/region below and submit.

Country:

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To change your address, method of billing or any of the account information featured below, please enter the updated information in the appropriate box. Once you have completed all

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information requested, please click Submit at the bottom of the page. (Please note: It is necessary for all bold fields to be filled out to process your updated information.)

Your billing and payment history provides an at-a-glance summary of your account and makes it simple to check on your balance, last payment and new charges. Recent invoices are listed below for your review. Questions may be submitted to our customer care billing representatives by going to the Complaints page. Please be sure to indicate Billing Inquiry as the nature of your complaint.

Did you miss a paper? The New Herald is committed to making sure you get every issue you've ordered. If you did not receive your paper or any of its sections, simply select one of the following redelivery options so that we may deliver one to you.

Please note: Only same day redelivery is available on-line; you must submit this information on the same day on which your paper or section was to be delivered. For credits on past issues, please phone our customer care representatives at 1(800) 555-9876.

I would like to have today's paper delivered tomorrow. Please credit my account for today's missed paper.

Did you miss a paper? The New Herald is committed to making sure you get every issue you've ordered. If you did not receive your paper or any of its sections, simply select one of the following redelivery options so that we may deliver one to you.

Please note: Only same day redelivery is available on-line; you must submit this information on the same day on which your paper or section was to be delivered. For credits on past issues, please phone our customer care representatives at 1(800) 555-9876.

PAPER NOT RECEIVED

I did not receive today's paper.

ACCOUNT NUMBER: 060095544

Reason:

Select One: I would like to have today's paper delivered tomorrow.

Please credit my account for today's missed paper.

SECTIONS NOT RECEIVED

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I received today's paper with the section(s) checked below missing

Sections not received: ARTS & LEISURE BUSINESS

DINING IN/OUT MAIN NEWS SEC

METROPOLITAN SPORTS

Select One: I would like to have today's paper delivered tomorrow.

Please credit my account for today's missed paper.

As a newspaper home delivery subscriber, you may suspend your service for any amount of time. When you suspend your home delivery service, you may elect to take part in our vacation donation program (see description below). Please indicate your suspension

and restart dates below:

ACCOUNT NUMBER: 060095544

SUSPEND/RESUME

Suspend:

Resume:

Vacation Donation Program

During your next vacation, sit back, relax -- and at the same time enrich your community. Through The New Herald Newspaper in Education program, you can donate your subscription to students for the time period in which you will be out of town. For each copy you donate, at least two students will receive their own copy of The New Herald. To donate your vacation copies, please indicate below.

Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation. SUSPEND/RESUME 2

Suspend:

Resume:

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Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation. SUSPEND/RESUME 3

Suspend:

Resume:

Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation.

To best provide you with responsive, accessible customer service, we encourage your comments and suggestions. Please let us know about any dissatisfaction you may have with your delivery or billing service. Customers who have not received a paper can order another paper or receive credit for today by clicking here.

For all other subscription concerns, please use the form below to send us an email indicating the nature of your complaint and explaining how we may help you. A customer care representative will respond to your request within 24 hours to the email address provided on this form.

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f: Document 'f'

[FORM1]

Type="FormType":Value="AcceptForm"

Type="AcceptResponse":Name="AcctNo":APrompt="Please tell us your account number.":Value="":RPrompt="Your account number is "

Type="AcceptResponse":Name="date":APrompt="When would you like to start suspending the paper?":Value="":RPrompt="The delivery will stop on "

Type="MChoice":Name="Duration":APrompt="Would you like to suspend the paper for one month, two months, or three months?":Choice="one month,two months,three months":Value="":RPrompt="The delivery will be suspended for "

Type="FormAction":Value="/susp_deli"

[FORM2]

Type="FormType":Value="AcceptForm"

Type="AcceptResponse":Name="Name":APrompt="Please tell us your name.":Value="":RPrompt="Your name is "

Type="AcceptResponse":Name="Address":APrompt="What city do you live in?":Value="":RPrompt="You live in "

Type="MChoice":Name="SubType":APrompt="Would you like the newspaper daily or just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday newspaper":RPrompt="You have opted for "

Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual subscription?":Value="":Choice="a half-yearly subscription,an annual subscription":RPrompt="You have chosen "

Type="FormAction":Value="/add_acct"

[FORM3]

Type="FormType":Value="AcceptForm"

Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "

Type="FormAction":Value="/acct_info"

[FORM4]

Type="FormType":Value="AcceptForm"

Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "

Type="FormAction":Value="/get_pymt"

[FORM5]

Type="FormType":Value="AcceptForm"

Type="AcceptResponse":Name="Name":APrompt="Whom would you like to gift the subscription to?":Value="":RPrompt="You are gifting this subscription to "

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Type="AcceptResponse":Name="Address":APrompt="In which city does the person live?":Value="":RPrompt="The person lives in "
 Type="MChoice":Name="SubType":APrompt="Would you like to give a daily newspaper or just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday newspaper":RPrompt="You have opted for "
 Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual subscription?":Value="":Choice="a half-yearly subscription,an annual subscription":RPrompt="You have chosen "
 Type="FormAction":Value="/add_acct"

[FORM6]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="MChoice":Name="preference":APrompt="Would you like the newspaper or would you prefer credit for it?":Value="":Choice="the newspaper,credit":RPrompt="You prefer "
 Type="FormAction":Value="/prefer"

[FORM7]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="Hidden":Name="preference":Value="credit"
 Type="FormAction":Value="/prefer"

[FORM8]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="FormAction":Value="/chg_acct"

x: Document 'x'

FORM1:Would you like to temporarily suspend your delivery?
 FORM2:Would you like to order a subscription?
 FORM3:Would you like information about your account balance or your payments?
 FORM4:Would you like to pay your subscription fees?
 FORM5:Would you like to give a gift subscription?
 FORM6:Did you miss today's paper?
 FORM6:Did you receive a wet paper?
 FORM7:Did you miss yesterday's newspaper and would you like credit for yesterday?
 FORM8:Would you like to change your address or change any other information?

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a: Datafile 'a' contains data about subscription

- 1|1|2|01-01-2002|365|315|01-01-2002|50||Frege|Jena
- 2|2|2|01-02-2002|52|32|01-02-2002|20||Russell|Cambridge
- 3|2|2|01-02-2002|52|32|01-02-2002|20||Wittgenstein|Vienna
- 4|1|2|01-04-2002|364|314|01-04-2002|50||Austin|Oxford
- 5|1|2|01-05-2002|365|264|01-05-2002|100||Grice|Berkeley
- 6|1|1|01-06-2002|180|49|01-06-2002|130||Parikh|New York

CONFIGURATION FILES

t.cfg: Thesaurus configuration file. This is generated by program 't'

[PROMPTS]

- Are you calling about subscriptions?
- Would you like to order a subscription?
- Would you like to pay your subscription fees?
- Would you like to give a gift subscription?
- Would you like to change your address or change any other information?
- Do you have any billing enquiries or concerns?
- Would you like information about your account balance or your payments?
- Would you like to speak to a customer care representative?
- Would you like to temporarily suspend your delivery?
- Is there a problem with your paper or delivery?
- Did you miss today's paper?
- Did you miss yesterday's newspaper and would you like credit for yesterday?
- Did you receive a wet paper?
- Would you like information about the New Herald website?
- Would you like to obtain your New Herald website password?
- The website address is www.newherald.com. Would you like any other information about the website?
- Are you calling about advertisements?
- Would you like to advertise in the New Herald?
- Is it a classified ad?
- Is it a full-page, half-page, or quarter-page ad?
- Would you like to place an ad?
- Are you calling about something else?
- Would you like to write to the New Herald?
- Would you like to submit an article to the op-ed page?
- Please email your article to oped@newherald.com.
- Would you like to send a letter to the editor?
- Please email your letter to letters@newherald.com.
- Would you like to work for the New Herald?

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Would you like to write for the New Herald?
Would you like to work for the editorial division or for the administrative division?

[MENUTREE]

- 0,1,0
- 1,2,99
- 1,3,99
- 1,4,99
- 1,5,99
- 1,6,0
- 6,7,99
- 6,8,99
- 1,9,99
- 0,10,0
- 10,11,99
- 10,12,99
- 10,13,99
- 0,14,0
- 14,15,99
- 14,16,99
- 0,17,0
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```
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
    exit 0
fi
line=`grep "^$acctno|" a`
echo 'Type="FormType":Value="ResponseForm"'

name=`echo $line | cut -d'|' -f 11`
echo 'Type="Say":RPrompt="Your last name is ":Value="$name"'
city=`echo $line | cut -d'|' -f 12`
echo 'Type="Say":RPrompt="You live in ":Value="$city"'
sub_type=`echo $line | cut -d'|' -f 2`
if [ $sub_type -eq 1 ]
then
    sub_type="a daily newspaper"
else
    sub_type="the Sunday newspaper"
fi
echo 'Type="Say":RPrompt="You have subscribed for ":Value="$sub_type"'
sub_prd=`echo $line | cut -d'|' -f 3`
sdate=`echo $line | cut -d'|' -f 4`
if [ $sub_prd -eq 1 ]
then
    sub_prd="six months"
else
    sub_prd="one year"
fi
echo 'Type="Say":RPrompt="The subscription starts on '$sdate' for a period of
":Value="$sub_prd"'

fee=`echo $line | cut -d'|' -f 5`
echo 'Type="Say":RPrompt="The subscription fee is $":Value="$fee"'
bal=`echo $line | cut -d'|' -f 6`
echo 'Type="Say":RPrompt="Your balance is $":Value="$bal"'
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
echo 'Type="Say":RPrompt="Your last payment was '$pymt' on ":Value="$pdate"'
sdate=`echo $line | cut -d'|' -f 9`
if [ "X$sdate" != "X" ]
```


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```

then
    suprd=`echo $line | cut -d'|' -f 10`
    case $suprd in
    1) suprd="one month";;
    2) suprd="two months";;
    3) suprd="three months";;
    esac
    echo 'Type="Say":RPrompt="Your account is suspended from '$sudate' for
":Value="$suprd"'
fi

```

add_acct: Script to add new account into 'a'

```

#!/bin/sh
# arrange all the values of input into a single line
cp /dev/null /tmp/param
cut -d=' ' -f 2 | sed "s/^//g"
s/ ^\\\\\\\\/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param
done
echo "" >>/tmp/param

# now transfer them into env variables.
read NAME CITY SUB_TYPE SUB_PRD < /tmp/param
if [ "$SUB_TYPE" = "a daily newspaper" ]
then
    SUB_TYPE=1
    FEE=182
else
    SUB_TYPE=2
    FEE=26
fi
if [ "$SUB_PRD" = "a half-yearly subscription" ]
then
    SUB_PRD=1
else
    SUB_PRD=2
    FEE=`expr $FEE \\* 2`
fi
cnt=1
while true

```

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```
do
    if [ "`grep -c \"^$cnt|\" a`" -ne 0 ]
    then
        cnt=`expr $cnt + 1`
        continue
    fi
    echo $cnt|" $SUB_TYPE|$SUB_PRD|" `date +%d-%m-%Y`|$FEE|$FEE||0||$NAME|$CITY" >> a
    echo "Type="FormType":Value="AcceptForm""
    echo "Type="Say":RPrompt="Your subscription request has been entered":Value=""
    echo "Type="Say":Name="acct_no":RPrompt="Your account number is ":Value="$cnt""
    echo "Type="Say":RPrompt="Your fee for the subscription is $":Value="$FEE""
    echo "Type="AcceptResponse":Name="payment":APrompt="Your minimum initial
payment is $25. How much would you like to pay now?":Value="":RPrompt="You have chosen
to pay $"
    echo "Type="FormAction":Value="./updt_pymt""
    break
done
#rm /tmp/param
```

chg_acct: Script to generate a form to change account information

```
#!/bin/sh
acctno=`cut -d'=' -f 2 | sed s/"/`g`
#echo $acctno
cnt=`grep -c \"^$acctno|\" a`
if [ $cnt -eq 0 ]
then
    echo "Type="FormType":Value="ResponseForm""
    echo "Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""
    exit 0
fi
line=`grep \"^$acctno|\" a`
echo "Type="FormType":Value="AcceptForm""
echo "Type="Hidden":Name="acctno":Value=$acctno""
#----- Response info
name=`echo $line | cut -d'|' -f 11`
echo "Type="Say":RPrompt="Your last name is ":Value="$name""
city=`echo $line | cut -d'|' -f 12`
echo "Type="Say":RPrompt="You live in ":Value="$city""
sub_type=`echo $line | cut -d'|' -f 2`
```

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```

if [ $sub_type -eq 1 ]
then
    sub_type="a daily newspaper"
else
    sub_type="the Sunday newspaper"
fi
echo 'Type="Say":RPrompt="You have subscribed for ":Value="$sub_type"'
sub_prd=`echo $line | cut -d'|' -f 3`
sdate=`echo $line | cut -d'|' -f 4`
if [ $sub_prd -eq 1 ]
then
    sub_prd="six months"
else
    sub_prd="one year"
fi
echo 'Type="Say":RPrompt="The subscription starts on '$sdate' for a period of
":Value="$sub_prd"'

fee=`echo $line | cut -d'|' -f 5`
echo 'Type="Say":RPrompt="The subscription fee is $":Value="$fee"'
bal=`echo $line | cut -d'|' -f 6`
echo 'Type="Say":RPrompt="Your balance is $":Value="$bal"'
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
echo 'Type="Say":RPrompt="Your last payment was '$pymt' on ":Value="$pdate"'
sudate=`echo $line | cut -d'|' -f 9`
if [ "X$sudate" != "X" ]
then
    suprd=`echo $line | cut -d'|' -f 10`
    case $suprd in
    1) suprd="one month";;
    2) suprd="two months";;
    3) suprd="three months";;
    esac
    echo 'Type="Say":RPrompt="Your account is suspended from '$sudate' for
":Value="$suprd"'
fi
#-----
echo 'Type="AcceptResponse":Name="Name":APrompt="What name would you like to
use?":Value="":RPrompt="The name you would like to use is "'
echo 'Type="AcceptResponse":Name="Address":APrompt="What city would you like the
newspaper sent to?":Value="":RPrompt="The city you would like the newspaper sent to is "'

```

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```
echo "Type="MChoice":Name="SubType":APrompt="Would you like the newspaper daily or
just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday
newspaper":RPrompt="You have opted for "
echo "Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual
subscription?":Value="":Choice="a half-yearly subscription,an annual
subscription":RPrompt="You have chosen "
echo "Type="FormAction":Value="/updt_acct"
```

get_pymt: Script to generate a form to accept payment for a particular account

```
#!/bin/sh
acctno=`cut -d'|' -f 2 | sed s/^//g`
#echo $acctno
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo "Type="FormType":Value="ResponseForm"
    echo "Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""
    exit 0
fi

line=`grep "^$acctno|" a`

fee=`echo $line | cut -d'|' -f 5`
bal=`echo $line | cut -d'|' -f 6`
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
if [ $bal -le 0 ]
then
    echo "Type="FormType":Value="ResponseForm"
else
    echo "Type="FormType":Value="AcceptForm"
fi
echo "Type="Say":RPrompt="The subscription fee is $":Value="$fee"
echo "Type="Say":RPrompt="Your last payment was '$pymt' on":Value="$pdate"
echo "Type="Say":RPrompt="Your balance is $":Value="$bal"
if [ $bal -ne 0 ]
then
    echo "Type="Hidden":Name="acctno":Value="$acctno"
    echo "Type="AcceptResponse":Name="payment":APrompt="How much would you like
to pay now?":Value="":RPrompt="You have paid $"
```

```
echo 'Type="FormAction":Value="/upd_t_pymt"'
fi
```

upd_t_pymt: Script to update the data file 'a' using form information

```
#!/bin/sh
cp /dev/null /tmp/param1
cut -d'=' -f 2 | sed "s/^//"g
s/ \\\\\\\\\ /g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno payment < /tmp/param1
touch /tmp/tmpa
echo "no" > /tmp/found
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo "yes" > /tmp/found
        echo -n $cacno'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 2`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 3`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 4`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 5`'|' >> /tmp/tmpa
        bal=`echo $line | cut -d'|' -f 6`
        bal=`expr $bal - $payment`
        echo -n $bal'|' >> /tmp/tmpa
        echo -n `date +%d-%m-%Y`'|' >> /tmp/tmpa
        echo -n $payment'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 9`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 10`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 11`'|' >> /tmp/tmpa
        echo `echo $line | cut -d'|' -f 12` >> /tmp/tmpa
    else
        echo $line >> /tmp/tmpa
    fi
done
mv /tmp/tmpa a
read ans < /tmp/found
```

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```

if [ "$sans" = "yes" ]
then
    echo "Type="FormType":Value="ResponseForm"
    echo "Type="Say":RPrompt="Thank you for the subscription":Value=""
else
    echo "Type="FormType":Value="ResponseForm"
    echo "Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""
fi
rm /tmp/param1 /tmp/found

```

susp_deli: Script to suspend delivery for a particular account

```

#!/bin/sh
cp /dev/null /tmp/param1
cut -d=' ' -f 2 | sed "s^/^/g
s/ ^/ /g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno sdate period < /tmp/param1
if [ "$period" = "one month" ]
then
    period=1
fi
if [ "$period" = "two month" ]
then
    period=2
fi
if [ "$period" = "three months" ]
then
    period=3
fi
echo "no" > /tmp/found
touch /tmp/tmpa
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo "yes" > /tmp/found
    fi
done

```

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```

echo -n $carno'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 2`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 3`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 4`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 5`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 6`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 7`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 8`'| >> /tmp/tmpa
echo -n $sdate'| >> /tmp/tmpa
echo -n $period'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 11`'| >> /tmp/tmpa
echo `echo $line | cut -d'|' -f 12` >> /tmp/tmpa
else
    echo $line >> /tmp/tmpa
fi
done
mv /tmp/tmpa a
read ans < /tmp/found
if [ "$ans" = "yes" ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Thank you. The information has been updated":Value=""'
else
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
fi
rm /tmp/param1 /tmp/found

```

updt_acct: Script to update data file 'a' with changed information

```

#!/bin/sh
# arrange all the values of input into a single line
cp /dev/null /tmp/param
cut -d=' ' -f 2 | sed "s^/^/g
s/ ^/ /g" | while read aa
do
    echo -n $aa' ' >> /tmp/param
done
echo "" >>/tmp/param
cp /dev/null /tmp/tmpa

```

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```
read acctno name city sub_type sub_prd < /tmp/param
cat a | while read line
do
cacno=`echo $line | cut -d'|' -f 1`
if [ $cacno -eq $acctno ]
then
    echo -n $cacno'|' >> /tmp/tmpa
    if [ "$sub_type" = "a daily newspaper" ]
    then
        sub_type=1
        newfee=182
    else
        sub_type=2
        newfee=26
    fi
    echo -n $sub_type'|' >> /tmp/tmpa
    if [ "$sub_prd" = "a half-yearly subscription" ]
    then
        sub_prd=1
    else
        sub_prd=2
        newfee=`expr $newfee \* 2`
    fi
    echo -n $sub_prd'|' >> /tmp/tmpa
    echo -n `echo $line | cut -d'|' -f 4`'|' >> /tmp/tmpa
    echo -n $newfee'|' >> /tmp/tmpa
    oldfee=`echo $line | cut -d'|' -f 5`
    oldbal=`echo $line | cut -d'|' -f 6`
    newbal=`expr $newfee - $oldfee + $oldbal`
    echo $newfee' '$newbal > /tmp/newbal
    if [ $newbal -gt 0 ]
    then
        echo -n $newbal'|' >> /tmp/tmpa
    else
        echo -n '0'|' >> /tmp/tmpa
    fi
    #echo -n `date +%d-%m-%Y`'|' >> /tmp/tmpa
    echo -n `echo $line | cut -d'|' -f 7`'|' >> /tmp/tmpa
    echo -n `echo $line | cut -d'|' -f 8`'|' >> /tmp/tmpa
    echo -n `echo $line | cut -d'|' -f 9`'|' >> /tmp/tmpa
    echo -n `echo $line | cut -d'|' -f 10`'|' >> /tmp/tmpa
    echo -n $name'|' >> /tmp/tmpa
    echo $city >> /tmp/tmpa
```


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```

else
    echo $line >> /tmp/tmpa
fi
done
mv /tmp/tmpa a
echo "Type="FormType":Value="ResponseForm"
read newfee newbal < /tmp/newbal
echo "Type="Say":RPrompt="Your fee for the subscription is $":Value=""$newfee"
if [ $newbal -lt 0 ]
then
    newbal=`expr $newbal \* -1`
    echo "Type="Say":RPrompt="A cheque of '$$newbal' will be sent to you to compensate
for excess balance"
else
    echo "Type="Say":RPrompt="Your balance is $":Value=""$newbal"
fi
echo "Type="Say":RPrompt="Thank you":Value=""
rm /tmp/param /tmp/newbal

```

prefer: Script to generate form for damaged / missing newspaper complaint

```

#!/bin/sh
cp /dev/null /tmp/param1
cut -d=' ' -f 2 | sed "s/^//g
s/ \\\\\\\\\\\\\\\\\/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno preference < /tmp/param1
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo "Type="FormType":Value="ResponseForm"
    echo "Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""
    exit 0
fi

if [ "$preference" = "the newspaper" ]
then
    echo "Type="FormType":Value="ResponseForm"

```


WE CLAIM:

1. A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:
 - at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,
 - identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and
 - jumping to the at least one node.
2. The method of claim 1 further comprising:
 - providing a verbal description associated with the at least one node to the user.
3. The method of claim 1 further comprising:
 - searching a thesaurus correlating keywords with synonyms.
4. The method of claim 3 wherein the searching further comprises:
 - identifying the at least one word as synonymous with the at least one keyword.
5. The method of claim 1 further comprising:
 - determining that the at least one word is neither a keyword nor a synonym of any keyword; and

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learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. The method of claim 5 further comprising:
adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

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8. A method performed in connection with an arrangement of nodes representable as a hierarchical graph comprising:

correlating keywords with nodes in which the keywords appear to create an inverted index so that the keywords each appear only once and all nodes containing each of the keywords are indexed to those keywords;

maintaining a thesaurus of synonyms for at least some of the keywords;

receiving an input from a user containing a meaningful word;

searching the inverted index to determine whether the meaningful word is a keyword and, if the meaningful word is a keyword, jumping to a node identified in the inverted index as correlated to that keyword, otherwise,

searching the thesaurus to determine if the meaningful word is a synonym for at least one particular keyword and, if the meaningful word is the synonym, using the synonym to identify the at least one particular keyword, and

jumping to at least one node correlated to the at least one particular keyword.

9. The method of claim 8 further comprising:

creating the thesaurus by analyzing at least two files and determining synonymy among application meaningful words contained therein based upon a frequency of co-occurrence among the application meaningful words.

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10. A system comprising:
a hierarchically arranged series of nodes;
an inverted index correlating keywords with the nodes;
a thesaurus correlating at least some keywords with synonyms for those keywords;
a processor executable learning procedure configured to, upon receipt of a term that is identified as neither a synonym nor a keyword based upon a search of both the inverted index and the thesaurus,

(a) identify the term as at least one particular synonym for at least one particular keyword and

(b) correlate the term with the at least one particular keyword,

so that when a subsequent user provides the term the system will operate as if the term was synonymous with the at least one particular keyword.

11. The system of claim 10 further comprising:

a set of verbal descriptions for at least some of the nodes.

12. The system of claim 10 wherein at least one of the nodes is a service node.

13. The system of claim 10 further comprising an interactive voice response system and wherein the hierarchically arranged series of nodes is part of the interactive voice response system.

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14. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a file system browser application.

15. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a navigation system for television listings.

16. The system of claim 10 wherein the hierarchically arranged series of nodes is part of one of a document navigation or a document retrieval system.

17. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a geographic information system.

18. A transaction processing system, having a hierarchical arrangement of nodes and configured to interact with a user so that the user can navigate among the nodes in the hierarchy, the system comprising:

an inverted index correlating keywords with at least some of the nodes in the hierarchical arrangement so that when the user interacts with the system and provides an input in response to a verbal description from one node in the hierarchy and the response includes a meaningful word correlatable with a keyword, the system will identify at least one node that is correlated to the meaningful word by the inverted index and jump to that at least one node without first traversing any other node.

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19. The system of claim 18 further comprising:
a thesaurus correlating at least some of the keywords with synonyms for the at least some keywords.

20. The system of claim 18 further comprising:
at least one stored learned word correlated to a keyword.

21. A method performed by a program executed by a processor to navigate among a hierarchically arranged group of nodes, each of the nodes having an associated verbal description, the method comprising:

eliminating stop words and duplicates from the verbal descriptions to create a list of keywords;

creating a list of thesaurus words;

creating a first matrix comprising a correlation of at least some thesaurus words with at least some keywords;

creating a second matrix by calculating cosine values from a co-occurrence analysis of the entries in the first matrix;

determining a synonymy among the at least some thesaurus words and the at least some keywords; and

creating a thesaurus configured as an inverted index based upon the synonymy.

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22. The method of claim 21 further comprising:
tracking frequency of use of the nodes.
23. The method of claim 22 further comprising:
ranking the nodes based upon a result of the tracking.
24. The method of claim 21 further comprising:
pruning a node from the group of nodes based upon a frequency of usage criterion.
25. The method of claim 21 further comprising:
adding a synonym entry into the thesaurus based upon a result of an unknown word
analysis.
26. The method of claim 21 wherein the thesaurus further comprises at least some
learned entries, the method further comprising:
deleting a learned entry based upon satisfaction of a frequency of use criterion.

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ABSTRACT

A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement involves receiving an input containing at least one word identifiable with at least one keyword, identifying at least one node, other than the first node, not directly connected to the first node, but associated with the at least one keyword, and jumping to the identified node. A transaction processing system having a hierarchical arrangement of nodes and is configured for user navigation among the nodes. The system has an inverted index correlating keywords with at least some nodes in the arrangement so that when the user provides an input in response to a verbal description and the response includes a meaningful word correlatable with a keyword, the system will identify at least one node correlated to the meaningful word by the inverted index and jump to that node without first traversing any other node.

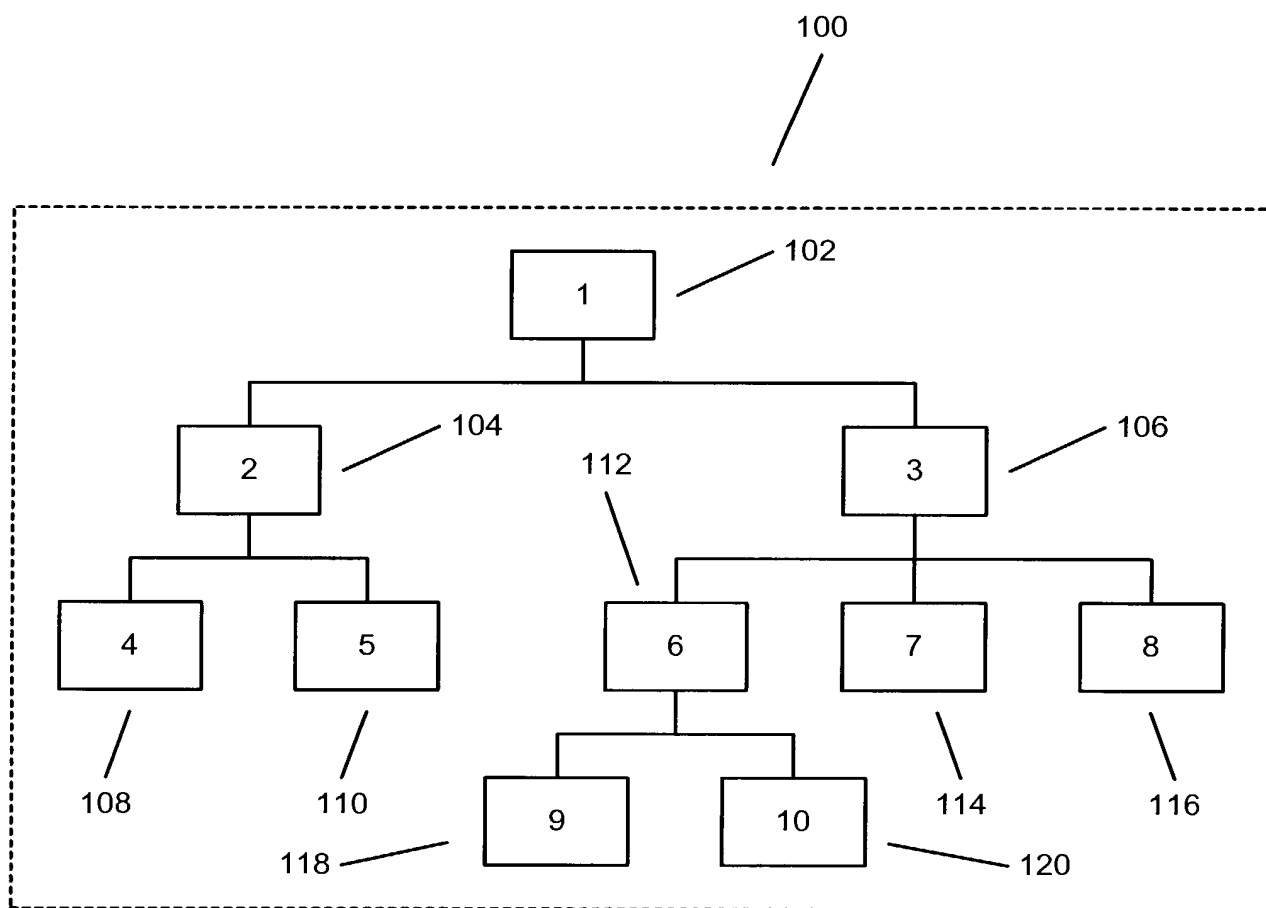


FIG. 1

FIG. 2

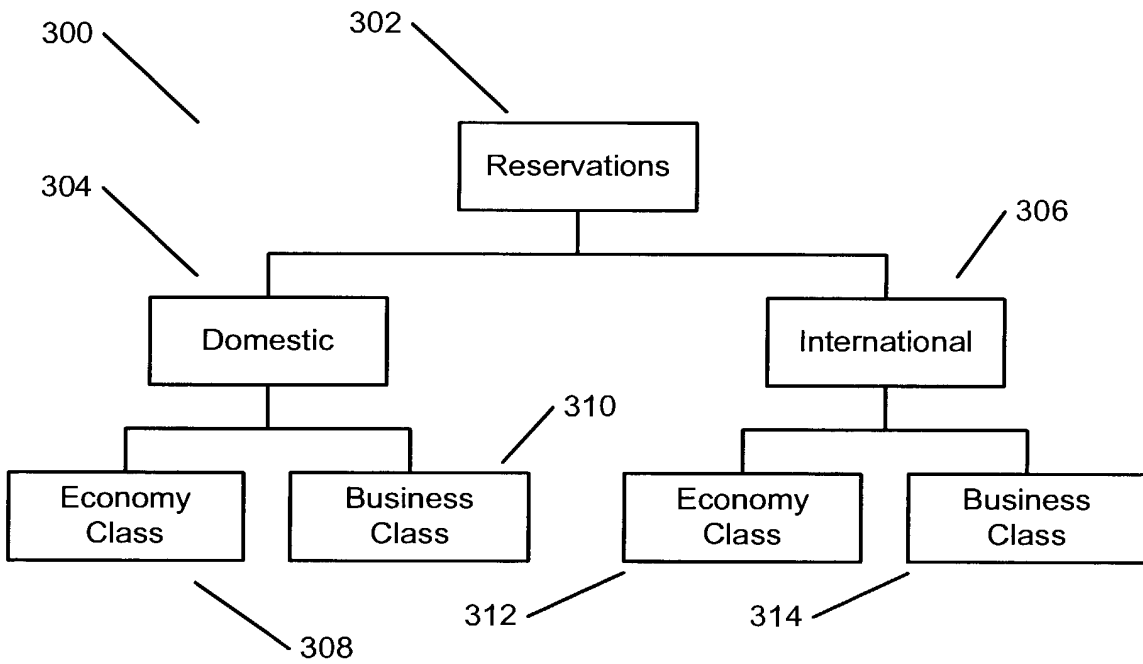
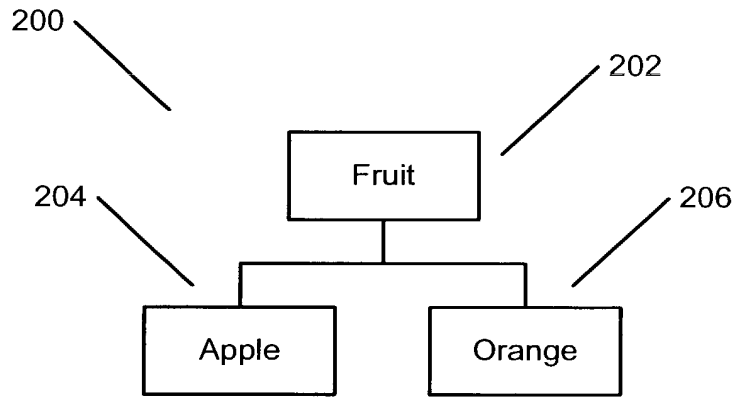


FIG. 3

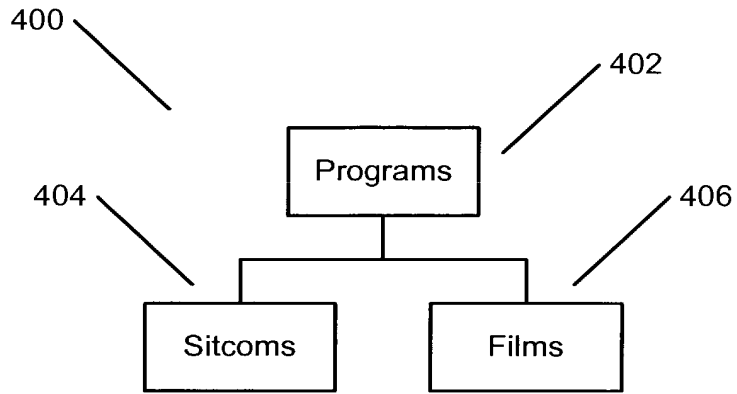


FIG. 4

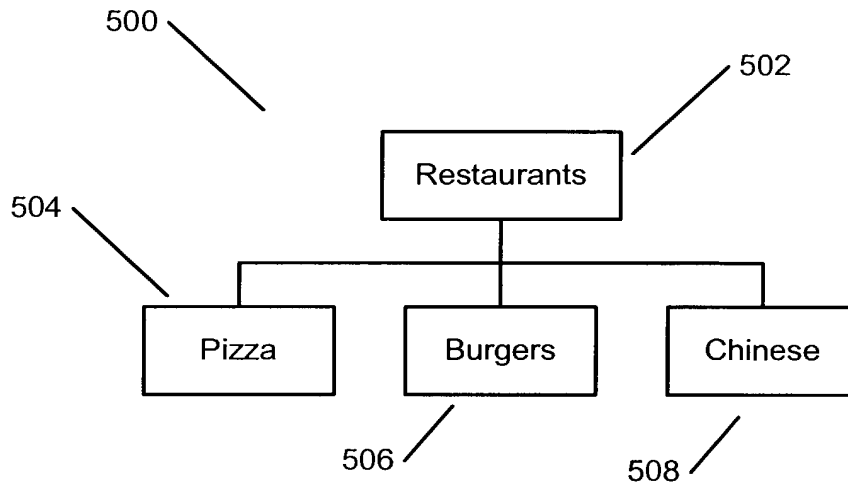


FIG. 5

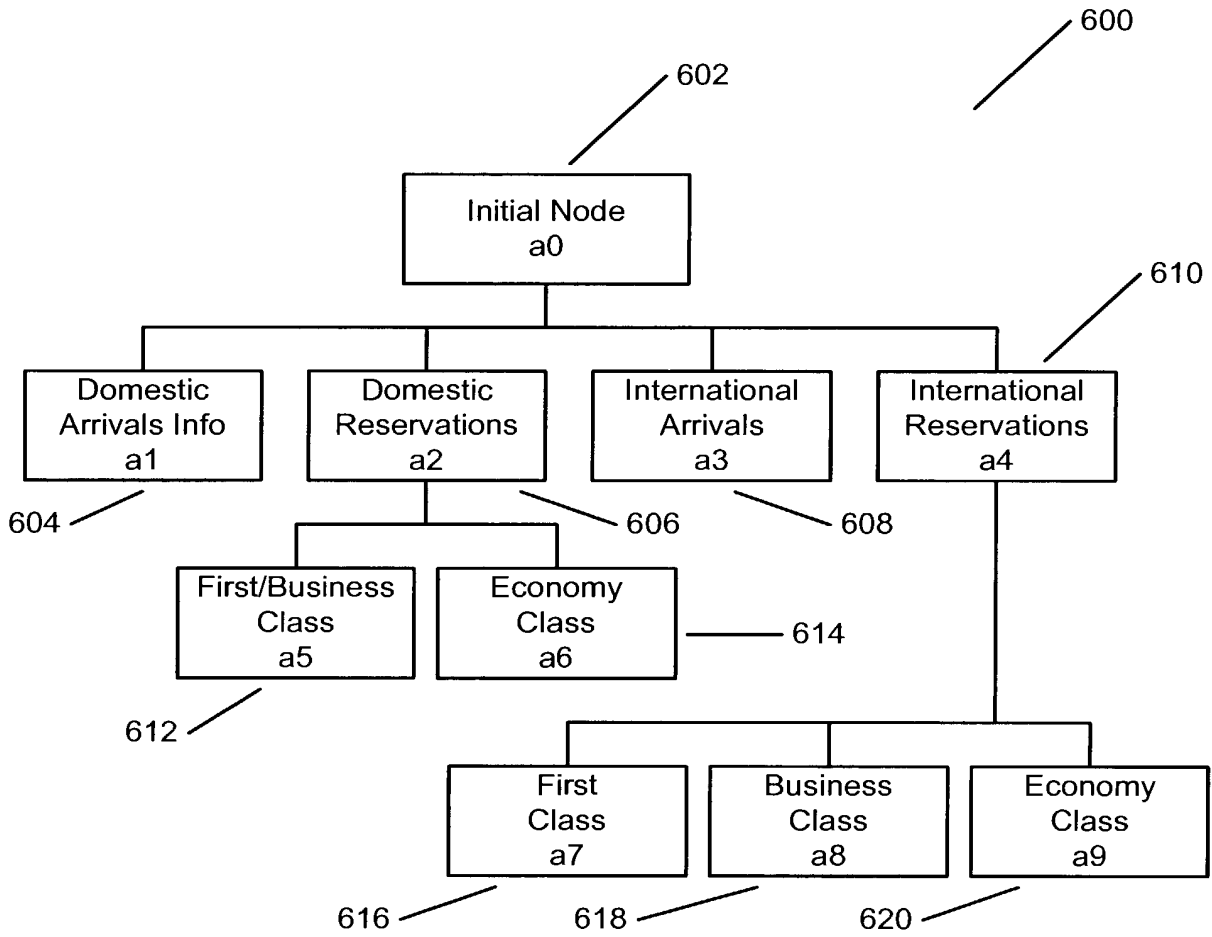


FIG. 6

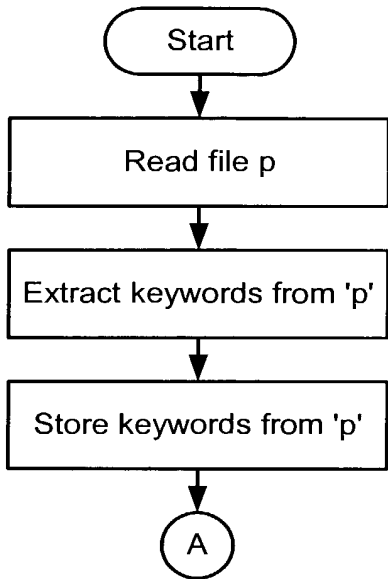


FIG. 7A

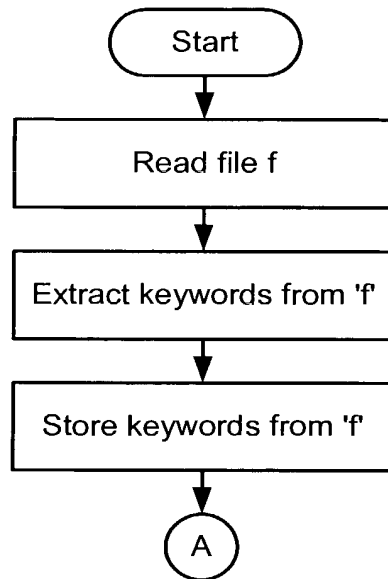


FIG. 7B

FIG. 8

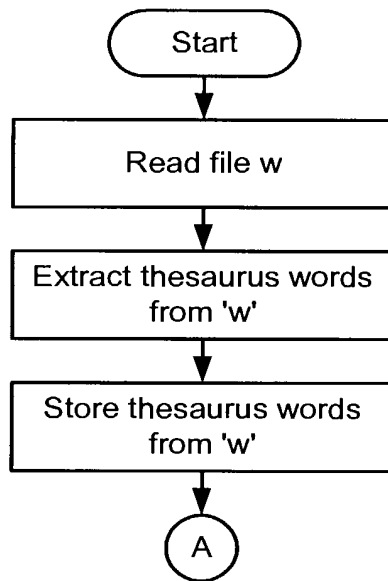


FIG. 9

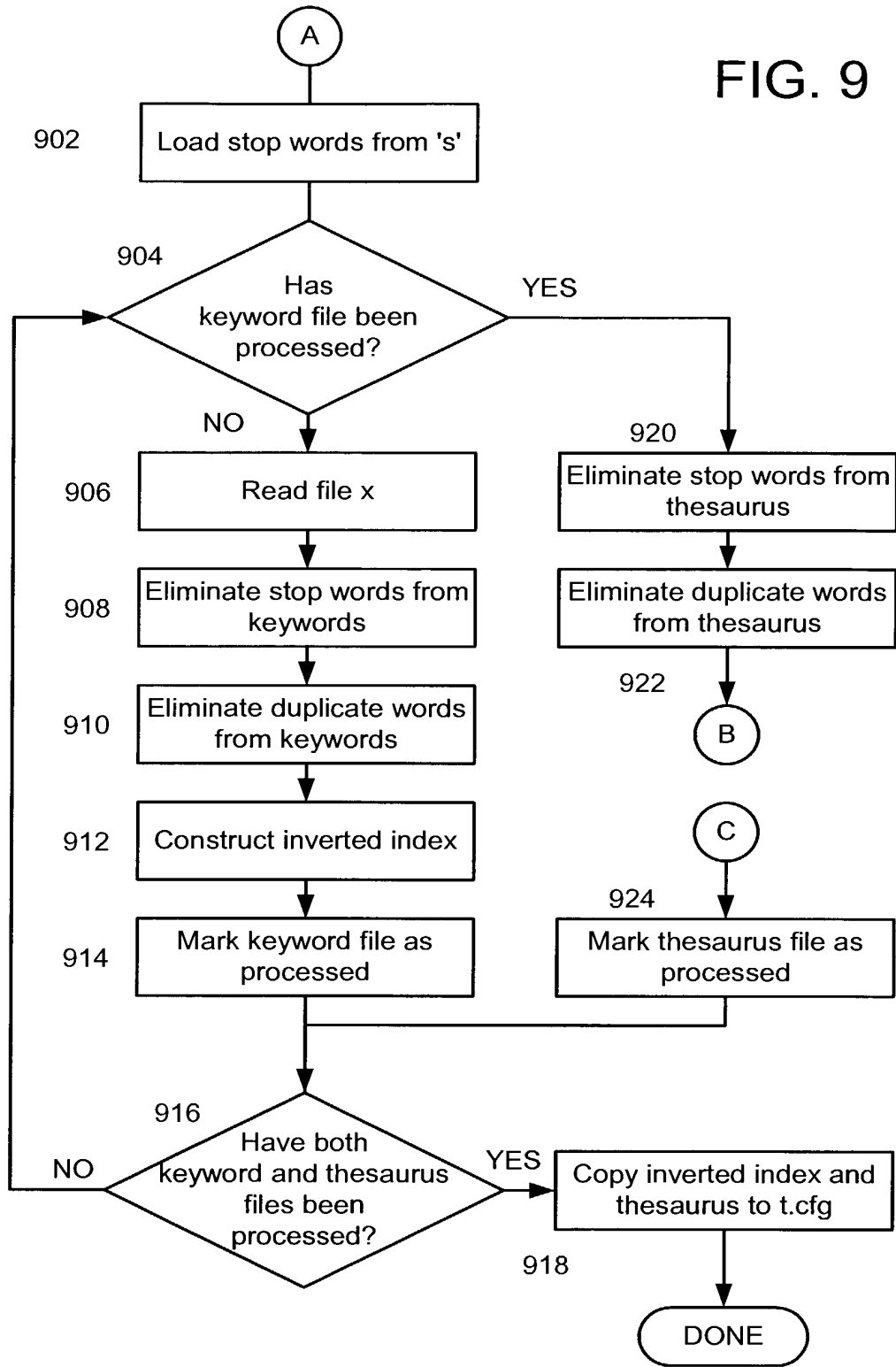


FIG. 10

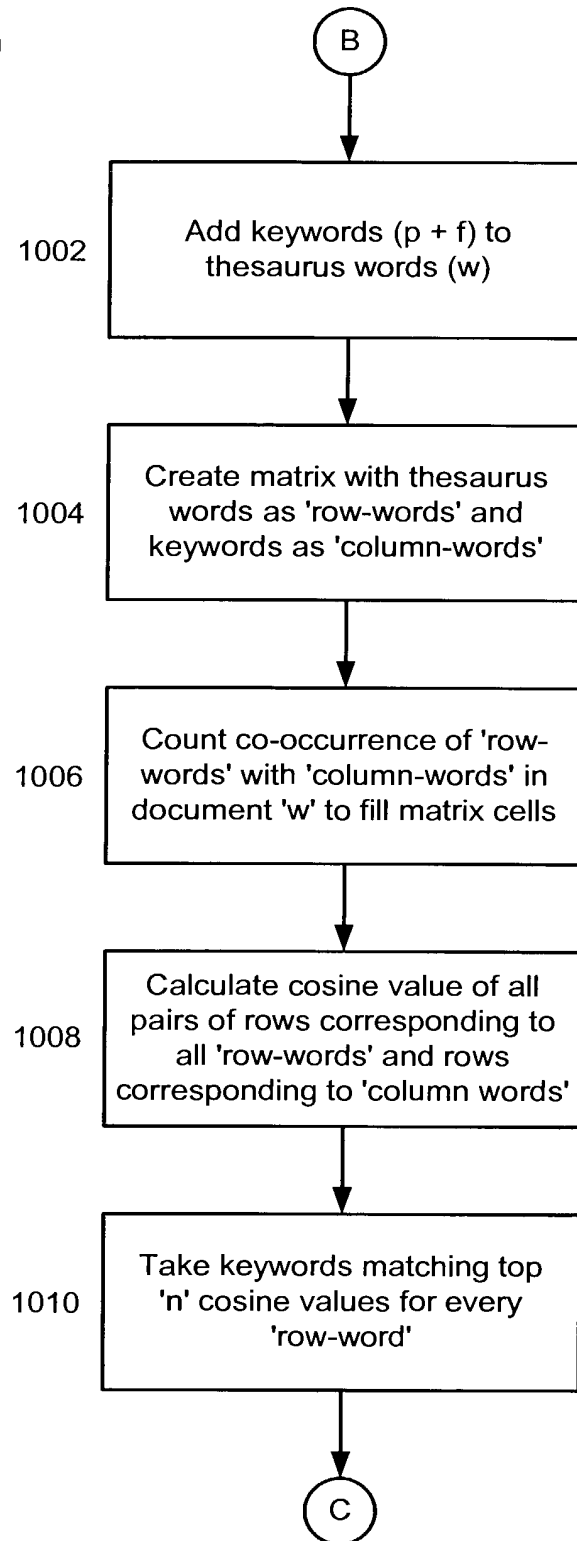
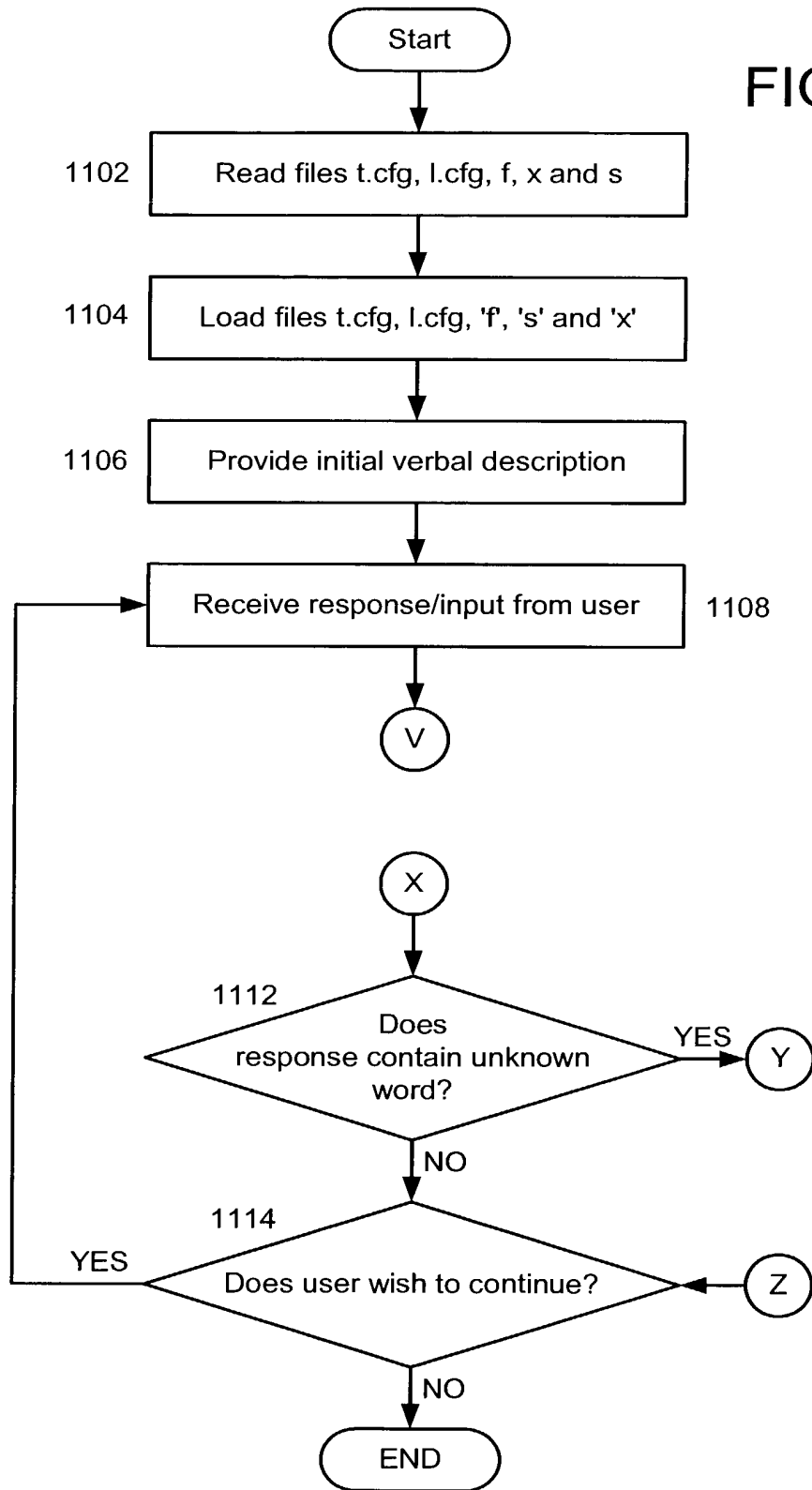


FIG. 11



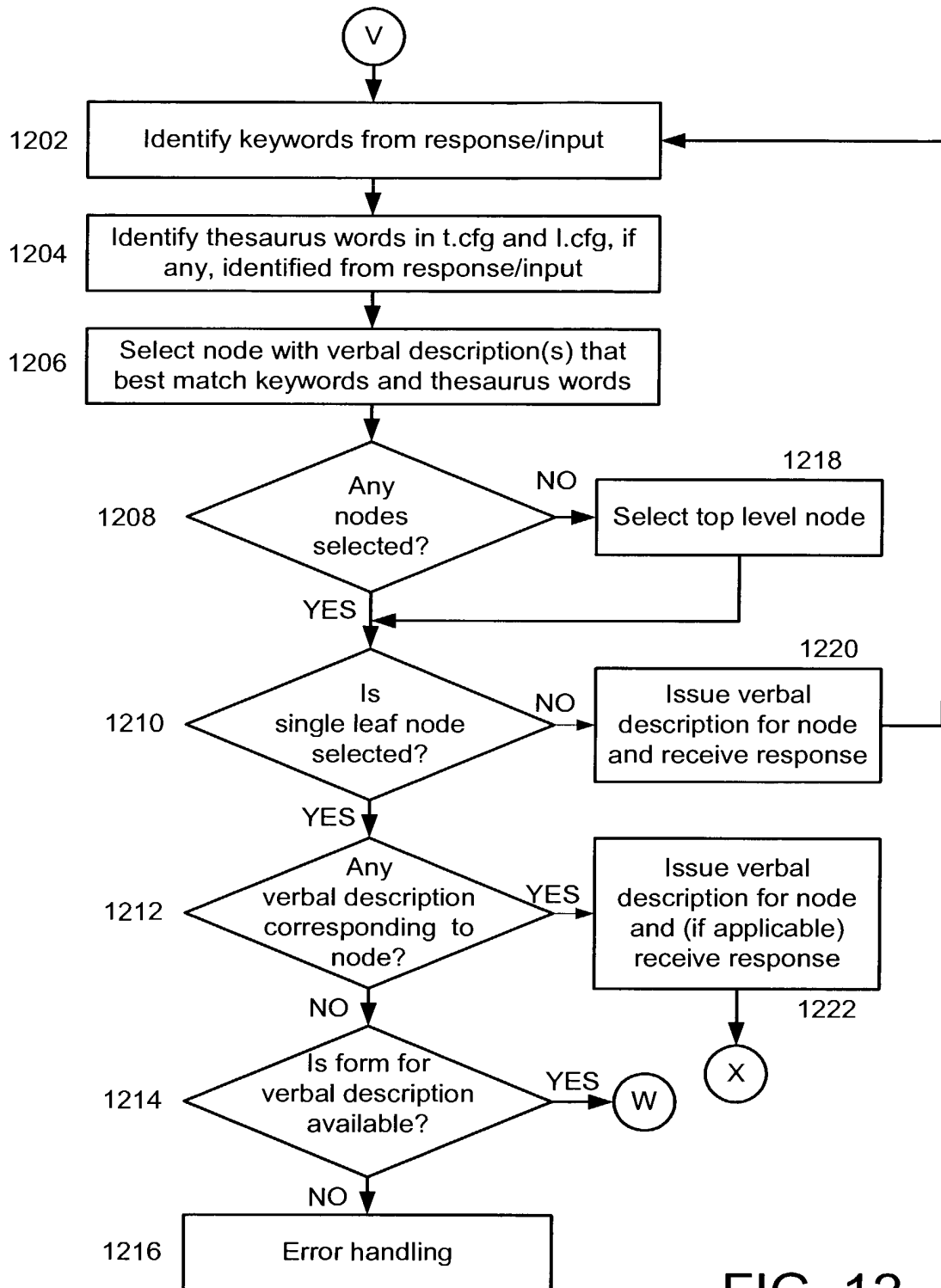


FIG. 12

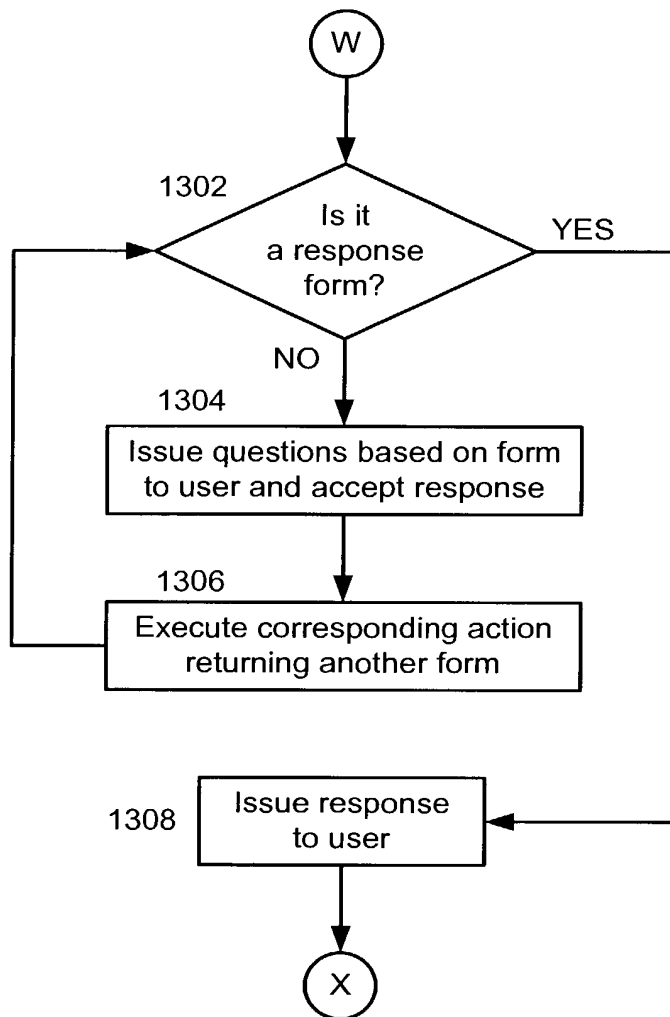


FIG. 13

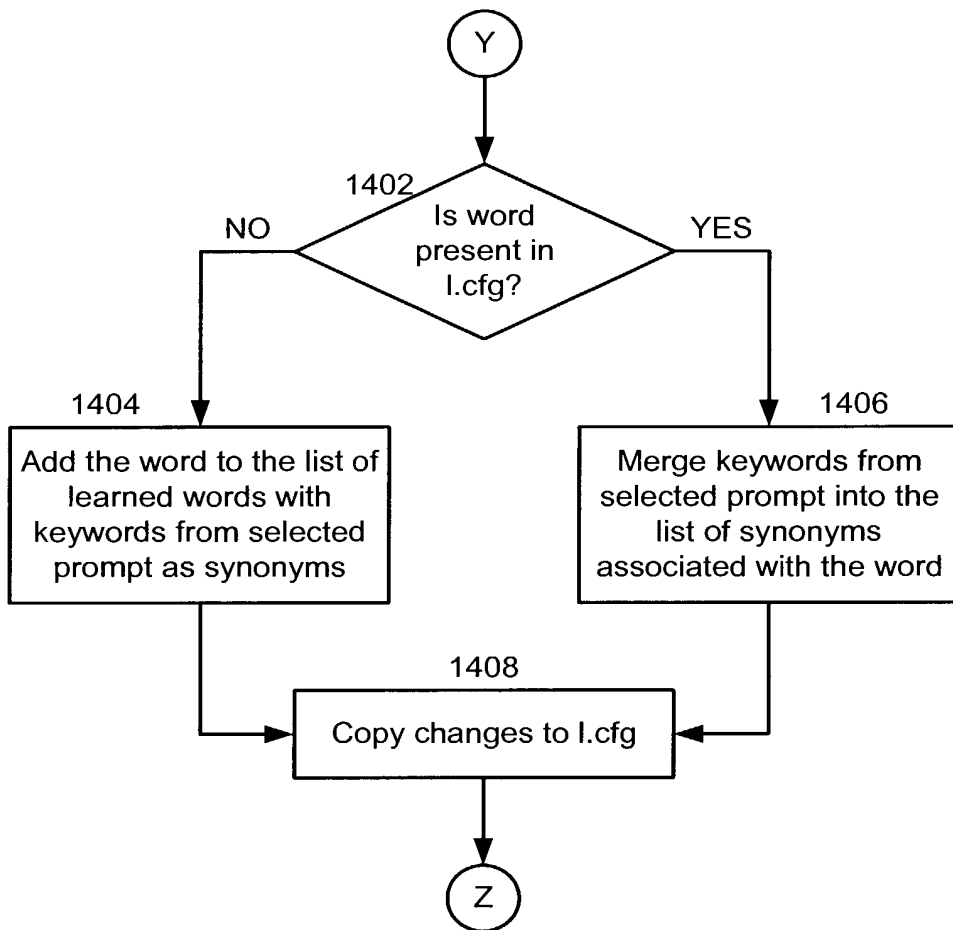


FIG. 14

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COMBINED DECLARATION AND POWER OF ATTORNEY FOR ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

NAVIGATION IN A HIERARCHICAL STRUCTURED TRANSACTION PROCESSING SYSTEM

the specification of which

- a. is attached hereto.
- b. was filed on _____ as application Serial No. _____ and was amended on _____ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

- c. was described and claimed in International Application No. ____ filed on ____ and as amended on ____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. § 1.56.

I hereby specify the following as the correspondence address to which all communications about this application are to be directed:

SEND CORRESPONDENCE TO:

- Bar Code label attached (see right)
- Address Shown (see below)

MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, N.Y. 10154



27123

PATENT TRADEMARK OFFICE

↑AFFIX CUSTOMER NO. LABEL ABOVE ↑

DIRECT TELEPHONE CALLS TO: 212-758-4800

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- I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a)-(d) or under § 365(b) of any foreign application(s) for patent or inventor's certificate or under § 365(a) of any PCT international application(s) designating at least one country other than the U.S. listed below and also have identified below such foreign application(s) for patent or inventor's certificate or such PCT international application(s) filed by me on the same subject matter having a filing date within twelve (12) months before that of the application on which priority is claimed:
- The attached 35 U.S.C. § 119 claim for priority for the application(s) listed below forms a part of this declaration.

Country/PCT	Application Number	Date of filing (day, month, yr)	Date of issue (day, month, yr)	Priority Claimed
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N

- I hereby claim the benefit under 35 U.S.C. § 119(e) of any U.S. provisional application(s) listed below.

Provisional Application No.	Date of filing (day, month, yr)

ADDITIONAL STATEMENTS FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART OR PCT INTERNATIONAL APPLICATION(S) DESIGNATING THE U.S.

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or under § 365(c) of any PCT international application(s) designating the U.S. listed below.

US/PCT Application Serial No.	Filing Date	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)

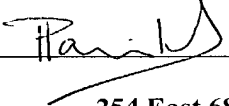
- In this continuation-in-part application, insofar as the subject matter of any of the claims of this application is not disclosed in the above listed prior United States or PCT international application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or Imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys and/or agents with full power of substitution and revocation, to prosecute this application, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith: David H. Pfeffer (Reg. No. 19,825), Harry C. Marcus (Reg. No. 22,390), Robert E. Paulson (Reg. No. 21,046), Stephen R. Smith (Reg. No. 22,615), Kurt E. Richter (Reg. No. 24,052), J. Robert Dailey (Reg. No. 27,434), Eugene Moroz (Reg. No. 25,237), John F. Sweeney (Reg. No. 27,471), Arnold I. Rady (Reg. No. 26,601), Christopher A. Hughes (Reg. No. 26,914), William S. Feiler (Reg. No. 26,728), Joseph A. Calvaruso (Reg. No. 28,287), James W. Gould (Reg. No. 28,859), Richard C. Komson (Reg. No. 27,913), Israel Blum (Reg. No. 26,710), Bartholomew Verdirame (Reg. No. 28,483), Maria C.H. Lin (Reg. No. 29,323), Joseph A. DeGirolamo (Reg. No. 28,595), Michael P. Dougherty (Reg. No. 32,730), Seth J. Atlas (Reg. No. 32,454), Andrew M. Riddles (Reg. No. 31,657), Bruce D. DeRenzi (Reg. No. 33,676), Mark J. Abate (Reg. No. 32,527), John T. Gallagher (Reg. No. 35,516), Steven F. Meyer (Reg. No. 35,613), Kenneth H. Sonnenfeld (Reg. No. 33,285), Tony V. Pezzano (Reg. No. 38,271), Andrea L. Wayda (Reg. 43,979), Walter G. Hanchuk (Reg. No. 35,179), John W. Osborne (Reg. No. 36,231), Robert K. Goethals (Reg. No. 36,813), Peter N. Fill (Reg. No. 38,876), Mary J. Morry (Reg. No. 34,398) and Kenneth S. Weitzman (Reg. No. 36,306) of Morgan & Finnegan, L.L.P. whose address is: 345 Park Avenue, New York, New York, 10154; and Michael S. Marcus (Reg. No. 31,727), and John E. Hoel (Reg. No. 26,279), of Morgan & Finnegan, L.L.P., whose address is 1775 Eye Street, Suite 400, Washington, D.C. 20006.

- I hereby authorize the U.S. attorneys and/or agents named hereinabove to accept and follow instructions from us as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and/or agents and me. In the event of a change in the person(s) from whom instructions may be taken I will so notify the U.S. attorneys and/or agents named hereinabove.

Full name of second inventor:	<u>PRASHANT PARIKH</u>	
Inventor's signature*		<u>18 Nov. 2002</u> Date
Residence:	<u>254 East 68th Street, Apart. 21D, New York, New York 10021</u>	
Citizenship:	<u>Indian</u>	
Post Office Address:	<u>Same as residence</u>	

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Full name of second inventor:	<u>STANLEY PETERS</u>	
Inventor's signature*	<u>Stanley Peters</u>	<u>13 Nov. 2002</u> Date
Residence:	<u>128 Hillside Avenue, Menlo Park, CA 94025</u>	
Citizenship:	<u>U.S.A.</u>	
Post Office Address:	<u>Same as residence</u>	

- ATTACHED IS ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY THIRD AND SUBSEQUENT INVENTORS FORM.

*Before signing this declaration, each person signing must:

1. Review the declaration and verify the correctness of all information therein; and
2. Review the specification and the claims, including any amendments made to the claims.

After the declaration is signed, the specification and claims are not to be altered.

To the inventor(s):

The following are cited in or pertinent to the declaration attached to the accompanying application:

Title 37, Code of Federal Regulation, §1.56

Duty to disclose information material to patentability

- (a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:
- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and

- (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
 - (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
 - (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.
 - (iii) A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.
- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:
 - (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.
- (e) In any continuation-in-part application, the duty under this section includes the duty to disclose to the Office all information known to the person to be material to patentability, as defined in paragraph (b) of this section, which became available between the filing date of the prior application and the National or PCT international filing date of the continuation-in-part application.

Title 35, U.S. Code § 101

Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Title 35 U.S. Code § 102

Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless --

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States, or
- (c) The has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
- (e) The invention was described in--
 - (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
 - (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a); or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g) (1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Title 35, U.S. Code § 103

103. Conditions for patentability; non obvious subject matter

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
- (b) (1) Notwithstanding subsection (a), and upon timely election by the applicant for patent to proceed under this subsection, a biotechnological process using or resulting in a composition of matter that is novel under section 102 and nonobvious under subsection (a) of this section shall be considered nonobvious if—

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- (A) claims to the process and the composition of matter are contained in either the same application for patent or in separate applications having the same effective filing date; and
 - (B) the composition of matter, and the process at the time it was invented, were owned by the same person or subject to an obligation of assignment to the same person.
- (2) A patent issued on a process under paragraph (1)—
- (A) shall also contain the claims to the composition of matter used in or made by that process, or
 - (B) shall, if such composition of matter is claimed in another patent, be set to expire on the same date as such other patent, notwithstanding section 154.
- (3) For purposes of paragraph (1), the term "biotechnological process" means--
- (A) a process of genetically altering or otherwise inducing a single- or multi-celled organism to--
 - (i) express an exogenous nucleotide sequence,
 - (ii) inhibit, eliminate, augment, or alter expression of an endogenous nucleotide sequence, or
 - (iii) express a specific physiological characteristic not naturally associated with said organism;
 - (B) cell fusion procedures yielding a cell line that expresses a specific protein, such as a monoclonal antibody; and
 - (C) a method of using a product produced by a process defined by subparagraph (A) or (B), or a combination of subparagraphs (A) and (B).
- (c) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Title 35, U.S. Code § 112 (in part)

Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly printing out and distinctly claiming the subject matter which the applicant regards as his invention.

Title 35, U.S. Code, § 119

Benefit of earlier filing date; right of priority

- (a) An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, or in a WTO member country, shall have the same effect as the same

application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; but no patent shall be granted on any application for patent for an invention which had been patented or described in a printed publication in any country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country more than one year prior to such filing.

(b)

- (1) No application for patent shall be entitled to this right of priority unless a claim is filed in the Patent and Trademark Office, identifying the foreign application by specifying the application number on that foreign application, the intellectual property authority or country in or for which the application was filed, and the date of filing the application, at such time during the pendency of the application as required by the Director.
- (2) The Director may consider the failure of the applicant to file a timely claim for priority as a waiver of any such claim. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed claim under this section.
- (3) The Director may require a certified copy of the original foreign application, specification, and drawings upon which it is based, a translation if not in the English language, and such other information as the Director considers necessary. Any such certification shall be made by the foreign intellectual property authority in which the foreign application was filed and show the date of the application and of the filing of the specification and other papers.

(c) In like manner and subject to the same conditions and requirements, the right provided in this section may be based upon a subsequent regularly filed application in the same foreign country instead of the first filed foreign application, provided that any foreign application filed prior to such subsequent application has been withdrawn, abandoned, or otherwise disposed of, without having been laid open to public inspection and without leaving any rights outstanding, and has not served, nor thereafter shall serve, as a basis for claiming a right of priority.

(d) Applications for inventors' certificates filed in a foreign country in which applicants have a right to apply, at their discretion, either for a patent or for an inventor's certificate shall be treated in this country in the same manner and have the same effect for purpose of the right of priority under this section as applications for patents, subject to the same conditions and requirements of this section as apply to applications for patents, provided such applicants are entitled to the benefits of the Stockholm Revision of the Paris Convention at the time of such filing.

(e)

- (1) An application for patent filed under section 111(a) or section 363 of this title for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in a provisional application filed under section 111(b) of this title, by an inventor or inventors named in the provisional application, shall have the same effect, as to such invention, as though filed on the date of the provisional application filed under section 111(b) of this title, if the application for patent filed under section 111(a) or section 363 of this title is filed not later than 12 months after the date on which the provisional application was filed and if it contains or is amended to contain a specific reference to the provisional application. No application shall be entitled to the benefit of an earlier filed provisional application under this subsection unless an amendment containing the specific reference to the earlier filed provisional application is submitted at such time during the pendency of the application as required by the Director. The Director may consider the failure to submit such an amendment within that time period as a waiver of any benefit under this subsection. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this subsection during the pendency of the application.
- (2) A provisional application filed under section 111(b) of this title may not be relied upon in any

Docket No.: 4428-4001

proceeding in the Patent and Trademark Office unless the fee set forth in subparagraph (A) or (C) of section 41(a)(1) of this title has been paid.

- (3) If the day that is 12 months after the filing date of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, the period of pendency of the provisional application shall be extended to the next succeeding secular or business day.
- (f) Applications for plant breeder's rights filed in a WTO member country (or in a foreign UPOV Contracting Party) shall have the same effect for the purpose of the right of priority under subsections (a) through (c) of this section as applications for patents, subject to the same conditions and requirements of this section as apply to applications for patents.
- (g) As used in this section--
- (1) the term "WTO member country" has the same meaning as the term is defined in section 104(b)(2) of this title; and
 - (2) the term "UPOV Contracting Party" means a member of the International Convention for the Protection of New Varieties of Plants.

Title 35, U.S. Code, § 120

Benefit of earlier filing date in the United States

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application. No application shall be entitled to the benefit of an earlier filed application under this section unless an amendment containing the specific reference to the earlier filed application is submitted at such time during the pendency of the application as required by the Director. The Director may consider the failure to submit such an amendment within that time period as a waiver of any benefit under this section. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this section.

Please read carefully before signing the Declaration attached to the accompanying Application. If you have any questions, please contact Morgan & Finnegan, L.L.P.

PATENT

Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh
Stanley Peters

Serial No.: To Be Assigned

Examiner: To Be Assigned

Filed: Herewith

Group Art Unit: To Be Assigned

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

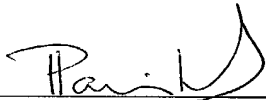
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Washington, D.C. 20231

ASSOCIATE POWER OF ATTORNEY (37 C.F.R. 1.34)


Please recognize as an Associate Practitioner in this case:

Richard Straussman
Morgan & Finnegan, LLP
345 Park Avenue
New York, NY 10154
Reg. No.: 39,847

Date: 18 Nov. 2002

Signed: 
Prashant Parikh

Date: 13 Nov. 2002

Signed: 
Stanley Peters

Date: 18 Nov. 2002

Signed: 

SEMIOSIS L.L.C.

Name (Print): PRASHANT PARIKH

Its (Title): CHAIRMAN + CEO

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New York, NY 10154
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31011 U.S. PTO
10/299359



U.S. UTILITY Patent Application

PATENT NUMBER and
ISSUE DATE

472

APPL NUM 10299359	FILING DATE 11/19/2002	CLASS 711	SUBCLASS 3	GAU 2186	EXAMINER <i>[Signature]</i>
** APPLICANTS: Parikh Prashant; Peters Stanley: <i>Wu</i>					
** CONTINUING DATA VERIFIED: <i>7/20/04</i>					
** FOREIGN APPLICATIONS VERIFIED: <i>4/20/04</i>					
PG-PUB <input type="checkbox"/>		DO NOT PUBLISH <input type="checkbox"/>		RESCIND <input type="checkbox"/>	
Foreign priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no				ATTORNEY DOCKET NO	
35 USC 119 conditions met <input type="checkbox"/> yes <input type="checkbox"/> no				4428-4001	
Verified and Acknowledged Examiners's initials					
TITLE : Navigation in a hierarchical structured transaction processing system					

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NOTICE OF ALLOWANCE MAILED		CLAIMS ALLOWED	
		Total Claims	Print Claim for O.G.
Assistant Examiner		DRAWING	
ISSUE FEE		Sheets Drwg.	Figs. Drwg.
Amount Due	Date Paid	Print Fig.	
Primary Examiner		Application Examiner	
<input type="checkbox"/> TERMINAL DISCLAIMER		PREPARED FOR ISSUE	
WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368, Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.			

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10/299359

SEARCH

Class	Sub.	Date	Exmr.
7.2	1 2 3 6 8 10 101 102 103 104	2/18/64	by

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.

SEARCH NOTES

(List databases searched. Attach search strategy inside.)

	Date	Exmr.
Inventory Search Double Entries USPIO USPIKB EPO JPO IBasic Derwent Acum IEEE NPL INIS-INT Search Strategy attached	2/18/64	by
Consulted Dr. Polivick	2/18/64	by

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ISSUE SLIP STAPLE AREA (for additional cross-references)

ORIGINAL		CROSS REFERENCE(S)					
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
INTERNATIONAL CLASSIFICATION							
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^ Continued on Issue Slip Inside File Jacket

INDEX OF CLAIMS

✓ Rejected - (Through numeral) ... Canceled N Non-elected A Appeal
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Claim	Date
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11-20-02 10299359.111902A

Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1011 U.S. PTO
10/299359
11/19/02

Applicant(s): Prashant Parikh and Stanley Peters
Serial No.: To Be Assigned
Filed: Herewith
For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

EXPRESS MAIL CERTIFICATE

Express Mail Label No.: EV062749235US

Date of Deposit: November 19, 2002

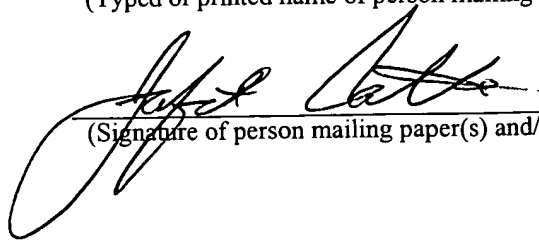
I hereby certify that the following attached paper(s) and/or fee

1. Utility Application and Application Fee Transmittal (in duplicate); enclosing Specification (147 pages), claims 1-26 (7 pages), abstract (1 page), 11 sheets of drawings (FIGS. 1-6, 7A, 7B and 8-14);
2. Executed Declaration And Power Of Attorney For Patent Application (9 pages);
3. Executed Associate Power of Attorney (1 page);
4. Recordation Form Cover Sheet (2 pages);
5. Executed Assignment (3 pages)
6. Checks in the amounts of \$550.00 and \$40.00; and
7. Return postcard.

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231.

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(Typed or printed name of person mailing papers(s) and/or fee)



(Signature of person mailing paper(s) and/or fee)

Correspondence Address:

MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, NY 10154-0053
(212) 758-4800 Telephone
(212) 751-6849 Facsimile

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Docket No. 4428-4001 PATENT TRADEMARK OFFICE

Express Mail No. EV062749235US

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10/299359
11/19/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UTILITY APPLICATION AND FEE TRANSMITTAL §(1.53(b))

Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s) names and addresses:

- (1) Prashant Parikh, 254 East 68th Street, Apartment 21D, New York, New York 10021
Stanley Peters, 128 Hillside Avenue, Menlo Park, California 94025

Additional inventors are listed on a separate sheet

For: **NAVIGATION IN A HIERARCHICAL**
STRUCTURED TRANSACTION PROCESSING SYSTEM

Enclosed Are:

- 147 page(s) of specification
- 1 page(s) of Abstract
- 7 page(s) of claims (numbered 1-26)
- 11 sheets of Formal Drawings, (FIGS. 16, 7A, 7B and 8-14)
- 9 page(s) of Declaration and Power of Attorney

- Unsigned
- Newly Executed**
- Copy from prior application
- Deletion of inventors including Signed Statement under 37 C.F.R. §1.63(d)(2)

REQUEST AND CERTIFICATION UNDER 35 U.S.C. §122(b)(2)(B)(i) (form PTO/SB/35)

As indicated on the attached Request and Certification, Applicant(s) certify that the invention disclosed in the attached application HAS NOT and WILL NOT be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing. Applicant(s) therefore request(s) that the attached application NOT be published under 35 U.S.C. §122(b).

- Incorporation by Reference:
- The entire disclosure of the prior application, from which a copy of the combined Declaration and Power of Attorney is supplied herein, is considered as being part of the disclosure of the accompanying application and is incorporated herein by reference.
- Deletion of Inventors (37 C.F.R. §1.63(d) and §1.33(b))
Signed statement attached deleting inventor(s) named in the prior application serial no. _____, filed _____.
- Microfiche Computer Program (Appendix)
- page(s) of Sequence Listing
- computer readable disk containing Sequence Listing
- Statement under 37 C.F.R. §1.821(f) that computer and paper copies of the Sequence Listing are the same
- Assignment Papers (assignment cover sheet and assignment documents)**
- A check in the amount of \$40.00 for recording the Assignment**
- Charge the Assignment Recordation Fee to Deposit Account No. 13-4500, Order No. _____.
- Assignment Papers filed in the parent provisional application Serial No. _____.
- Executed Associate Power of Attorney**
- Certification of chain of title pursuant to 37 C.F.R. §3.73(b)
- Priority is claimed under 35 U.S.C. §119 for:
Application No(s). _____, filed _____, in _____ (country).
- Certified Copy of Priority Document(s) [_____]
- filed herewith
- filed in application Serial No. _____, filed _____.
- English translation document(s) [_____]
- filed herewith
- filed in application Serial No. _____, filed _____.
- Priority is claimed under 35 U.S.C. §119(e) for _____, filed _____.
- Information Disclosure Statement
- Copy of [_____] cited references
- PTO Form-1449
- References cited in parent application Serial No. _____, filed _____.

- Related Case Statement under 37 C.F.R. §1.98(a)(2)(iii)
- A copy of related pending U.S. Application(s) Serial No(s): _____, filed _____, respectively, is attached hereto.
- A copy of related pending U.S. Application(s) entitled, _____, filed _____ to inventor(s) _____, respectively, is attached hereto.
- A copy of each related application(s) was submitted in parent application serial no. _____, filed _____.
- Preliminary Amendment
- Return receipt postcard (MPEP 503)**
- This is a continuation divisional continuation-in-part of prior application serial no. _____, filed _____, to which priority under 35 U.S.C. §120 is claimed.
- Cancel in this application original claims _____ of the parent application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- A Preliminary Amendment is enclosed. (Claims added by this Amendment have been properly numbered consecutively beginning with the number following the highest numbered original claim in the prior application).
- The status of the parent application is as follows:
- A Petition for Extension of Time and a Fee therefor has been or is being filed in the parent application to extend the term for action in the parent application until _____.
- A copy of the Petition for Extension of Time in the co-pending parent application is attached.
- No Petition for Extension of Time and Fee therefor are necessary in the co-pending parent application.
- Please abandon the parent application at a time while the parent application is pending or at a time when the petition for extension of time in that application is granted and while this application is pending has been granted a filing date, so as to make this application co-pending.
- Transfer the drawing(s) from the parent application to this application
- Amend the specification by inserting before the first line the sentence:
This is continuation divisional continuation-in-part of co-pending application Serial No. _____, filed _____.

I. CALCULATION OF APPLICATION FEE				
	Number Filed	Number Extra	Rate	Basic Fee \$740.00/370.00
Total Claims	26-20 =	6 x	\$18.00/ \$9.00	\$ 54.00
Independent Claims	6-3 =	3 x	\$84.00/ \$42.00	\$ 126.00
<input type="checkbox"/> Multiple Dependent Claims		If marked, add fee of \$270.00 (\$135.00)		\$0
TOTAL:				\$550.00

- Small entity status is or has been claimed. Reduced fees under 37 C.F.R. §1.9 (f) paid herewith \$550.00.**
- A check in the amount of \$550.00 in payment of the application filing fees is attached.**
- Charge fee to Deposit Account No. 13-4500, Order No. _____. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.
- The Commissioner is hereby authorized to charge any additional fees which may be required for filing this application pursuant to 37 CFR §1.16, including all extension of time fees pursuant to 37 C.F.R. § 1.17 for maintaining copendency with the parent application, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4428-4001. A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

By: 

Richard Straussman
Registration No. 39,847

Dated: November 19, 2002

Correspondence Address:

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345 Park Avenue
New York, NY 10154-0053
(212) 758-4800 Telephone
(212) 751-6849 Facsimile

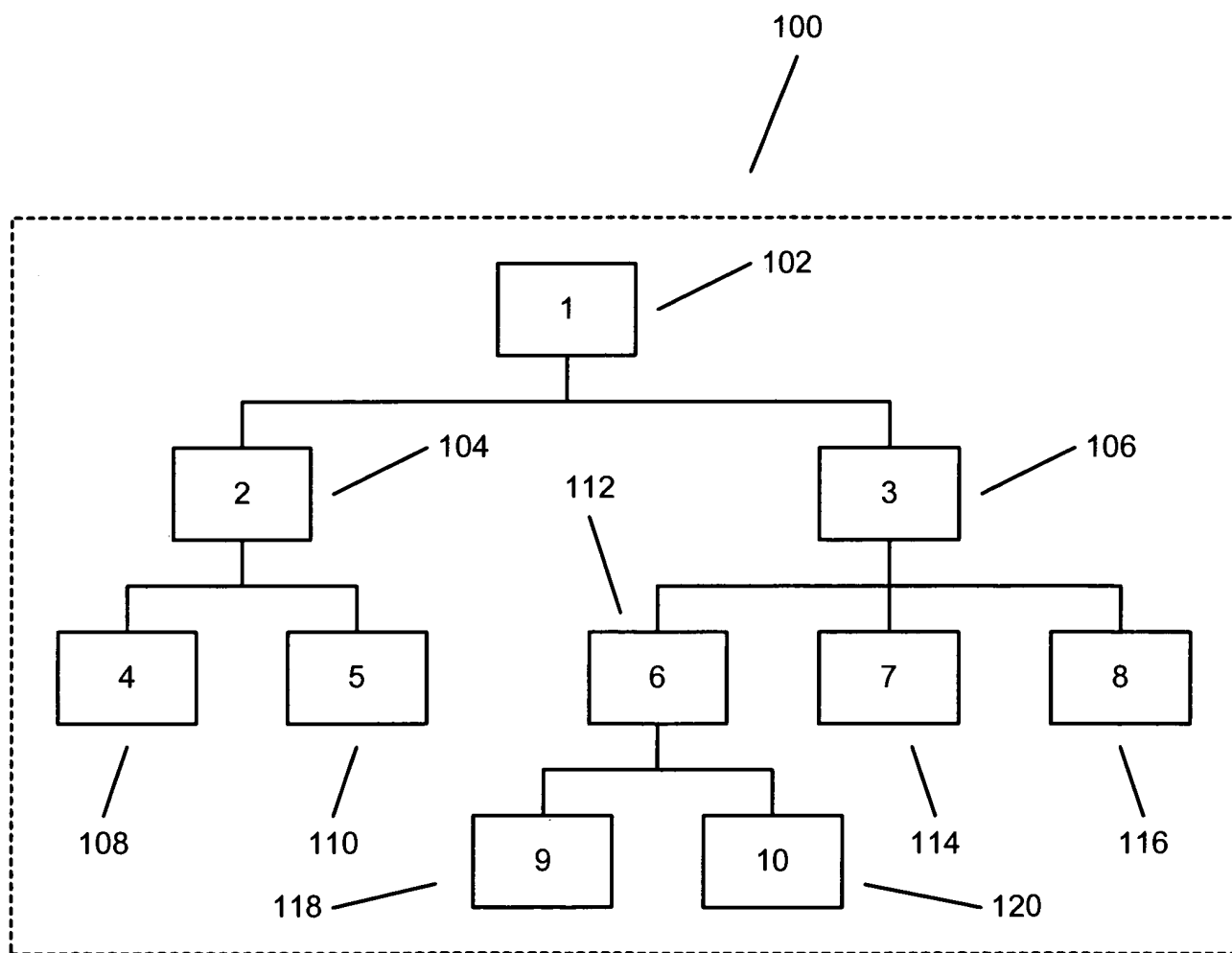


FIG. 1

FIG. 2

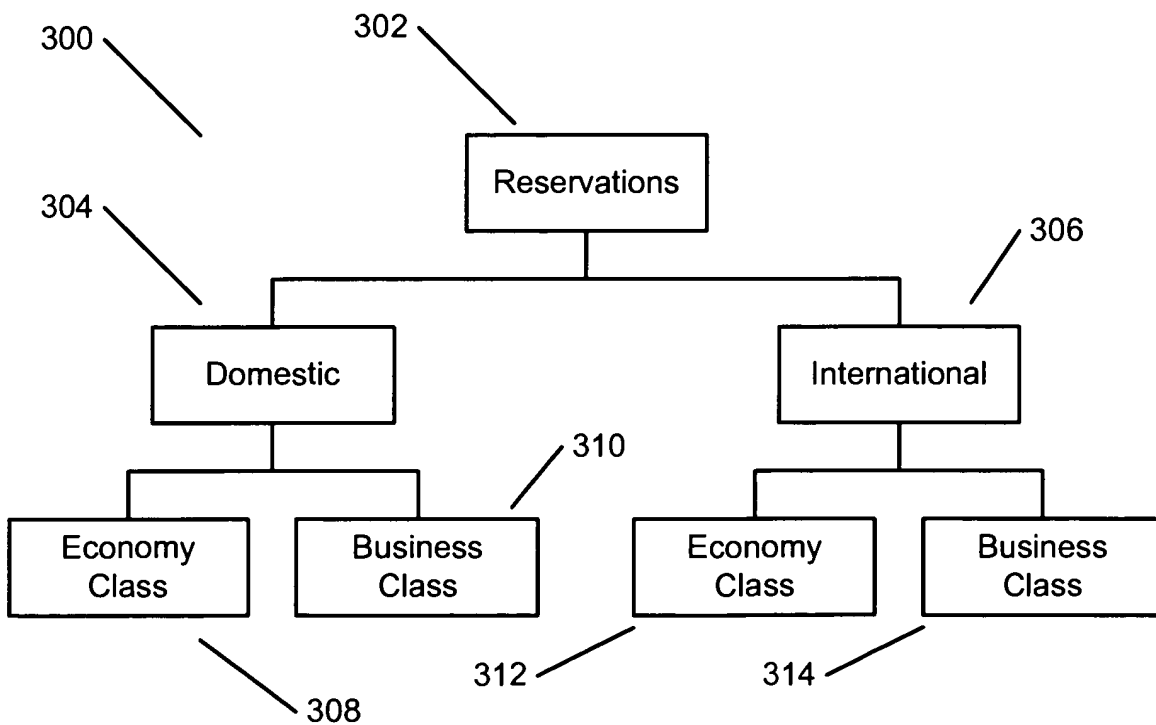
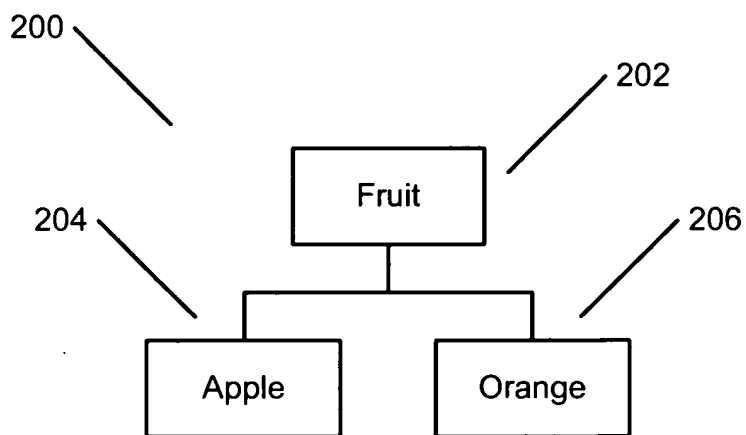


FIG. 3

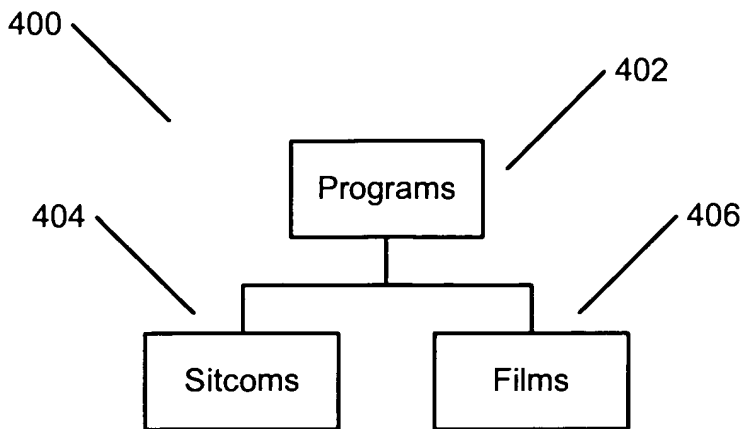


FIG. 4

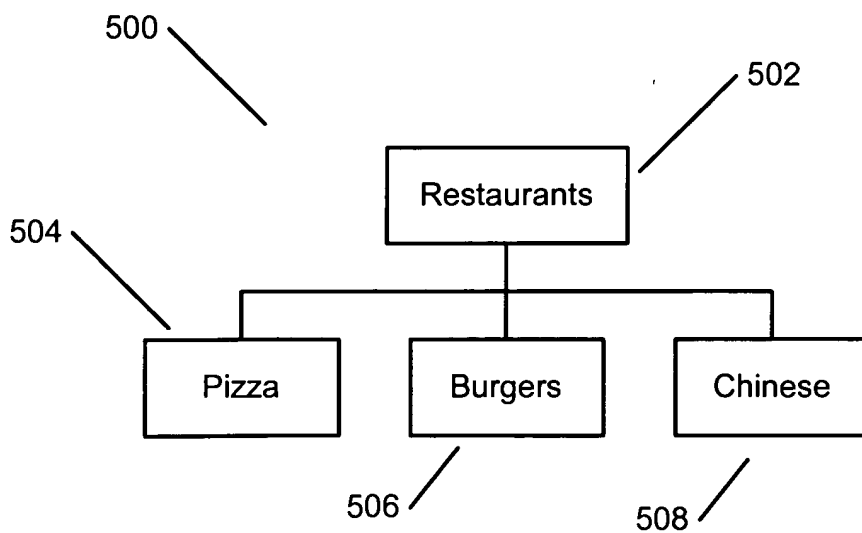


FIG. 5

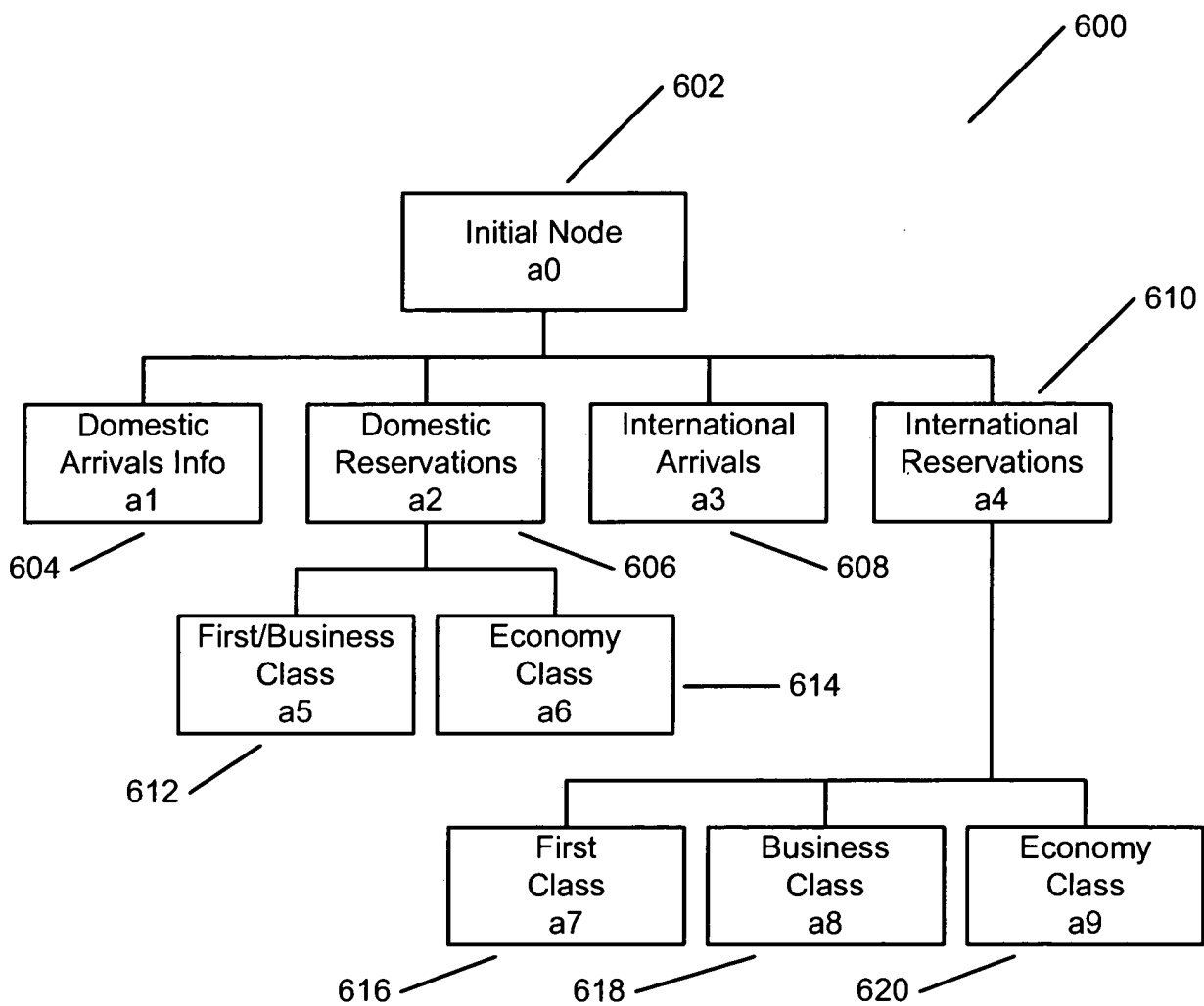


FIG. 6

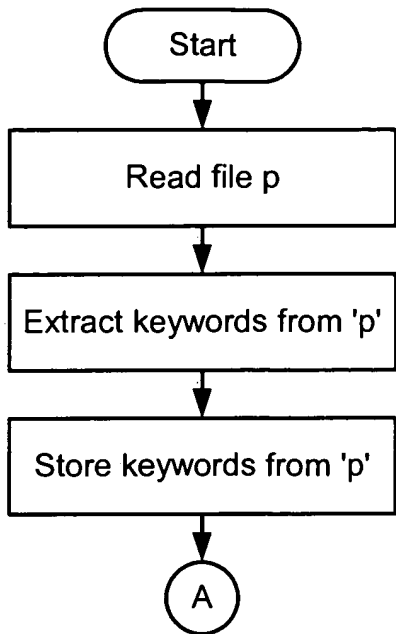


FIG. 7A

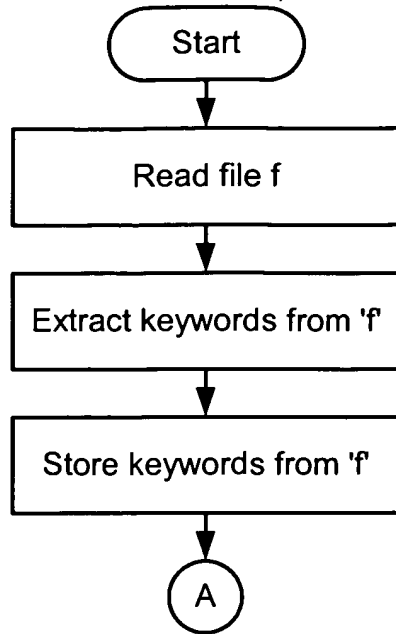


FIG. 7B

FIG. 8

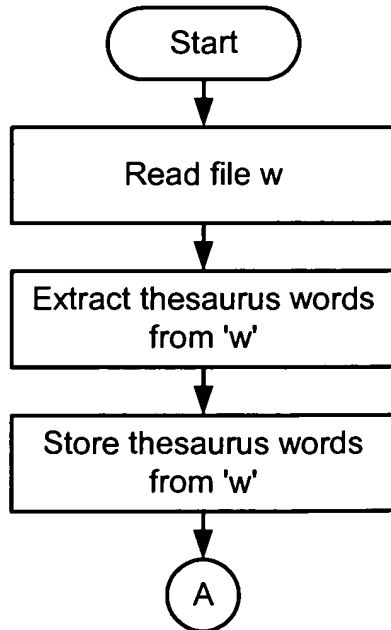


FIG. 9

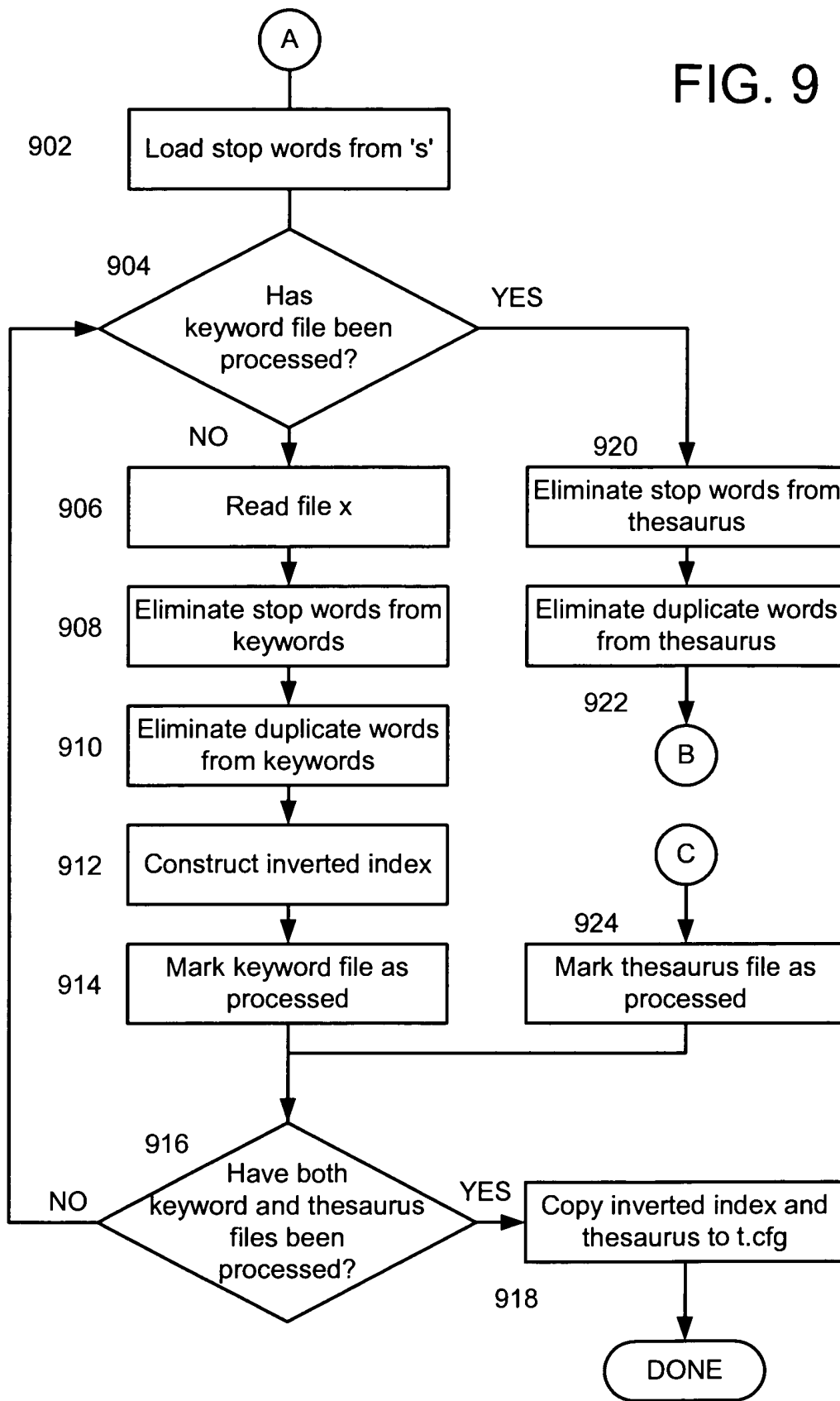


FIG. 10

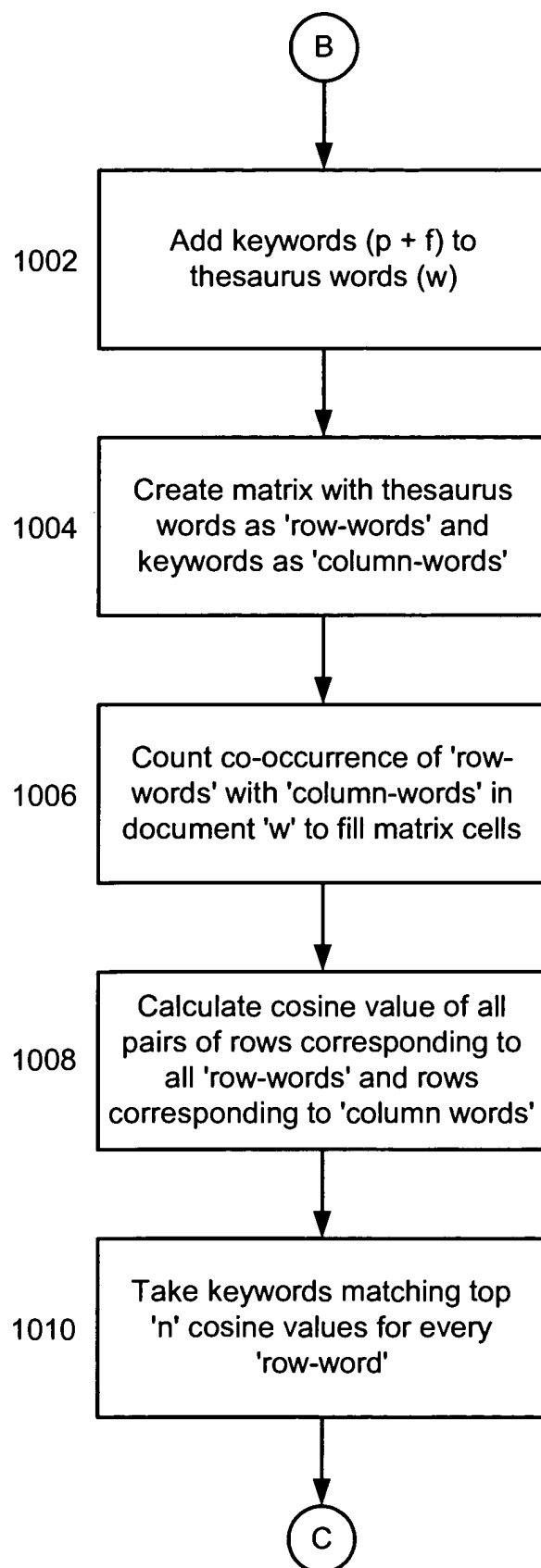
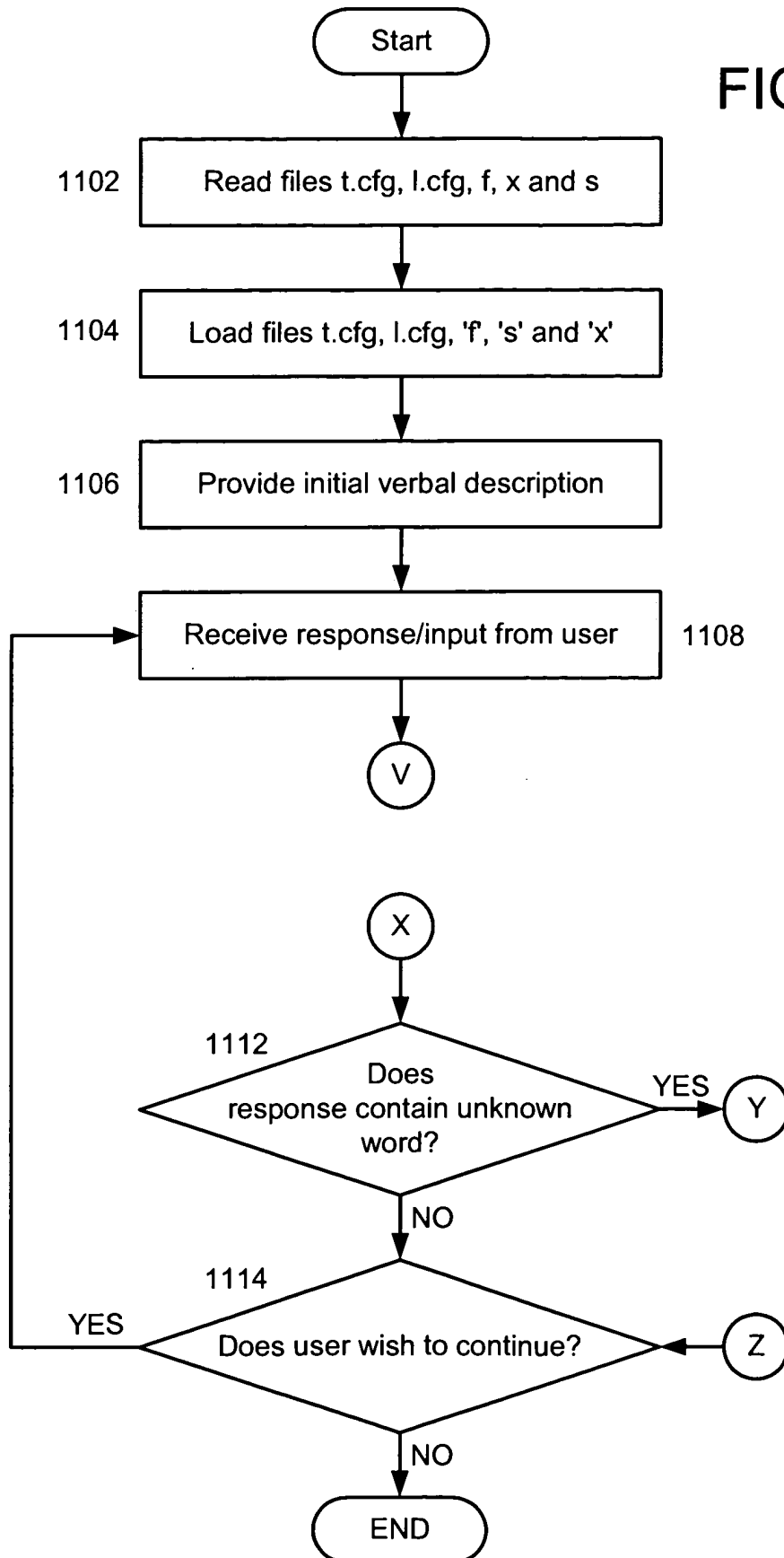


FIG. 11



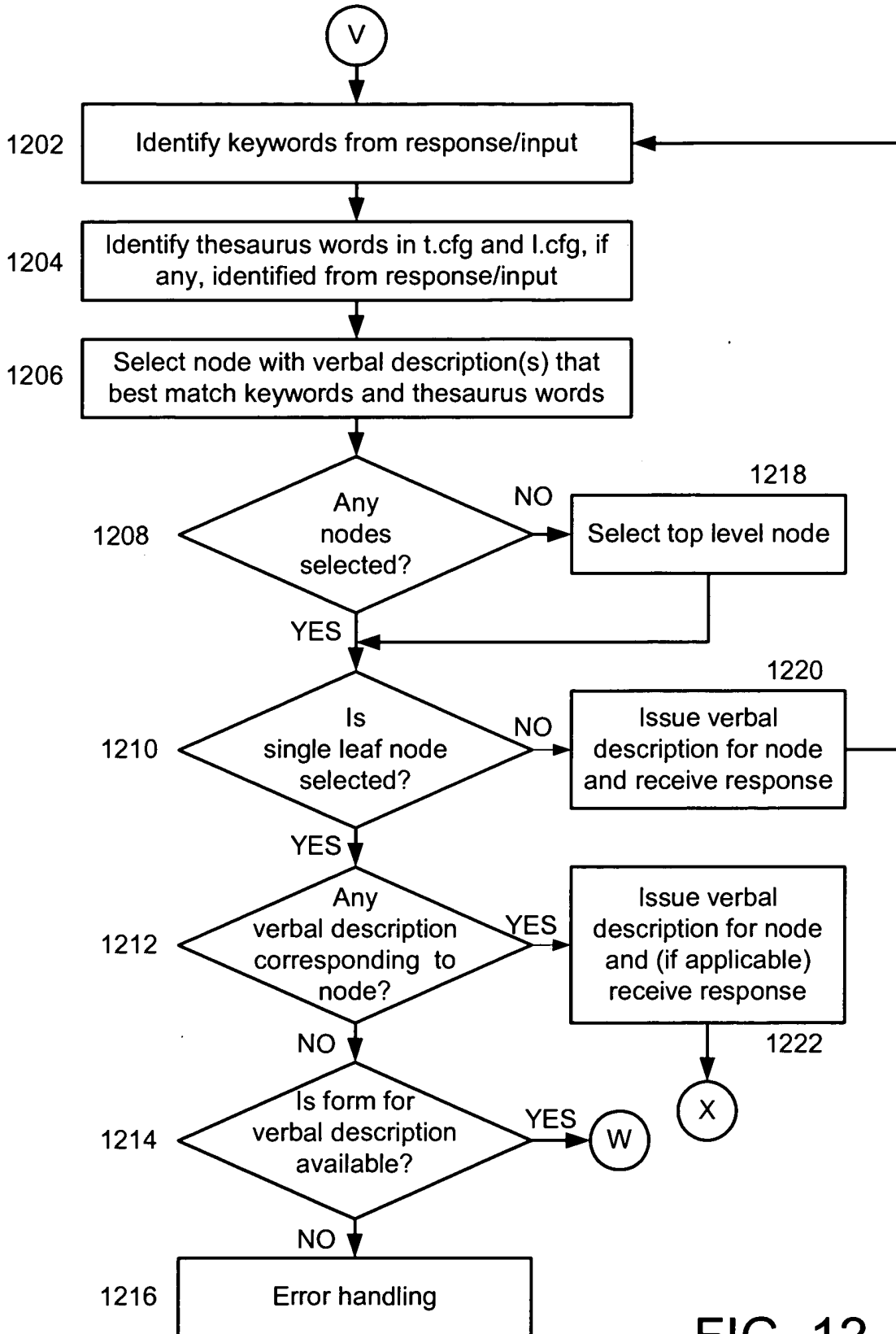


FIG. 12

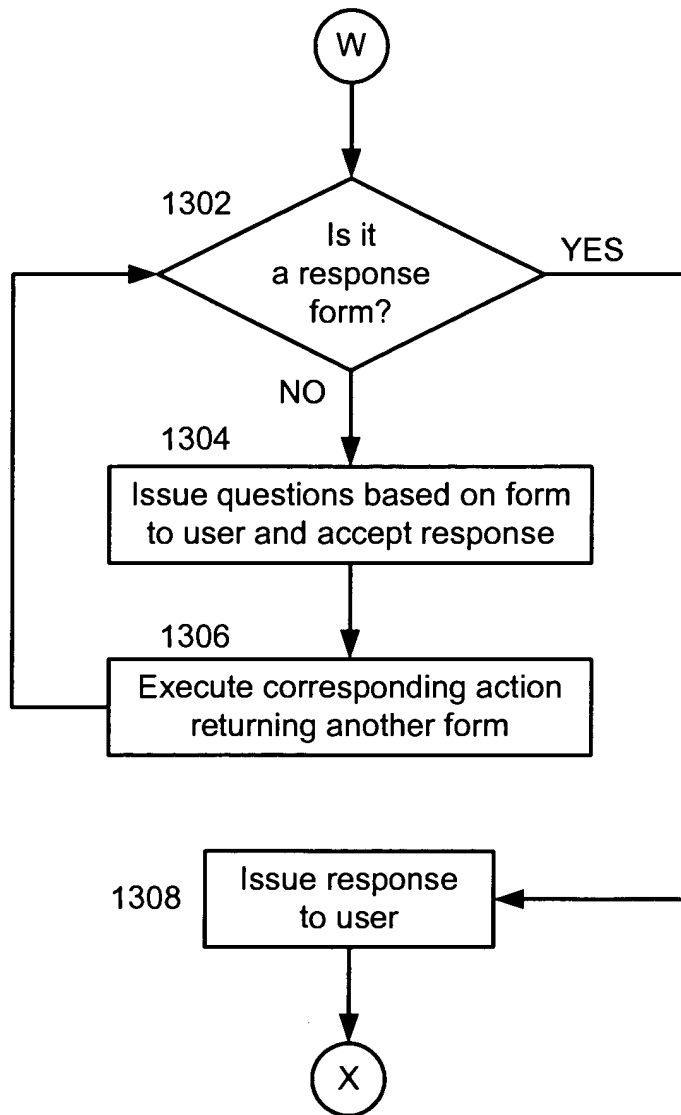


FIG. 13

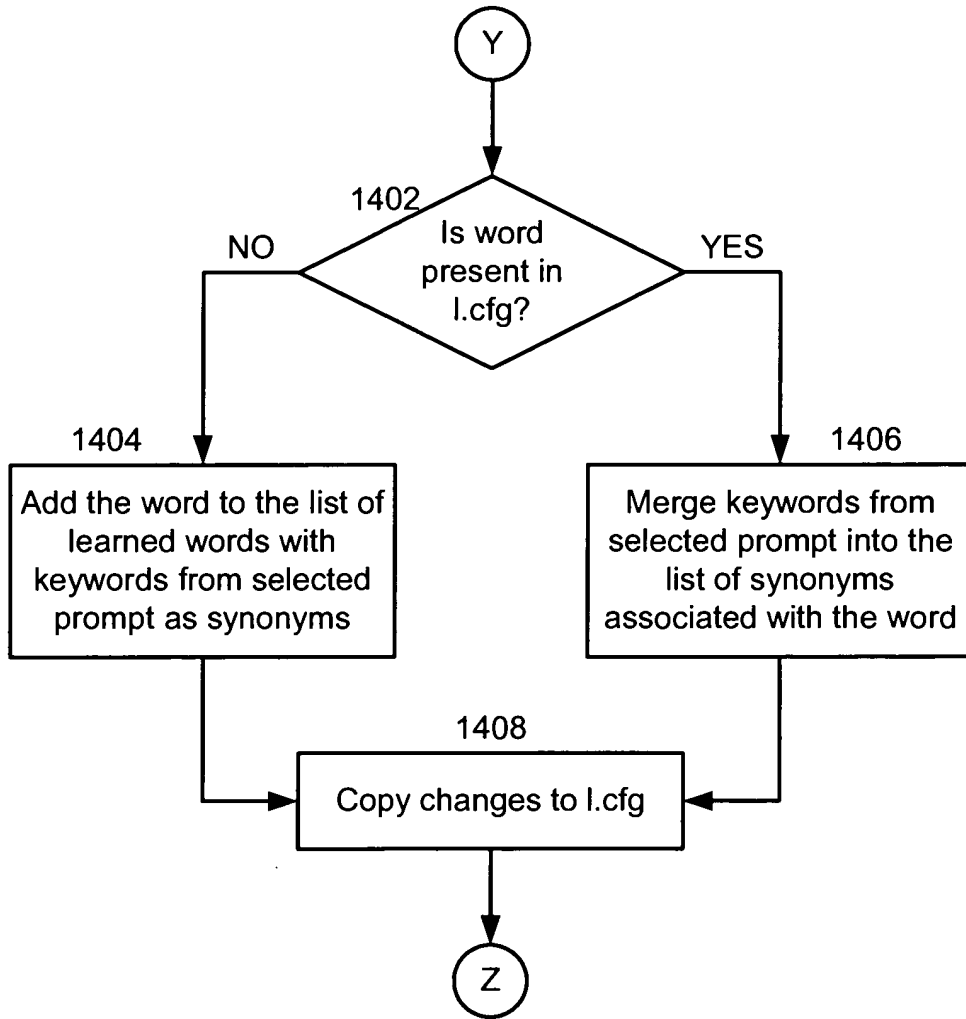


FIG. 14

The United States
Patent and Trademark Office

UNITED STATES

PATENT APPLICATION

FOR

NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM

Inventor(s):

Prashant Parikh
Stanley Peters

PATENT
Docket No.: 4428-4001

**NAVIGATION IN A HIERARCHICAL STRUCTURED
TRANSACTION PROCESSING SYSTEM**

FIELD OF THE INVENTION

The present invention relates to information processing and, more particularly, computer based transaction processing.

NOTICE OF COPYRIGHT RIGHTS

A portion of the disclosure of this patent document, particularly the Appendix, contains material that is protected by copyright. The copyright owner has no objection to the facsimile reproduction of the patent document or the patent disclosure as it appears in the Patent and Trademark Office file or records, but otherwise reserves all copyright rights whatsoever.

BACKGROUND OF THE INVENTION

In everyday life, networks of choices set forth in a particular order or hierarchy are encountered with increasing frequency. Usually, it is desired to traverse the network in the most efficient manner possible to accomplish a particular goal.

In modern mathematics, graph theory is used to study networks of hierarchical choices. The hierarchical networks can be represented as a graph structure. Graph theory finds practical applications in chemistry, computer science, economics, electronics and linguistics.

A graph structure is a collection of points, called "vertices", and a collection of lines, called "edges". Each edge joins a pair of vertices or a single point to itself.

A simple example of a network represented by a graph structure is a road map. The vertices represent towns or cities. The edges represent the roads that connect the towns and cities.

PATENT
Docket No.: 4428-4001

Another type of network familiar to anyone who has a telephone is an automated telephone voice response system, such as commonly utilized by many large companies, to direct incoming calls to particular individuals or departments or to assist the caller in performing a transaction, such as making a purchase.

That type of telephone network can also be represented as a graph structure. When the system answers an incoming call, it transmits a verbal description or prompt to the caller: "If you would like to speak to Harry, press 1; if you would like to speak to Fred, press 2". (In general, we will use "verbal description" to mean a set of words relating to the subject matter whether presented audibly or in written form. The verbal descriptions may range from a few words to an entire document worth of text). A first vertex on the graph represents the initial prompt, which a caller hears upon reaching the telephone response system. If the user's response is pressing 1, calls are directed along a first edge to Harry, represented by a second vertex. If the response is pressing 2, the call is directed along a second edge to Fred, represented by a third vertex. Then, if the chosen person is not available, the caller is asked whether the caller wishes to leave a message. If the response is positive, the caller is directed along another edge to the selected person's voice mail, which would be represented by another vertex of the graph.

In general, whether for a telephone response network or for any other application representable by a graph structure, the caller or user of the system will have some goal. By "goal" we mean a combination of transactions and information accesses which the user seeks to accomplish. By "transaction" we mean an operation performed electronically with a user. In general, there will also be a combination of vertices or nodes in the graph that best represent or are closest to the goal the user is trying to accomplish. We call these vertices the "goal vertices".

For the user, the object in navigating the graph is to get from the first vertex to the goal vertices. If this is not done as quickly and efficiently as possible the user may become frustrated and give up. Moreover, as the number of possible choices or nodes in the network becomes larger, the number of possible pathways between the first vertex and the goal vertices multiplies rapidly. Therefore, the ability to reach the goal vertex can become more difficult, require navigation of an excessive number of choices or nodes, or discourage a user before the goal vertex is even reached.

SUMMARY OF THE INVENTION

The present invention creates a method for navigating efficiently and naturally through a series of choices to obtain information, perform transactions, or accomplish some similar goal. The invention is implemented in a programmed computer that has a hierarchically configured decisional network that must be navigated as part of the processing and is constructed to accept inputs or data and process them in a manner that facilitates navigation of the network vertices more efficiently.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an example graph representing a simple, generic hierarchically arranged transaction processing or decisional system suitable for use with the invention;

FIG. 2 is an example portion of a graph used to illustrate jumping among nodes in accordance with one variant of the invention;

FIG. 3 is an example portion of a graph in a simple interactive voice response ("IVR") system used to illustrate grouping in accordance with one variant of the invention;

FIG. 4 is an example portion of a graph in a simple interactive television program listing used to illustrate another variant of the invention;

FIG. 5 is an example portion of a graph in a simple geographic information system used to illustrate a further variant of the invention;

FIG. 6 is an example portion of a graph for a simple automated voice response system used to illustrate a more complex variant of the invention;

FIGS. 7A, 7B, and 8-10 are collectively a flowchart illustrating an example setup process for use in accordance with an example implementation of one variant of the present invention; and

FIGS. 11-14 are collectively an overall flowchart illustrating an example process in accordance with a further variant of the present invention.

DETAILED DESCRIPTION

In graph theory, mathematicians refer to a “path” from one vertex in a graph to another specified vertex in the graph as consisting of a sequence of edges that connect the vertices between the first vertex and the final vertex. If the path contains an edge sequence that is “closed”, meaning that it loops back on itself, the path is called a “circuit” or a “cycle”. A graph structure is considered to be “connected” if there is at least one path connecting every pair of vertices.

Our invention is particularly applicable to transactional processing as applied to instances where graph theory can be used to represent the transactions as a set of options and when the options are structured according to a connected graph that contains no circuits. We call such a graph a “tree”. We use the term “menu tree” for a network that provides a “menu” of

options, typically presented as verbal descriptions, to assist a user in making a series of choices through which he or she is able to accomplish one or more of his or her information access or transaction goals. Informally, a “menu tree” can be regarded as a series of vertices in a hierarchy or ordered pattern, arranged in rows of increasing numbers of vertices. More precisely, a “menu tree” can be represented as a “tree” in which (i) the vertices are all the options provided anywhere in the “menu tree”, plus a first vertex, (ii) every vertex except the first vertex, i.e., every “option vertex”, is associated with the verbal description (or such other means) by which a “menu” presents that option, (iii) an edge connects the first vertex to each vertex that the first “menu” presents to the user as an option, and (iv) each other vertex is similarly connected by edges to every other vertex that the corresponding “menu” presents to the user as an option. As the number of options increases, so does the length of paths from the first vertex to goal vertices.

In overview, in accordance with the teachings of our invention, the user can navigate the graph or tree in a way that allows them to skip from one vertex to another vertex that may be many rows down the graph or tree and/or where the vertices may not be connected together by an edge. This eliminates the necessity for making many choices.

Particular implementations make it possible to jump laterally from one vertex to another if the navigation enters a wrong branch of the tree or if the user changes his goal. The approach is accomplished through associating each vertex with a verbal description (or prompt), and matching words in users' requests and responses with these verbal descriptions to enable the selection of vertices that may not be directly connected to the user's current location in the graph or tree by an edge.

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In some variants, we create a system with the unique ability to learn by incorporating previously unknown words, keyword or synonyms of keywords so that the system modifies itself to thereby increase the likelihood that a user will efficiently and quickly reach the goal.

For purposes of illustration, the invention will be described by way of example, first using a series of simple examples followed by a more complex example of a more detailed and commercially suitable example variant, in the context of a menu-type automated telephone voice response system for a publication, a hierarchical network of the type that is frequently encountered and easily understood that implements a combination of some of the features of the simple examples in order to illustrate how those features can be combined or overlaid.

It should be understood that the present invention is applicable to a wide range of different networks, which can be mathematically represented by graph structures consisting of vertices and edges and should not be considered to be limited to the particular application described. Representative examples of suitable applications for the invention include implementing an enhanced and more efficient "Find" function or file system browser for personal computer operating systems, a navigation system for television program listing, document management or retrieval systems, a "geographic information system" in an automobile that allows location of addresses or business(es) meeting certain criteria, or other devices that incorporate some hierarchical navigation aspect as part of its operation.

In order to more fully understand the invention, various independent aspects are now presented below by way of simple illustrative examples. In this manner the teachings of the invention can be understood in a way that makes it possible to use, overlay and/or combine those aspects in a beneficial manner in an implementation of the invention. Depending upon the

particular implementation of the invention, one or more of the aspects may be used together in various permutations and/or combinations, with the understanding that different permutations and/or combinations may be better suited for particular applications or have more or less benefits or advantages than others.

The underlying scenario common to all these basic examples is that there is a hierarchical arrangement to the possible choices that can be illustrated in a form of “tree” structure.

FIG. 1 is an example graph 100 representing a possible hierarchically arranged transaction processing or decisional system suitable for use with the invention. The individual boxes 102 - 120 are referred to as “nodes” and each represents a specific choice or option in the hierarchy. For purposes described in more detail below, each node is arbitrarily uniquely identified in some manner. In the example of FIG. 1, the individual nodes 102 - 120 are numbered 1 through 10 starting from the top node 102 in the hierarchy.

Each “node” is associated with exactly one verbal description, for example in the case of an airline system, a verbal description relating to some aspect of the reservation process. Each such description contains “key” words that are deemed to be of importance and other words that can be disregarded. For example, one node may have the associated verbal description “Would you like to make a reservation?” In this description, there is only one “key” word – “reservation” deemed important, so all of the other words in the description can be ignored.

A level in the hierarchy below that one may be used to obtain further narrowing information, for example, using the verbal description “Is the reservation for a domestic or international flight?” In this description, the terms “domestic” and “international” are “key” words. Similarly, the word “flight” could be a “key” word, for example, for a system that

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involves not only airline travel but also rail and/or cruise travel or it could be an “ignored” or stop word for a purely airline related system because it has minimal meaning in that context. Again, the other words can be ignored as well.

The unique identification of each node allows the creation of a list of all the key words and their associated nodes so that, if a key word is duplicated in two or more nodes, it need only be listed once. For example, a hierarchical tree related to “pens” might have nodes for ball-point pens, fine point pens, medium point pens, fountain pens, felt-tip pens, quill pens, erasable pens, etc. By using this approach, one could list the keyword “point” once, but associate it with each of the nodes where that keyword appears by using the unique identifier for each node where the term appears.

In this manner the keywords are obtained from the collection of available descriptions found in the particular application in which the invention will be used. In addition, each particular node where the keyword appears is associated with the keyword. Thus, with respect to the pen application above, the keyword “point” might appear in nodes 2, 3, 6, 7, 13 and 15. Similarly, the keyword “erasable” might appear in nodes 3, 4, 5, 6 and 22. An index, as described more fully below, associating these keywords with the nodes containing them is then created, for example:

point: 2, 3, 6, 7, 13,15
erasable: 3, 4, 5, 22

By making use of these associations the “tree” can be negotiated by allowing presentation of relevant verbal descriptions for the nodes associated with a term, irrespective of where in the

hierarchy they are, thereby causing a “jump” to a particular node without necessarily traversing the tree in the rigid hierarchical manner.

Various examples will now be presented to illustrate certain concepts related to the invention. It should be understood that while these examples are presented in the context of things and likely experiences of ordinary people, the same approach can be applied to other forms of transaction processing including navigating through hierarchically nested data files in a computer system, pattern analysis or image processing, etc. the term “transaction” as used herein relating to traversal through a hierarchy to a goal, not mathematical calculation per se.

Moreover, the specific formats used and presented in these examples are purely for illustration purposes. It should be understood that that other techniques for interrelating data, such as hash tables, direct or indirect indexing, etc. can be substituted in a straightforward manner. Thus, for example, the relationship between the word and a node could be configured such that the location of the word in a list as the “n-th” item could be used as an index into another list containing the nodes correlated to the list. A similar approach could be used for the thesaurus, the important aspect relative to the invention being the relationship among certain words and the node(s) in which they occur and, where applicable, the relationship between certain words and “synonyms” for those words, not the data structure or its form or format whereby that information is kept or maintained.

Example 1

Example 1 illustrates, in simplified form, how an index is used to jump among nodes with reference to FIG. 2. In this example, the hierarchical tree 200 represents a portion of a more

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complex tree specifically involving possible decision relating to fruit and a decision between two specific types of fruits, an apple and an orange.

In prior art hierarchical trees, navigation of this graph 200 would necessarily involve going through the “fruit” node 202 in order to reach the “apple” 204 or “orange” 206 nodes. As a result, assuming this simple tree was part of a larger tree for an on-line supermarket that prompted the user for what they wanted to purchase, the exchange would be both rigid and time consuming. For example, in response to a prompt “What do you want to purchase?” if the response was anything other than “fruit” traversal to the “fruit” node 202 could not occur. At the point in the tree that would lead to the “fruit” node 202, neither apple nor orange would be an acceptable response.

In accordance with the invention, assuming the only relevant keywords for that portion of the tree were “fruit”, “apple” and “orange”, an inverted index would be created that includes an association of “Fruit” with the top node 202, “Apple” with the bottom left node 204, and “Orange” with the bottom right node 206. As shown above, that association can be created using node identifiers, in this example, the node identifiers 1A01, 1A02 and 1A03 are arbitrarily assigned and used. Thus, the information can be stored in a file, for example, as follows:

Fruit, 1A01
Apple, 1A02
Orange, 1A03

Accordingly, to navigate the system 200, when a response to a verbal description is provided by a user, possible keywords are identified in the response and used to search the index and identify any node to which the response may be directed, irrespective of the hierarchy. Thus, a user response of “an orange” to a verbal description located above the “fruit” node 202 in

the hierarchy, for example, “What would you like to buy today?” would cause the system to identify “orange” as a key word from the response, search the index, and directly identify node 1A03 (206) as the node whose verbal description should be presented next, thereby avoiding the need to traverse intervening nodes, for example, through the “fruit” node (202) 1A01, at all.

This illustrates an example of a simple jump according to the invention.

Example 2

Having illustrated a simple “node jump” a more complex (and likely) scenario can be shown. In this example, the Example 1 graph of FIG. 2 applies, but relevant portion of the index is as follows:

Fruit, 1A01
Apple, 1A02, 2F09
Orange, 1A03

As a result, there are two nodes relevant to the keyword “apple” one being the node 204 in the portion of the graph shown in FIG. 2 and one in the node uniquely identified as 2F09 located somewhere else in the hierarchy (not shown).

In this example, a user response containing the keyword “apple” would identify nodes with identifiers 1A02 and 2F09. In this case, and unlike the prior art, the verbal descriptions from both nodes would be presented to the user, likely in alternative fashion. Thus, if the user did not want an apple, they wanted apple cider, node 2F09 might be more appropriate because it is part of the “drinks” portion of the overall hierarchy.

Thus, presenting the user with the verbal description from both nodes would likely result in a jump to the portion of the graph nearer to node 2F09 since it is closer to the user’s goal thereby speeding up the process and avoiding potentially confusing or frustrating the user.

Example 3

While the verbal descriptions associated with various nodes will generally be chosen to accurately represent the node, in accordance with certain variants of the invention, it is possible to create a situation where a user response takes them away from their ultimate desired goal. Nevertheless, by using the teachings of the present invention, the user can often still be brought to their goal quicker than possible with the prior art because the user need not rigidly trace through the hierarchy. This is accomplished by virtue of the “grouping” aspect inherent in some implementations of the invention.

This example illustrates the “grouping” aspect using a simplified graph 300 representing a portion of an airline reservation system as shown in FIG. 3.

In particular, the graph of FIG.3 can be thought of as part of a very simple interactive voice response (“IVR”) system.

As described above, each node is uniquely identified, for example, by the numbers 1 through 7 and the identified terms “Reservation”, “Domestic”, “International”, “Business Class”, “Economy Class” are deemed the relevant keywords. Note, there is no requirement for a the “keyword” to be a single word, in some implementations, keywords could be single words, phrases of two or more words, or even some other form of information like a specific data pattern.

Again, an inverted index is created as described above associating those keywords with the nodes, in this case:

Reservation, 1
Domestic, 2
International, 3

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Business Class, 4, 6
Economy Class, 5, 7

Assuming that the top node is assigned the number 1, its two child nodes (Domestic and International) are assigned the numbers 2 and 3, and the grandchild nodes (i.e. at the lowest level in the hierarchy) have been assigned numbers 4, 5, 6, and 7 taken from left to right each node can be uniquely located. Note that the last two entries in the inverted index are each associated with two nodes, 4 and 6 in the first case, and 5 and 7 in the second.

Using the above, the concept of grouping of nodes from different parts of the graph (i.e. nodes that are not siblings or nodes that do not have a common parent) can be explained.

Presume that the response to a verbal description presented as an initial query of “What do you want to do?” was “Make a business class reservation.” In this case there are two keywords present, “reservation” and “business class”.

Depending upon the particular implementation, as noted previously, the verbal descriptions associated with each identified node could be presented together or in sequence. Alternatively, and as is the case here, a set of rules can be established, for example, such that if an identified node is a sub-node of another identified node, only the verbal description of the sub-node(s) is provided because of inherent redundancy. Thus, since both “business class” nodes 310, 314 are sub-nodes of the “reservation” node 302, the verbal description associated with the “reservations” node can be suppressed if it can be determined that business class necessarily implies reservations.

In this example, a search of the inverted index would identify nodes 4 and 6 (310, 314) from different parts of the tree are associated with the keywords in the query, and thus the

system, in presenting the verbal descriptions from each, in effect, alters the tree structure and groups these nodes in the result. Thus, the combination of result nodes presented depends upon the user query or response, not that predetermined by the graph structure itself.

Of course, the goal would still not be reached because of the ambiguity caused by “Business Class” being under both “Domestic” and “International”. However, that ambiguity can be handled by suitable wording of the following verbal descriptions and whether they are combined or provided sequentially or by other nodes.

Example 4

A persistent and further drawback present in the prior art is the inability to operate if any term other than the specific allowed terms are provided. Thus, in an IVR of the prior art, providing anything other than the recognized term(s) will likely result in meaningless repeat of the same inquiry by the IVR or an error.

Advantageously, the teachings of the present invention allow for construction of a more flexible system than available in the prior art. Specifically, we can incorporate a thesaurus to accommodate synonyms for the keywords.

Example 4 illustrates the addition of a simple thesaurus as an aspect of a system so that a synonym of a keyword may also be used by the system to jump to the desired nodes in the graph. Example 4 is discussed with reference to a portion 400 of an interactive television program listing system as shown in FIG. 4.

Such a system implementing the invention will allow a user to speak to or interact with a device to look for programs of his choice by time slot, genre, favorite actor or actress, etc.

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This example, as with the other examples above, use an inverted index, in this case one where each node 402, 404, 406 is uniquely identified by a string of six characters, the portion of which corresponding to FIG. 4 is shown as follows.

Programs; acgyct
Sitcoms; ifgnxh
Films; vnmos

Since a common synonym for “Films” is “Movies” a thesaurus can be created associating the two. Depending upon the particular implementation, thesaurus terms to be equated to the keywords can be taken from a standard thesaurus or can be custom created for the particular application. In addition, the equating of terms can be done in any of a myriad of different ways, the exact implementation details of which however re irrelevant to the invention, but a few representative examples of which however are contained herein for purposes of illustration.

In one example case, the equating can be done on a purely word basis. For example, a file can be constructed such that one or more single word synonyms are directly associated with an index word, for example as follows:

Movies, Flicks – Films

Alternatively, the synonyms can be equated with the node identifier(s) corresponding to the index term, for example as follows:

Movies, Flicks – vnmos

In the former case, the system would still have to search the index after the thesaurus has provided the proper index term(s). In the latter case, the thesaurus provides a direct link to the respective node(s) so that re-searching is not required.

In the system of Example 4, a user who provides the input “Movies” would cause the processing to occur as follows.

The system would search the inverted index of keywords and fail to locate “Movies” as a keyword. As a result, it would search the thesaurus and find that the word “Movies” is a synonym that can be correlated with a keyword. At this point, depending upon the particular thesaurus, it would either return to the inverted index and search using the synonym keyword “Films” and return the result as the node 406 identified by “vnymos”, or go directly to the node 406 identified by “vnymos” based upon the thesaurus entry.

Of course, it is possible (and likely) that in actual usage a synonym will be associated with more than one keyword. For example, “Comedies” may be associated with both the keywords “Sitcoms” and “Films”, resulting in, for example, the following entry in a thesaurus:

Comedies – Sitcoms, Films

In this case, a search for “Comedies” would result in the system identifying that the synonym was associated with nodes 404, 406 for both “Sitcoms” and “Films”, and it would return both terms or node identifiers corresponding to the two keywords as the result.

Example 5

Advantageously, the thesaurus concept can be extended further so that an initially unknown word (i.e. a word that is neither a keyword nor a thesaurus word) can be learned by the system and added to a thesaurus for future use.

This example is described with reference to FIG. 5 which is a portion 500 of a larger system graph as part of a very simple “geographic information system” found in some automobiles, kiosks and elsewhere today. Such a system enables a user to, among other things,

identify and get information about different locations in an environment. For example, information about particular types of restaurants in an area.

In this example, the inverted index for the portion 500 shown in FIG. 5 could look as follows:

Restaurants, 1
Pizza, 2
Burgers, 3
Chinese, 4

A user issues the following query to the system “fast food” in order to find a quick meal.

The system’s search of both the index and thesaurus would result in the “term”, in this case a phrase, not being found in either. In this case, it is an unknown phrase, and the system has to learn the “meaning” of the term.

To do this, the system first offers the verbal description from the top level node(s) 502 to the user – in this example, just “Restaurants”. The user presumably provides a positive response. (Of course, in a real system, it is possible and likely there are more top level nodes than just one. In that case, the user would be offered two or more of these nodes, and would have to select “Restaurants” to match his intended request.)

Continuing on, once the user has responded affirmatively, the system moves down the tree and offers the verbal description from each of the child nodes: “Pizza” (504), “Burgers” (506), and “Chinese” (508). Presuming that the user picks “Pizza”, the transaction interaction would look something like this:

User: Fast food

System: Restaurants?

User: Yes

System: Pizza, Burgers, or Chinese?

User: Pizza

At this point, the system has “learned” for the time being that it can equate “fast food” with “pizza” and can add “fast food” as a synonym to “pizza” in the thesaurus.

This user, who first used the unknown term “fast food”, had to trace a path down the tree. However, now the system is able to associate “pizza” with “fast food” and create or add a thesaurus entry to reflect this association, for example as follows:

Fast food – Pizza

Thus, the system has learned a meaning of the initially unknown term “fast food” and has added it to the thesaurus for future use.

As a result, a subsequent uses of the same term “fast food” will enable the system to jump directly to the “pizza” node 504.

Example 6

This example illustrates how additional meanings for an existing thesaurus term or phrase can be learned by the system for future use, whether the existing thesaurus term or phrase was an original thesaurus term or one previously learned with continuing reference to FIG. 5.

At this point, the inverted index is unchanged as:

Restaurants, 1
Pizza, 2
Burgers, 3
Chinese, 4

Additionally, presume the following entry now exists in the thesaurus.

Fast food – Pizza

Suppose a new user now issues the query “fast food” as above, but with “Burgers” rather than “Pizza” in mind.

Based upon the thesaurus, the system would go directly to the “Pizza” node. However, the user will reject “Pizza”, having “burgers” in mind. By rejecting the “Pizza” node 504 description, the user indicates that the “Pizza” node 504 is not of interest. The system is therefore configured with a further set of rules, in this case one in which the system goes up in the hierarchy to a higher node, the top node 502 in this portion of the example, and provides the verbal descriptions for the other nodes 502, 504, 506, 508 so as to cause a tracing down the tree. This can be illustrated by the following “dialog”:

User: Fast food

System: Pizza?

User: No

System: Restaurants?

User: Yes

System: Pizza, Burgers, or Chinese?

User: Burgers

This time, although this user has had to trace through at least a portion of the path from a higher-level node 502 of the tree 500, the system has learned yet another meaning for “fast food”. It now adds this meaning to the earlier entry in the thesaurus, for example as:

Fast food – Pizza, Burgers

It has now learned two meanings for future use. If a user were now to issue the query “Fast food”, the system would respond with the verbal descriptions from the nodes 504, 506 corresponding to both Pizza and Burgers.

Thus, the system can keep learning new meanings of terms based on the intended meanings of users “deduced” from the interactions between users and the system.

Of course, the nature and extent to which the system will incorporate synonyms and/or keywords in a continual learning process will not only depend upon its construction and rules, but also on the quality of the original thesaurus and the quality of the initial inverted index. In addition, where in the tree the system jumps if the user rejects the initial meaning(s) offered by the system can be handled different ways in different implementations.

For example, the system can always jump to fixed ancestor(s) (either the top node or a parent or some ancestor(s) at an intermediate point) or a fixed level (e.g. halfway from the top). This approach has the advantage of being simple to implement, but it has the problem of inflexibility because it may be relatively efficient for certain graphs and associated verbal descriptions, but not for all. For example, if two or more nodes’ verbal descriptions are offered and rejected, the relevant node selected would have to be common ancestor(s) of the offered nodes. In other words, with reference to Example 6 which is part of a larger tree, going up to the “Restaurants” node 502 would mean going to the parent of the “Pizza” node 504 rather than all the way to the top in the larger tree containing the portion 500 shown.

A more flexible alternative uses the information recorded in the thesaurus to find every synonym for “pizza” in the thesaurus and collect all the other keywords associated with those synonyms. Then the system would search the inverted index to identify all the nodes associated

with these other associated keywords and identify the most common ancestor of all of those nodes and go to it. By using the information in the thesaurus in this way the system makes use of known properties of the one meaning of “fast food”, which is “Pizza”, to construct an intelligent hypothesis about where the other meanings of “fast food” might lie in the graph. This allows the user to reach another meaning with the least effort and allows the system thereby to learn what the new meaning of “fast food” is more efficiently.

Example 7

Of course, just as it may be desirable to create implementations to add meanings to the thesaurus, it may be equally or more desirable to cause an existing meaning for a thesaurus word to be dropped, for example, due to relative lack of use. This process is described with continuing reference to FIG. 5 and the associated inverted index, particularly with respect to the thesaurus entry resulting from the most recent example.

Fast food – Pizza, Burgers

In this example, presume that there have been several uses of the query “fast food” and that the user(s) issuing these queries have almost always selected “Burgers” and almost never “Pizza”.

In accordance with another implementation of the invention, the system is constructed to track the frequency of use of a particular term in the thesaurus. Depending upon the particular implementation, the tracking can be done for all entries in the thesaurus, for only those added as part of the “learning” process, or for some specified combination thereof.

In addition, some specified criterion is used to determine when, and which terms, if any, should be removed from the thesaurus. Depending upon the particular implementation the

criterion can be based upon usage relative to time, usage of a particular term relative to some other term(s), term usage relative to overall thesaurus usage, or simply elimination of all added terms not used since the last purge.

Thus, presuming that the system has kept track of the frequency of use of different meanings of “fast food”, and that “Pizza” does not meet the criterion for a sufficiently high frequency, the meaning “Pizza” can be dropped as a synonym for “Fast food” and the entry (after purging) would look as follows:

Fast food – Burgers

Thus, a further enhanced implementation can be constructed so the system is dynamically updating the thesaurus, either adding meanings or dropping meanings for existing and/or initially unknown words.

Example 8

A further advantage to the invention is that, in some implementations, it can be configured so that, when there are multiple relevant nodes to be presented, an associated ranking can be used to determine the type, method or order of presentation. For example, the ranking can be based upon the frequency of use of particular nodes, which is tracked in these implementations, so that the most frequently selected or used nodes are presented first, more prominently, or in a particular manner.

For example, this can be illustrated by continuing from Example 7, where the thesaurus entry was as follows:

Fast food – Pizza, Burgers

Under the assumption that the system has been tracking the frequency of usage of the “Pizza” node and the “Burgers” node and each has been accessed an identical number of times. When a user enters the query “Fast food”, as above, the system presents the user with both the “Pizza” node 504 and the “Burgers” node 506, but because it tracks usage and the usage is the same, it presents them in the order they are listed, i.e. “Pizza” and then “Burgers”. However, at this point, the user’s selection will cause one entry to have a greater frequency of usage relative to the other entry, for example a selection of “Burgers” will make it have a higher frequency of usage and, accordingly, a higher ranking for the next instance of use.

Thus, the next time the system will be presenting both the “Pizza” and “Burgers” nodes to a user, the “Burgers” node 506 will have the higher frequency of usage and, accordingly, will be presented first, or more prominently, or in some other specified manner because of its ranking. If the frequency reverses with use so that the “Pizza” node 504 outranks “Burgers” node 506, then the “Pizza” node 504 will supplant the “Burgers” node 506.

Example 9

A further variant of Example 8 allows the node rankings to be used to prune the nodes themselves. In this variant, a criterion can be specified, typically zero usage over a long specified period of time, that is used to remove an entire node. This is advantageously made possible because of the system’s ability to “jump” among nodes. Thus, it may occur that a node within the tree is never accessed, but a child node of that node is. In some variants therefore, when this state exists for a sufficiently long period of time, the system is constructed to delete that node. It should be understood that, if handled properly, this process will not even affect the “learning” process because, even if no user action ever directly causes the node to be presented,

if the learning process causes the node to be presented the node's access frequency will be non-zero and it will not be "pruned".

In addition, by tracking access frequency on a node basis, a qualitative evaluation of the hierarchical system can be made and visualized. This makes it possible to review the overall hierarchy after some period of time and periodically optimize it based upon the result instead of relying purely upon the dynamic optimization that inherently and naturally flows from use of the teachings of the invention.

Having now described various component aspects of different variants implementing the invention, by way of the above examples, it should be understood that the "jumps" can occur from any node to any node, i.e. vertically and/or laterally and to another node that is higher, lower or on the same "level" as the node from which the jump is made. All manner of vertical and lateral jumps from multiple nodes to multiple nodes are possible.

In addition, it should be understood that in some applications (like document retrieval systems) the verbal description from the identified node may be the one issued whereas, in others (like an IVR system), the verbal descriptions for the children of the identified nodes may be what is presented. Nevertheless, in both cases, the process as described above by way of example will be the same or directly analogous.

Having described the various aspects individually a more commercially suitable example, employing a combination of the above examples, can now be presented with reference to FIG. 6 which illustrates a simplified example of an "interactive voice response unit" (IVR) hierarchy 600 that might be used in the airline industry. Of course, a real menu tree used in an IVR may have any number of nodes from several, up to a thousand, or more. For example, a tree with 4

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branches from each node and which has 5 levels uniformly would have 1365 nodes. As shown in FIG. 6, the tree 600 is a hierarchical tree and consists of the following nodes and branches:

- Initial start (node a0) 602
- domestic flight arrival information (node a1) 604
- domestic reservations (node a2) 606
- international flight arrival information (node a3) 608
- international reservations (node a4) 610

The node 604 identified by a1 is a service node with pre-recorded information.

The node 606 has two child node a 2, first/business class (node a5) and economy (node a6).

The node 608 identified by a3 is service node with pre-recorded information.

The node identified as a4 has three child nodes identified as first class (node a7), business class (node a8), and economy (node a9).

The nodes 612, 614, 616, 618, 620 identified as a5, a6, a7, a8, a9 are all service nodes (i.e. terminal nodes) where a respective customer service representative will interact with the caller.

Of course, a real system may also have a choice at the top level or at each level for a live operator and may even have a choice to go back to the previous menu.

Even for such a simple example, in a traditional interactive voice response system, the caller would have to listen to several choices and then traverse a path down to a service node. Someone interested in business class reservations on a domestic flight would have to traverse the path (a0, a2, a5) for example. This involves listening to multiple choices at each level of the tree (e.g. first a prompt at a0, then four prompts offering a1, a2, a3, and a4 at the next level, at which the caller would choose a2, and finally two prompts offering a5 and a6, at which level the caller

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would choose a5 and then wait for the operator) and then making a choice by pressing an appropriate number on the telephone dial pad or alternatively saying the appropriate number. In certain cases, he may make a mistake: he may choose international reservations when he is interested in domestic reservations or something similar (simply by pressing the wrong number on his touch-tone telephone or saying the wrong number). If he does, then he has no choice but to disconnect the phone and redial the number (or if the system has a backtracking option, then he can backtrack, but even here he has wasted valuable time).

In contrast, in accordance with a system implementing the invention, the caller would be able to say what he was looking for (e.g. "I want to make a domestic business class reservation") and the system would identify and respond with the appropriate node 612 (e.g. a5 in this case or the relevant customer service representative directly). In other words, it would enable the caller to skip to the correct node(s) without having to trace through the entire path. If the user makes a mistake, he could ask for something different wherever he finds himself in the tree, and skip laterally or vertically to his preferred choice.

The system implementing the invention can further include an option that the entire transaction (e.g. the making of the reservation) would be carried out through natural language interactions with the system without the intervention of a human customer service representative. In other words, all the details of his domestic reservation are obtained by the system and the system updates a database accordingly and issues whatever commands are required (e.g. the mailing of a ticket) to be carried out by some human representative later.

While it is true that some more advanced interactive voice response systems available today allow for natural language interactions, they are highly constrained natural language

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interactions with relatively little or no intervention by a human operator. However, unlike with systems using the invention, those systems still require direct path traversal through the hierarchy (i.e. jumping to non-connected nodes is not contemplated or possible, let alone allowed). Moreover, such systems still typically use a limited list of keywords, which the caller is required to use to correctly traverse to the next connected node.

In contrast, variants of a system implemented in accordance with the invention can incorporate an automatically generated or updated thesaurus, which greatly expands the range of words or terms a caller can use. In these variants, the user is not restricted to parroting the highly constrained script as required by other interactive voice response systems, nor is the user limited to traversal to a connected node. In these more complex implementations of the invention, a system can be constructed that is able to learn new words or terms that it may not have understood the first time. For example, if a user asks for “coach class” and the system does not have the word “coach” or the phrase “coach class” in its keyword list or in its current thesaurus, then on this first occasion, it offers the user a traditional path down the conventional tree. But it tracks what the user did, what node of the tree the user went to, and on this basis, it learns a new response to “coach class”. The next time a caller (either the same person or a different person) uses the words “coach class” the system does not offer the traditional path as it did the first time, but instead it offers a new set of nodes based on what it learned the first time. Thus, in such implementations, the thesaurus is a dynamically changing entity, continually updating itself by learning new words and terms and learning new “meanings” (i.e. new actions or responses) for existing terms.

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Implementations according to the invention can also allow novel groupings of nodes to be presented to the caller based on his query. If he asks for “economy class” without specifying whether he wants an international or domestic reservation, then the system would offer him the nodes a6 and a9 (appropriately phrased in natural language), and allow him to further choose whether he wants international or domestic reservations, something current systems do not offer. In other words, the system can pick out the relevant responses from different branches of the tree and pool them together and offer them to the caller.

This functioning of the system, by which it is able to skip around laterally or vertically in the tree, is enabled by the associating of natural language (i.e. human language) verbal descriptions with each node, and then using these as an initial basis for the navigation, augmented, in some variants, by a dynamically changing thesaurus that greatly expands its range and comprehension.

Thus, based upon a conceptual understanding of the above examples, further details of the process will now be presented.

The flowcharts of FIGS. 7 through 14 are illustrative of a functional example of the general method of a more complex variant the invention as would be implemented in software according to the flowcharts in this case for a newspaper subscription application. It should be understood that particular details are provided in the description below merely for completeness or because they are necessary or helpful for forming an understanding of the particular implementation. They are not to be considered essential for implementing the invention. Similarly, details unrelated to or unnecessary for understanding the invention have been omitted to avoid confusion.

An example implementation is described and contains two programs, a preparatory program, illustrated in FIGS. 7-10 and a transaction or query processing program, illustrated in FIGS. 11-14. In addition, a particular software implementation fairly corresponding to the flowcharts of FIGS. 7 - 14 appears in the Appendix A that follows. The program contained therein, is written in the "C" programming language for execution on any personal computer having a processor, memory , input-output, etc. capabilities to run the particular application in its intended environment.

Broadly, the first program process of FIGS. 7-10 constructs an inverted index and an application-specific thesaurus and the second program process of FIGS. 11-14 uses those constructs in a transaction processing system to interact with a user.

In the preparatory program of FIGS. 7A, 7B and 8-10, the shorthand names of files that the program uses and the contents of the corresponding files are as follows. Notably, both the process parts shown in FIG. 7A and 7B as well as the process part shown in FIG. 8 are indicated as start points. This is because they are each independent of each other in that any of the three could start before any other or two or more could be run concurrently. Thus, it should not be presumed that they are mutually exclusive or any one is per se required for the invention. Moreover, it should be understood that any one or more could have been undertaken at a different time, by a different entity, or for a different application. Whether one or more of the portions shown in FIG. 7A, FIG. 7B or FIG. 8 are the starting points, the starting point for actual operational processing will be the same.

The file named 'p' contains a list of prompts or verbal descriptions in a hierarchical relationship (i.e. they can be visualized or arranged in a tree-type graph).

The file named 'w' contains documents that are related to the prompts or verbal descriptions in 'p'. For example, 'w' could contain a training manual for customer service personnel or a website document that is likely to contain material that is related to the queries customers may have. This file is used to create a thesaurus.

The file named 'f' contains forms that are used to elicit relevant information from customers. They have fields like 'name', for example, which would be used by the system to ask and record a caller's name.

The file named 'x' contains an index associating the forms in 'f' with terminal prompts or descriptions in 'p'. Once a terminal prompt is reached in the process, the corresponding form from the file 'x' is activated, and the system proceeds to elicit information from the user.

The file named 's' contains a list of application-specific stop words, many of which are high-occurrence and/or generally uninformative words like 'a', 'an', 'the' or 'from' or words with a high-occurrence in for the particular application such that they have little meaning, for example, 'fly' in an airline reservation system, 'street' in a navigation system, 'file' in a computer search tool. These are eliminated from 'p' and 'w' and 'f' before processing, because they don't carry any useful information for the application.

The file 't.cfg' contains the thesaurus and inverted index that will be constructed by the program. Of course, in alternative variants, the thesaurus could be a separate file from the inverted index file and either or both could be made up of multiple files.

The file 'l.cfg' is a file that is used to store newly learned words. As with the t.cfg' file, the 'l.cfg' file need not be a separate file, it could be part of 't.cfg', or part of a separate thesaurus and/or inverted index file. Similarly, the 'l.cfg' file could be made up of several files.

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With reference to FIGS. 7A, 7B and 8 through 10, the processes as carried out by the first program are as follows. It bears noting that, although the process and its components are presented by way of example in a particular order, unless a specific process component is expressly stated to necessarily have to occur at a particular time or after some other particular process component, or two process components must necessarily occur in sequence because one relies upon completion of the other before it can start, no order should be implied or considered required since the order in different implementations may be different and may vary based upon the particular programmer, programming language and/or computer involved.

The files p, w, f, x, and s are each read and processed as follows. It should be understood that the order of processing of file 'p' relative to file 'f' or their respective sub-processing components, although shown sequentially, could be done in a myriad of ways including doing each of the reading extracting and storing concurrently or as a common operation (i.e. reading for both is done before extracting for both, etc.).

Specifically, keywords are extracted from p ___ and from f ____. These are initially just all the words or terms contained in the prompts in p. The keywords are stored, for example, in a temporary file.

Similarly, thesaurus words are extracted from w. These are initially just all the words or terms in w. They are also stored, for example, in a temporary file.

Stop words are loaded from s (902) and stop words and duplicate words are eliminated from keywords and thesaurus words stored in the temporary files.

The thesaurus is constructed in accordance with FIGS. 9 and 10 described in overview as follows:

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- a. Increment the file of thesaurus words with keywords from p and f remaining after elimination of stop words.
- b. Create a matrix of thesaurus words as row words (or words listed along the rows of the matrix) against keywords as column words (or words listed along the columns of the matrix).
- c. Count the number of co-occurrences of each row word with each column word of the matrix in the documents contained in w and fill in that number in the corresponding matrix cell. (For example, a co-occurrence of a pair of words may be defined as that pair occurring in the same paragraph. If w is made up of a hundred paragraphs, then take each pair of row word and column word and count the number of times this pair occurs within the space of each of the hundred paragraphs in w. For each pair, the pair may co-occur zero or more times in a paragraph and add up the number of co-occurrences in all the paragraphs in w.)

This process yields a matrix filled with nonnegative integers in each cell. It is then possible to consider each row of numbers as a vector associated with the corresponding row word. When viewed geometrically, these vectors, one for each row word, form angles with each other in a multi-dimensional space. As a result, we can calculate the cosine of each such angle by computing scalar products for the angles. Thus, we compute the cosines of the angles formed by the vectors associated with each pair of row words.

The cosine values for all pairs of row words and column words are calculated and stored, for example, in a new matrix.

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For each row word, the top 'n' cosine values are identified as are the corresponding keywords. For example, in an airline system context, if there are two row words 'coach' and 'economy', where 'economy' is also a keyword (originally from p and/or f), and if the cosine value of this pair or words is among the top 'n' cosines for the word 'coach', then 'economy' is identified as a synonymous keyword for coach.

A new file can then be created, formatted for example, by listing thesaurus words on the left (e.g. coach), and against each thesaurus word, its associated keywords (e.g. economy). This is referred to as an inverted index (i.e. the thesaurus) of row words and their keyword synonyms. Essentially, this file will now contain words like 'coach' coupled with its particular alternative meanings, one of which may be 'economy'. The user interactive transaction processing program, the second program, will later use this thesaurus file when a caller uses a word like 'coach' in his query to determine the relevant keywords (like 'economy'). This will enable the program to find the relevant prompt with which to respond to the user.

Optionally, to provide the system with a set of prompts or verbal descriptions with which to respond to a user, another inverted index is created using the files p, f, and x. This index will contain a list of keywords from p and/or f associated with the prompts in which they occur. Thus, when a user uses a synonym like 'coach' in a query, the second program will look up the thesaurus, find the keywords corresponding to it (e.g. 'economy'), and then look up the inverted index to find the prompts corresponding to 'economy' and other corresponding keywords.

Once both the inverted index and thesaurus files have been created, the file t.cfg can be created from them for use by the second program.

One example of the program flow for a fairly generic transaction processing program implementing one variant of the invention is illustrated in the flowcharts of FIGS. 11 through 14. This example is configured to incorporate a collection of several of previously described simple aspects. To demonstrate the functions of this program and how this program operates, for context we use an example interaction that a calling customer might have with this example system.

Following the example is the Appendix contains that program code essentially implementing a variant of the invention largely corresponding to that of FIGS. 7 through 14.

The particular example we use for purposes of illustration is for an automated telephone system for a newspaper, like the New York Times. For simplicity, every item in the flowchart is not traced through since, an understanding of the process with respect to one path will be sufficient to allow an understanding of the other paths.

The example begins with "I want to subscribe" uttered by the caller to the system. We will assume that the first three words of the query (i.e. "I", "want", and "to") are stop words and the last word (i.e. "subscribe") is neither a keyword nor a thesaurus word.

The process as carried out by the second program are as follows:

The files t.cfg, l.cfg, f, x, and s are read (1102).

The keywords, thesaurus words, prompts from t.cfg. are loaded (1104), as are the learned words from l.cfg. Initially, l.cfg will be empty as the program has not yet learned any new words. The forms and index of forms against prompts from f and x respectively are loaded, as are stop words from s.

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The program opens the interaction with a greeting (1106) and an elicitation of the first query from the caller (1108). This might be: “Thank you for calling the New Herald. How may we help you?”

The caller then utters his or her statement: “I want to subscribe”.

The stop words in the statement are first eliminated, leaving behind just the word “subscribe”.

The statement is then processed in the following way:

The keywords and the thesaurus words remaining in the query are identified (1202, 1204) by comparing with the list in t.cfg and l.cfg. As we have assumed that “subscribe” is neither, we have none.

The prompts that best match the identified keywords and thesaurus words are selected (1206). As there are no such words identified, there are no prompts selected.

The program arrives at a decision in the flowchart: are any nodes selected? (1208). Since the answer is in the negative, the program will follow the branch and select the top level node (1218). (Note: These top level prompts are the ones at the top level of the menu tree.) This completes the prompt selection process. The process then proceeds to the second part of the query process.

The process proceeds with another decision: has a single leaf prompt been selected? (1210). Since the top level prompts are selected (of which there are more than one and also none is a leaf prompt), a negative answer is the result.

These prompts or verbal descriptions are issued to the user (caller) and elicit another response. Assume that the offered verbal descriptions are as follows:

System: Are you calling about subscriptions?

System: Is there a problem with your paper or delivery?

System: Would you like information about the New York Times website?

System: Are you calling about advertisements?

System: Are you calling about something else?

Assume further that the caller responds as follows:

User: I am calling about subscriptions.

As a result, the program returns to selecting verbal descriptions by identifying the keywords and the thesaurus words remaining in the query by comparing with the list in t.cfg and l.cfg (1202, 1204). "Subscriptions" is now synonymous with a keyword and it is identified.

The program will again select verbal description(s) that best match the identified keywords and thesaurus words (1206).

For example, assume these are:

System: Would you like to order a subscription?

System: Would you like to give a gift subscription?

System: Would you like to change your address or change any other information?

The program then arrives at a decision branch (1208) in the flowchart: are any nodes selected? Since the answer is affirmative, it follows that branch and exits the prompt selection process and returns to the query process.

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This begins with another decision box: is a single leaf node selected? (1210). The answer is no, since three prompts have been selected.

Next, these verbal descriptions are issued to the caller and the system will await his response (1220). We assume the caller responds as follows:

User: I want to order a subscription

The program will again return through a loop to the prompt selection process (1202, 1204, 1206) where the program will identify the keywords and the thesaurus words remaining in the query by comparing with the list in t.cfg and l.cfg. "Order" and "subscription" are now identified.

Verbal descriptions are selected that best match the identified keywords and thesaurus words. Now assume this is just the prompt "Would you like to order a subscription?" from the three descriptions above.

The program will then arrive at a decision branch (1208) in the flowchart: are any nodes selected? Since the answer is affirmative, it follows that branch and exits the prompt selection process and returns to the query process to again arrive at a decision: has a single leaf node been selected? (1210). This time the answer is yes, a single prompt has been reached, which is also a leaf prompt, since it is at the bottom of the menu tree.

This is followed by another decision: any verbal description corresponding to the node? (1212). The program checks t.cfg and finds the answer is no.

The branch then leads to yet another decision (1214): is a form for verbal description available? The answer by checking the index x is the yes branch. This leads to the portion of the flowchart of FIG. 13.

The form is processed in the following way:

The first part is a decision: is it a response form? (1302). The answer is no.

The system then issues questions to the caller based on the form and accepts information back (1304). The questions are of the form “Please tell us your name”, “Where do you live?”, “Do you want an annual or half-yearly subscription?” etc. The caller provides the information to the system.

It repeats the information the caller has given the system and asks if the information is correct. Let us assume the user confirms that the information is correct.

The system then calls an external routine to store the information in a database. The routine returns another form to the system (1306) and returns in a loop to the question: is it a response form? (1302). Since the form contains questions about the payment, based on the type and period of subscription selected by the caller, the answer will be negative.

The system then issues these questions to the caller and the caller provides the required information (1304).

The system then repeats the information and gets a confirmation from the caller.

The information is passed to another routine (mentioned in the form) to update the database. This routine (1306) then returns a response form and again returns in the loop to the question: is it a response form? (1302). This time the answer is yes. The system then issues a response (1308) thanking the caller for the subscription, and exits this process returning to FIG.

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The system now exits the query process as well since the caller's query has been completely processed and the corresponding actions taken by the system. It now returns to the main part of the program.

The next process in the main part of the program is a question: is there an unknown word in the caller's query? (1112). The answer is yes, since the word "subscribe" in the initial query was not known to the system. This invokes the portion of the flowchart of FIG. 14.

The system therefore has to learn this previously unknown word:

The learning process begins with a decision: is the word already in l.cfg? (1402). The answer is no, since l.cfg is initially empty and the word has not been encountered before.

The corresponding "NO" branch is followed and the word is added to the list of learned words (initially empty) with keywords from the final single leaf prompt that was selected (1404).

The system then records these changes in l.cfg (1408) and returns to the main part of the program in FIG. 11. It has now learned the meaning of the initially unknown word "subscribe".

Next, the program asks the caller if he wishes to continue (1114) (i.e. are there any further queries). We assume the answer is no and the system thanks the user and exits.

Now, having described the example traversal of one path through the second program with reference to the flowchart, an example dialogue for the path traversal that has taken place is presented so the complete transaction can now be understood.

Dialogue:

Caller: I want to subscribe

System: Are you calling about subscriptions?

System: Is there a problem with your paper or delivery?

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System: Would you like information about the New York Times website?

System: Are you calling about advertisements?

System: Are you calling about something else?

Caller: I am calling about subscriptions

System: Would you like to order a subscription?

System: Would you like to give a gift subscription?

System: Would you like to change your address or change any other information?

Caller: I want to order a subscription

System: Please tell us your name

Caller: Bertrand Russell

System: Where do you live?

The dialogue continues in this way with the system eliciting the required information from the caller.

Having demonstrated traversal in a system where the system was constructed to learn when an unknown word is used, what happens the second time a caller uses the same word "subscribe" in a query after it has been learned by the system can now be demonstrated. This demonstrates the power of including the optional feature of learning in the program.

In this case, the dialogue that occurs when a new caller uses the word "subscribe" following the above is now presented.

Dialogue:

Caller: I want to subscribe

System: Please tell us your name

Caller: J. L. Austin

System: Where do you live?

Thereafter, the process continues. Notably, the system has now learned the correct response to the query "I want to subscribe".

Other Variants

Having described several simple and more complex examples that make it possible to use the invention, other variants can now be presented. Examples of such optional functions that can be incorporated into other variants, individually or collectively, include:

- a) creating the thesaurus by providing access to a collection of multiple documents and determining synonymy based on sufficient similarity of meaning with the keywords as measured by the frequency of co-occurrence of the keywords in the collection of documents;
- b) identifying words in the user's response by recording the response for future learning;
- c) parsing out of a response all non-stop word unknown terms or keywords;
- d) identifying synonyms for all non-stop terms in the user's response;
- e) cycling between user and system responses until the user reaches a vertex (i.e. verbal description) that enables him to carry out his goal and updating the thesaurus when the goal vertex is reached by associating the recorded previously unknown words in the user's response with the keywords that are associated with the verbal description reached by the user;
- f) recording, when the goal vertex is reached, the pairs of synonyms in the user's responses and the keywords that are associated with the verbal description reached by the user;

g) removing associations between keywords and their synonyms from the thesaurus that have not been accessed more than a specified amount of times within a specified period (this can be based upon a parameter set in the system by the system's administrator or can occur as part of program maintenance or updates);

h) selecting the verbal descriptions that best meet the user's goal as indicated by the keywords and synonyms in the user's response by identifying the keywords in the user's response and/or the keywords corresponding to synonyms in the user's response and computing a degree of match between each verbal description and the identified keywords, in accordance with conventional linguistic processing techniques;

i) computing the degree of match between verbal descriptions and identified keywords by utilizing the pairs of synonyms in user's response and the keywords associated with the verbal descriptions reached by users as previously recorded;

j) responding to the user on the basis of verbal descriptions selected by presenting the user with verbal descriptions that best match the user's previous response;

k) for "best match" variants, in the event that even the best matches have a low degree of match, the best "n" verbal descriptions are presented to the user ("n" being a number representing a predetermined system parameter);

l) for "best match" variants, in the event that the best matches have a low degree of match, the user is automatically connected to a human operator, when or if a human operator is available;

- m) for “best match” variants in the event that the best matches have a low degree of match, the best “n” verbal descriptions are presented to the user, along with an option of being connected to a human operator when or if a human operator is available;
- n) presenting the user with those verbal descriptions that best match the user’s previous response in order to elicit any information from the user that may be required to accomplish the user’s goal;
- o) recording information elicited from a user in a database for future use;
- p) selecting multiple vertices in the graph structure that are not connected to a previously selected vertex, based upon parameters associated with nodes correlated to keywords and synonyms in a user’s response;
- q) selecting a vertex in the graph structure in the same row as the previously selected vertex based upon the keywords and synonyms in the user’s response; and/or
- r) updating the thesaurus by adding words from a user’s response that are not in the thesaurus.

Finally, it is to be understood that various variants of the invention including representative embodiments have been presented to assist in understanding the invention. It should be understood that they are not to be considered limitations on the invention as defined by the claims, or limitations on equivalents to the claims. For instance, some of these variants are mutually contradictory, in that they cannot be simultaneously present in a single embodiment. Similarly, some advantages are applicable to one aspect of the invention, and inapplicable to others. Thus, no particular features or advantages should be considered dispositive in determining equivalence.

It should therefore be understood that the above description is only representative of illustrative embodiments. For the convenience of the reader, the above description has focused on a representative sample of all possible embodiments, a sample that teaches the principles of the invention. The description has not attempted to exhaustively enumerate all possible combinations or variations, for example, those arising out of the use of particular hardware or software, or the vast number of different types of applications in which the invention can be used. That alternate embodiments may not have been presented for a specific portion of the invention, or that further undescribed alternate embodiments may be available for a portion of the invention, is not to be considered a disclaimer of those alternate embodiments. One of ordinary skill will appreciate that many of those undescribed embodiments incorporate the minimum essential aspects of the invention and others incorporate one or more equivalent aspects.

APPENDIX A

FILE IDENTIFICATION

Main Source Files

main.c, process.c, arraylib.c, stemlib.c, dialog.c, interactive.c, formlib.c

Header Files

globalvar.h, process.h, arraylib.h, forms.h

Make Files

Makefile

Parameter Files

t.ini, d.ini

Data Files

p, w, s, f, x, a

Configuration Files

t.cfg, l.cfg

Shell Script Files

acct_info, add_acct, chg_acct, get_pymt, updt_pymt, susp_deli, updt_acct, prefer

MAIN SOURCE CODE (in C)

main.c: Main Program to process p and w to create the thesaurus

/******

SOURCE CODE DOCUMENTATION

*****/

```
#include <stdio.h>
#include <string.h>
#include "process.h"
#include "arraylib.h"
#include "forms.h"
```

```
int numColumn = 0, numRows = 0, numIndex = 0, numMenu;
int topValues = 5;
char **rowTerms, **columnTerms, **prompts, **stopWords;
double **matrix, **cosine;
float phoneThreshold = 0.02, webThreshold = 0.0006;
int **indexList, **menuList, **thesaurus, **promptKeys;
int numStopWord = 0;
int numForms, numPF;
struct form **formlist;
char ***Fprompts, *wdoc, *pdoc, *sdoc, *fdoc, *xdoc, *cfg;
```

```
main(int argc, char *argv[]) {
```

```
int i, j;
```

/******

PRINT THESAURUS PROGRAM INFO

*****/

```
/* if (argc != 5) {
    printf("Usage Instructions: t p w f x\n");
    printf("Parses w for matrix row terms and p for matrix column terms.\n");
    printf("*** Exiting, goodbye.\n");
    exit(1);
} */
```

```
if (argc != 2) {
    printf("Usage Instructions: t <ini-file>\n");
```



```

printf("*** Exiting, goodbye.\n");
exit(1);
}
/*****

```

OPEN INPUT FILES

```

*****/
readini(argv[1]);
loadStopWords(sdoc);
numPF = loadFormsList(xdoc);
numForms = loadForms(fdoc);

/*****

```

PREPARATION FOR PHONEDOC PARSING

```

*****/
printf("\nReading files ....\n");
numColumn = processFile(pdock, &columnTerms, phoneThreshold);
// printf("The document contains %d relevant terms.\n\n", numColumn);

// This routine will add the keywords from the Forms into ColumnTerms.
numColumn = addFormKeys(&columnTerms, numColumn);

// printf("The document contains %d relevant terms.\n\n", numColumn);

/*****

```

PREPARATION FOR WEBDOC PARSING

```

*****/

numRow = processFile(wdoc, &rowTerms, webThreshold);

/*****

```

MERGE COLUMNTERMS & FINALTERMS INTO ROWTERMS

```

*****/

numRow = mergeArray(&rowTerms, columnTerms, numRow, numColumn);
sortArray(rowTerms, numRow);

```

```
// printf("The document contains %d relevant terms.\n\n", numRows);
/*****
```

MATRIX CONSTRUCTIONS

```
*****/
```

```
printf("loading prompts ...\n", numIndex);
numIndex = loadPrompts(pdoc);
printf("processing words ...\n", numIndex);
createMatrix(wdoc);
numRow = eraseZeroes();
calcCosine();
fillIndex();
// This function will add leaf prompts to the index keywords from Forms.
// appendIndex(argv[3]);
createThesaurus();
// printf("created thesaurus .\n\n", numIndex);
printf("saving data ...\n");
saveData(cfg);
printf("done.\n");
}
```

```
readini(char * filenm)
{
    FILE * fp;
    char buf[80], key[80], value[80], comment[80];
    int cnt;
    if ((fp=fopen(filenm,"r"))==NULL)
    {
        perror(filenm);
        exit(1);
    }
    while (fgets(buf,79,fp)!=NULL)
    {
        sscanf(buf,"%s %s %s",key,value, comment);
        if (!strcmp(key, "pdoc"))
            pdoc=strdup(value);
        if (!strcmp(key, "wdoc"))
            wdoc=strdup(value);
        if (!strcmp(key, "sdoc"))
            sdoc=strdup(value);
    }
}
```

```

if (!strcmp(key, "fdoc"))
    fdoc=strdup(value);
if (!strcmp(key, "xdoc"))
    xdoc=strdup(value);
if (!strcmp(key, "cfg"))
    cfg=strdup(value);
if (!strcmp(key, "pt"))
    sscanf(buf,"%s %f %s",key,&phoneThreshold,value);
    //phoneThreshold=(float)atof(value);
if (!strcmp(key, "wt"))
    sscanf(buf,"%s %f %s",key,&webThreshold,value);
if (!strcmp(key, "tv"))
    topValues=atoi(value);

    }
}

```

process.c: This program contains various functions called from Main

```

#include <stdio.h>
#include <string.h>
#include <math.h>
#include "globalvar.h"
#include "arraylib.h"
#include "forms.h"
#define min(x, y) (x < y) ? x : y

int *rowcount, *colcount;

int processFile(char *filename, char ***cArray, float threshold) {
FILE * fp;
char tmpWord[50], paraFlag;
int i, numWords = 0, wordLen = 0, totWords = 0;
float *freqArray;

fp = fopen(filename,"r");
*cArray = NULL;
freqArray = NULL;

while((wordLen = fetchWord(fp, tmpWord)) != 0) {
    totWords++;
    if (! inArray(stopWords, tmpWord, numStopWord)) { // ignore stopwords

```

```

    stemWord(tmpWord);
    if (i = inArray(*cArray, tmpWord, numWords)) {
        freqArray[i - 1]++;
    }
    else {
        addWord(cArray, tmpWord, ++numWords);
        freqArray = (float *) realloc(freqArray, numWords * sizeof(float));
        freqArray[numWords - 1] = 1;
    }
}
}
// printf("Totwords = %d, numWords = %d\n",totWords, numWords);
for ( i = 0; i < numWords; i++)
{
    if ((float)(freqArray[i] / totWords) >= threshold)
        (*cArray)[i] = NULL;
}

numWords = removeNulls((*cArray), numWords);
sortArray((*cArray), numWords);

return numWords;
}

/*****
Prompts Processing
*****/

int loadPrompts(char *filename)
{
    char buffer[256];
    int i = 0, j, len, nc;
    int level[10], tabs, m = 0;
    FILE * fp;

    for (i = 0; i < 10; i++)
        level[i] = 0;

    fp = fopen(filename,"r");
    prompts = NULL;
    menuList = NULL;
    j = i = 0;
    while (fgets(buffer, 256, fp) != NULL)

```

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```

{
tabs = allTrim(buffer);
if ((len = strlen(buffer)) == 0)
    continue;
if ((j = inArray(prompts, buffer, i)) == 0)
    j = i;
else
    j--;
level[tabs + 1] = j + 1;
menuList = (int **)realloc(menuList, ++m * sizeof(int *));
menuList[m - 1] = (int *)malloc(3 * sizeof(int));
menuList[m - 1][0] = level[tabs];
menuList[m - 1][1] = level[tabs + 1];
menuList[m - 1][2] = 0;
if (j == i)
    addWord(&prompts, buffer, ++i);
}
numMenu = m;
for (j = 0; j < numMenu; j++)
{
for (m = 0; m < numMenu; m++)
    if (menuList[j][1] == menuList[m][0])
        break;
if (m != numMenu) /* Leaf Node */
    continue;
nc = 0;
for (m = 0; m < numMenu; m++)
    if (menuList[m][0] == menuList[j][0])
        nc++;
if (nc != 1)
{
    menuList[j][2] = 99;
    continue;
}
len = strlen(prompts[menuList[j][1] - 1]);
if (prompts[menuList[j][1] - 1][len - 1] == '?')
    menuList[j][2] = 99;
else
{
    for (m = 0; m < numMenu; m++)
        if (menuList[m][1] == menuList[j][0])
            menuList[m][2] = menuList[j][1];
    menuList[j][2] = 100;
}
}

```

```

    }
}
return i;
}

void fillIndex()
{
int i, j, k;

indexList = (int **)malloc(numColumn * sizeof(int *));
for (i = 0; i < numColumn; i++) {
    indexList[i] = (int *)malloc(numIndex * sizeof(int));
    for (j = 0; j < numIndex; j++)
        indexList[i][j] = 0;
}

for (i = 0; i < numIndex; i++)
    updateThesaurus(prompts[i], i + 1);
updateFrmForms();
}

updateThesaurus( char *str, int pmpt)
{
char tmpstr[256];
char *sarray[50];
int i, j, k, wrds;
int iflag = 0, dflag = 0;

strcpy(tmpstr, str);
wrds = readValues(tmpstr, sarray);
stemArray(sarray, wrds);
for (i = 0; i < wrds; i++)
{
    for (j = 0; j < numColumn; j++)
    {
        if (!strcmp(columnTerms[j], sarray[i]))
        {
            iflag = 1;
            dflag = 0;
            for (k = 0; indexList[j][k] && k < numIndex; k++)
                if (indexList[j][k] == pmpt)

```

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```

                                dflag = 1;
                                if (k < numIndex && dflag == 0)
                                    indexList[j][k] = pmpt;
                                break;
                                }
                            }
if (iflag == 0)
{
    printf("*** warning the following prompt does not contain index word\n");
    printf("\t\t%s\n", str);
}
}

```

```

/*****
Create Matrix here
*****/

```

```

void createMatrix(char * filename) {
    int i, j, nwp = 0, k = 0;
    int minv;
    FILE * fp;

    /* allocate memory for matrix */
    matrix = (double **)malloc(numRow * sizeof(double *));
    for (i = 0; i < numRow; ++i) {
        matrix[i] = (double *)malloc(numColumn * sizeof(double));
        for (j = 0; j < numColumn; j++)
            matrix[i][j] = 0;
    }

    /* allocate memory for rowcount and column count */
    rowcount = (int *)malloc(numRow * sizeof(int));
    colcount = (int *)malloc(numColumn * sizeof(int));

    /* Go to start of document */

    fp = fopen(filename, "r");

    while (!feof(fp))
    {
        /* initialize rowcount array */
        for (j = 0; j < numRow; j++)

```

```

        rowcount[j] = 0;
/* initialize columncount array */
for (j = 0; j < numColumn; j++)
    colcount[j] = 0;

nwp = readPara(fp);
if (feof(fp))
    break;
if (nwp == 0)
    continue;

/* add co-occurrence of rowword & colword to the matrix */
for (j = 0; j < numRow; j++)
    for (k = 0; k < numColumn; k++) {
        minv = min(rowcount[j], colcount[k]);
        matrix[j][k] += minv;
    }
}

}

int readPara(FILE *fp )
{
int i, j, k, wcount = 0, m = 0;
int nextpara, currpara, wordLen;
char tmpword[50];

currpara = ftell(fp);
wcount = wordsInPara(fp);
if (feof(fp)) {
    if (wcount == 0)
        return 0;
}

nextpara = ftell(fp);
fseek(fp, currpara, 0);
for (i = 0; i < wcount; ++i) {
    wordLen = fetchWord(fp, tmpword);
    if (inArray(stopWords,tmpword,numStopWord))
        continue;
    stemWord(tmpword);

/* count the occurrence of each word from the row in para */

```



```

    for (j = 0; j < numRow; j++)
        if (!strcmp(rowTerms[j], tmpword)) {
            rowcount[j]++;
            break;
        }
    /* count the occurrence of each word from the column in para */
    for (j = 0; j < numColumn; j++)
        if (!strcmp(columnTerms[j], tmpword)) {
            colcount[j]++;
            break;
        }
}
fseek(fp, nextpara, 0);
return wcount;
}

int wordsInPara (FILE *fp)
{
    int c, count = 0;
    int state;
    const int out = 0, in = 1;

    state = out;
    while ((c = getc(fp)) != EOF) {
        if (!isalpha(c)) {
            if (c == '\n' || c == EOF)
                break;
            state = out;
        }
        else
            if (state == out) {
                state = in;
                count++;
            }
    }
    return count;
}

/*****
Calculate Cosine Function
*****/
void calcCosine()

```

```

{
int i, j, k, sum;

/* memory allocation for the cosine matrix */

cosine = (double **)malloc(numRow * sizeof(double *));
for (i = 0; i < numRow; ++i) {
    cosine[i] = (double *)malloc(((numRow) * sizeof(double)));
    for (j = 0; j < numRow; j++)
        cosine[i][j] = 0;
}

/*Normalization*/

for (i = 0; i < numRow; ++i)
    {
    sum = 0;
    for (k = 0; k < numColumn; ++k)
        sum += matrix[i][k] * matrix[i][k];
    if (sum != 0)
        {
        for (j = 0; j < numColumn; ++j)
            matrix[i][j] = matrix[i][j] / sqrt(sum);
        }
    }

/*Cosines*/

for (i = 0; i < numRow; ++i)
    {
    for (k = i + 1; k < numRow; ++k)
        {
        cosine[i][k] = 0;
        for (j = 0; j < numColumn; ++j)
            cosine[i][k] += matrix[i][j] * matrix[k][j];
        }
    }
}

/*****
eraseZeroes : removes the row with all zero column in the matrix
*****/
int eraseZeroes() {

```

```

int j, k;
int cond;

/* Free and nullify the rowTerms and matrix row for all zeroes */
for (j = 0; j < numRows; ++j) {
    cond = 1;
    for (k = 0; k < numColumn; ++k) {
        if (matrix[j][k] != 0) {
            cond = 0;
            break;
        }
    }
    if (cond == 1) {
        rowTerms[j] = NULL;
        matrix[j] = NULL;
    }
}

/* Push NULL rows at the end of arrays */
for (j = 0; j < numRows; j++)
{
    if (rowTerms[j] == NULL)
    {
        for (k = j + 1; k < numRows; k++)
            if (rowTerms[k] != NULL)
                break;
        if (k < numRows)
        {
            rowTerms[j] = rowTerms[k];
            matrix[j] = matrix[k];
            rowTerms[k] = NULL;
            matrix[k] = NULL;
        }
    }
}

/* count new numRows */
for (j = 0; (rowTerms[j] != NULL) && j < numRows; j++);

return j;
}

```

```

/*****
createThesaurus: Function to Create Thesaurus of rowTerms by taking the
index words matching the top 5 cosine values.
*****/
void createThesaurus()
{
int i, j, k, l;
int m, numword;
double *tmpcos, prevcosine = 0;
int *colnum;

tmpcos = (double *)malloc(numRow * sizeof(double));
colnum = (int *)malloc(numRow * sizeof(int));

thesaurus = (int **)malloc(numRow * sizeof(int *));
for (i = 0; i < numRow; i++) {
    thesaurus[i] = (int *)malloc(numColumn * sizeof(int));
    for (j = 0; j < numColumn; j++)
        thesaurus[i][j] = 0;
}

/* initialization of thesaurus */

for (i = 0; i < numRow; i++) {
    for (j = 0; j < numRow; j++) {
        if (i > j)
            tmpcos[j] = cosine[j][i];
        else
            if (i < j)
                tmpcos[j] = cosine[i][j];
            else
                tmpcos[j] = 0;
        colnum[j] = j;
    }
    floatSort(colnum, tmpcos, numRow);

    numword = prevcosine = 0;

    /* count top 'topValues' of cosine */
    for (m = 0; m < numColumn; m++) {
        if (prevcosine != tmpcos[m])
            numword++;
    }
}

```

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```

        prevcosine = tmpcos[m];
        if (numword == topValues + 1)
            break;
    }
    --m;
    /* m = total num of syn */

    for (j = k = 0; k <= m; k++) {
        if ((l = inArray(columnTerms,rowTerms[colnum[k]], numColumn)) != 0)
            if (tmpcos[k] != 0) {
                thesaurus[i][j] = l;
                j++;
            }
    }
}

}

/*****
floatSort : Sorts the array of cosine values and corresponding index of
index words in reverse order.
*****/
floatSort(int *colnum, double *tmpcos, int numRows)
{
    int i, j, k;
    double f;
    for (i = numRows - 1; i > 0; i--)
        for (j = 0; j < i; j++) {
            if (tmpcos[j] < tmpcos[j + 1]) {
                f = tmpcos[j], k = colnum[j];
                tmpcos[j] = tmpcos[j + 1], colnum[j] = colnum[j + 1];
                tmpcos[j + 1] = f, colnum[j + 1] = k;
            }
        }
}

void saveData(char *filenm)
{
    int i, j, k, l;
    FILE *fp;

    fp = fopen(filenm, "w");

```

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```

printArray(fp, "PROMPTS", prompts, NULL, numIndex, 0); // Write Prompts to the file

/***** Write Menu-Tree to the file *****/
// printArray(fp, "MENUTREE", NULL, menuList, numMenu, 2);
fprintf(fp, "[%s]\n", "MENUTREE");
for (i = 0; i < numMenu; i++)
    fprintf(fp, "%d,%d,%d\n", menuList[i][0], menuList[i][1], menuList[i][2]);
fprintf(fp, "\n");

printArray(fp, "INDEX", columnTerms, indexList, numColumn, numIndex); // Write Index to
the file
printArray(fp, "THESAURUS", rowTerms, thesaurus, numRows, numColumn); // Write
Thesaurus to the file

fclose(fp);
printf("Data saved in %s\n", filename);
}

printArray(FILE *fp, char *head, char **cArray, int **iArray, int cNum, int iNum)
{
int i,j;
fprintf(fp, "[%s]\n", head);
for (i = 0; i < cNum; i++)
    {
    fprintf(fp, "%s ", cArray[i]);
    for (j = 0; j < iNum && iArray[i][j] != 0; j++)
        fprintf(fp, "%d,", iArray[i][j]);
    fprintf(fp, "\n");
    }
fprintf(fp, "\n");
}

int addFormKeys(char ***cArray, int count)
{
char **wordList, *tmparray[20];
int i, j, k, words;
int l, tmpcount;

wordList = NULL;
words = 0;
for(i = 0; i < numForms; i++)

```

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```

for (j = 0; j < formlist[i]->numFields; j++)
    {
        if (!strcmp("MChoice", formlist[i]->fields[j]->Type))
            for(k = 0; k < formlist[i]->fields[j]->numChoice; k++)
                {
                    tmpcount = createArray(formlist[i]->fields[j]->Choice[k],
tmparray);
                    for(l = 0; l < tmpcount; l++)
                        addWord(&wordList, tmparray[l], ++words);
                }
    }

i = mergeArray(cArray, wordList, count, words);
sortArray((*cArray), i);
return i;

}

```

```

updateFrmForms()
{
    int i, j, k, l;
    int m, n, x, tmpcount;
    int pmpt;
    char *tmpstr, *tmparray[20];

    for (i = 0; i < numPF; i++)
        {
            pmpt = inArray(prompts, Fprompts[i][1], numIndex);
            if (pmpt == 0)
                {
                    printf("Unknown prompt encountered for form %s\n", Fprompts[i][0]);
                    exit(1);
                }
            for(j = 0; j < numForms; j++)
                if (!strcmp(Fprompts[i][0], formlist[j]->name))
                    break;
            if (j == numForms)
                continue;
            for(k = 0; k < formlist[j]->numFields; k++)
                {
                    if (strcmp(formlist[j]->fields[k]->Type, "MChoice"))

```

```

        continue;
    for(l = 0; l < formlist[j]->fields[k]->numChoice; l++)
    {
        tmpcount = createArray(formlist[j]->fields[k]->Choice[l], tmparray);
        for(m = 0; m < tmpcount; m++)
        {
            n = inArray(columnTerms, tmparray[m], numColumn);
            n--;
            for (x = 0; indexList[n][x] && x < numIndex; x++)
                if (indexList[n][x] == pmpt)
                    break;
            if (x < numIndex && indexList[n][x] == 0)
                indexList[n][x] = pmpt;
        }
    }
}
}
}
}
}

```

arraylib.c: This program contains general purpose functions

```

#include <stdio.h>
#include <string.h>
#include "globalvar.h"
#include "forms.h"

FILE * fileOpen(char *, char *);

int fetchWord(FILE *f, char * wrd) {
    int i = 0, c;
    wrd[0] = 0;
    if (feof(f))
        return 0;
    while(!isalpha(c = fgetc(f)))
        if (c == EOF)
            return 0;
    do {
        wrd[i++] = tolower(c);
    } while(isalpha(c = fgetc(f)));
    wrd[i] = 0;
    return i;
}

```



```

int inArray(char **array, char *word, int length)
{
int i;

for (i = 0; i < length; i++)
    if (array[i] != NULL && !strcmp(array[i], word))
        return i + 1;
return 0;
}

int removeNulls(char **strarray, int numWords)
{
int i, j;

for (i = 0; i < numWords; i++)
    {
    if (strarray[i] == NULL)
        {
        for (j = i + 1; j < numWords; j++)
            if (strarray[j] != NULL)
                {
                strarray[i] = strarray[j];
                strarray[j] = NULL;
                break;
                }
        }
    }

/* get count of filtered words */
for (j = 0; (strarray[j] != NULL) && (j < numWords); j++);
return j;
}

int mergeArray(char ***Array1, char **Array2, int numArray1, int numArray2) {
int i;

for (i = 0; i < numArray2; i++)
    if (! inArray((*Array1), Array2[i], numArray1))
        addWord(Array1, Array2[i], ++numArray1);

return numArray1;
}

```

```

int readValues(char *str, char **array)
{
int i , j = 0, c;
int state;
const int out = 0, in = 1;

state = out;
for (i = 0; (c = str[i]) != 0; i++)
    {
        if (!isalnum(c)) /* alfa-numeric to read numbers also */
            {
                state = out;
                str[i] = 0; /* word is over end it with null */
            }
        else
            {
                str[i] = tolower(c);
                if (state == out)
                    {
                        state = in;
                        array[j++] = str + i; /* word started, store the ptr.*/
                    }
            }
    }
return j;
}

```

```

void sortArray(char *allwords[], int numwords) {
int i = 0;
int j = 0;
char *tmp;

for (i = 0; i < numwords; ++i)
    for (j = i + 1; j < numwords; ++j)
        if (strcmp(allwords[i], allwords[j]) > 0) {
            tmp = allwords[i];
            allwords[i] = allwords[j];
            allwords[j] = tmp;
        }
}

```

```

loadStopWords( char * filename) {

```

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```

FILE * fp;
char tmpWord[50];
int wordLen = 0;

numStopWord = 0;
fp = fopen(filename,"r");
stopWords = NULL;
while((wordLen = fetchWord(fp, tmpWord)) != 0)
    addWord(&stopWords, tmpWord, ++numStopWord);
}

FILE * fopen(char *filename, char *mode)
{
FILE * fp;

if ((fp = fopen(filename, mode)) == NULL) {
    perror(filename);
    exit(1);
}

return fp;
}

addWord(char ***cArray, char * word, int c)
{
*cArray = (char **) realloc(*cArray, c * sizeof(char *));
(*cArray)[c - 1] = strdup(word);
}

int removeZeros(int *intArray, int numInt)
{
int i, j;

for (i = 0; i < numInt; i++)
    {
    if (intArray[i] == 0)
        {
        for (j = i + 1; j < numInt; j++)
            if (intArray[j] != 0)
                {
                intArray[i] = intArray[j];
                intArray[j] = 0;
                break;
                }
        }
    }
}

```

```

    }
}

/* get count of filtered integers */
for (j = 0; (intArray[j] != 0) && (j < numInt); j++);
return j;
}

/*****88
Newly added functions ( for further reducing the code )
*****/
int breakStr(char * str, char **strarray)
{
char c, *tmpstr;
int i, j = 0;
int state;
const int out = 0, in = 1;
/* Seperate the sentence into individual words */
tmpstr = strdup(str);
state = out;
for (i = 0; (c = tmpstr[i]) != 0; i++)
{
    if (!isalpha(c))
    {
        state = out;
        tmpstr[i] = 0;
    }
    else
    {
        tmpstr[i] = tolower(c);
        if (state == out)
        {
            state = in;
            strarray[j++] = tmpstr + i;
        }
    }
}
return j;
}

/* remove stopWords */
filterStopWords(char ** strarray, int numWords)
{

```

```

int i;

for (i = 0; i < numWords; i++)
    if (inArray(stopWords, strarray[i], numStopWord))
        strarray[i] = NULL;
}

/* remove duplicates */
filterDuplicates(char ** strarray, int numWords)
{
int i;
for (i = 0; i < numWords; i++)
    if (strarray[i] != NULL && inArray(strarray, strarray[i], i))
        strarray[i] = NULL;
}

int loadFormsList( char *filename)
{

char buf[256];
FILE *fp;
int len, i;

fp = fopen(filename, "r");

Fprompts = NULL;
numPF = 0;
while (fgets(buf,255,fp) != NULL)
    {
    len = strlen(buf);
    for (i = 0; i < len; i++)
        if (buf[i] == ':')
            {
            buf[i] = 0;
            break;
            }
    if (i == len)
        {
        fprintf(stderr, "Error in Prompt list\n");
        exit(0);
        }
    allTrim(buf);
    allTrim(buf + i + 1);
}

```

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```

    Fprompts = (char ***)realloc(Fprompts, (++numPF)*sizeof(char **));
    Fprompts[numPF-1] = (char **)malloc(2 * sizeof(char *));
    Fprompts[numPF-1][0] = strdup(buf);
    Fprompts[numPF-1][1] = strdup(buf + i + 1);
    }
fclose(fp);
return numPF;
}

int loadForms(char * filename)
{
int i, j, formcount = 0;
FILE *fp;
char buf[80], **namelist = NULL;
formlist = NULL;
numForms = 0;

fp = fopen(filename, "r");
while(fgets(buf,79,fp) != NULL)
    {
    if (buf[0] == '[')
        {
        for(i = 0; buf[i]; i++)
            if (buf[i] == '[' || buf[i] == ']')
                buf[i] = ' ';
        allTrim(buf);
        addWord(&namelist, buf, ++formcount);
        }
    }

for ( i = 0; i < formcount; i++)
    {
    formlist = (struct form **)realloc(formlist, (++numForms) * sizeof(struct form *));
    formlist[numForms - 1] = (struct form *)malloc(sizeof(struct form));
    loadForm(fp , formlist[numForms - 1], namelist[i]);
    }
fclose(fp);
return numForms;
}

int allTrim (char * str)
{
    int i, j, sf, tabs;

```

```

    for (i = tabs = 0; isspace(str[i]) && str[i]; i++)
        tabs += (str[i] == '\t')? 1: 0;
    for (j = sf = 0; str[i]; i++, j++)
        str[j] = iscntrl(str[i])? ' ': str[i];
    for(str[j--] = 0; isspace(str[j]) && j > 0; str[j--] = 0);
    return tabs;
}

int createArray (char * str, char ** array)
{
int count;
count = breakStr(str, array);
return processArray(array, count, 1);
}

int processArray(char ** array, int count, int sflag)
{
if (sflag)
    filterStopWords(array, count);
stemArray(array, count);
filterDuplicates(array, count);
return removeNulls(array, count);
}

```

stemlib.c: This program contains functions related to stemming algorithm

/* This is the Porter stemming algorithm, coded up in ANSI C by the author. It may be regarded as cononical, in that it follows the algorithm presented in Porter, 1980, An algorithm for suffix stripping, Program, Vol. 14, no. 3, pp 130-137, only differing from it at the points maked --DEPARTURE-- below.

See also <http://www.tartarus.org/~martin/PorterStemmer>

The algorithm as described in the paper could be exactly replicated by adjusting the points of DEPARTURE, but this is barely necessary, because (a) the points of DEPARTURE are definitely improvements, and (b) no encoding of the Porter stemmer I have seen is anything like as exact as this version, even with the points of DEPARTURE!

You can compile it on Unix with 'gcc -O3 -o stem stem.c' after which 'stem' takes a list of inputs and sends the stemmed equivalent to

stdout.

The algorithm as encoded here is particularly fast.

Release 1

*/

```
#include <string.h> /* for memmove */
```

```
#define TRUE 1
```

```
#define FALSE 0
```

```
/* The main part of the stemming algorithm starts here. b is a buffer
   holding a word to be stemmed. The letters are in b[k0], b[k0+1] ...
   ending at b[k]. In fact k0 = 0 in this demo program. k is readjusted
   downwards as the stemming progresses. Zero termination is not in fact
   used in the algorithm.
```

```
Note that only lower case sequences are stemmed. Forcing to lower case
should be done before stem(...) is called.
```

*/

```
static char * b; /* buffer for word to be stemmed */
static int k,k0,j; /* j is a general offset into the string */
```

```
/* cons(i) is TRUE <=> b[i] is a consonant. */
```

```
int cons(int i)
{ switch (b[i])
  { case 'a': case 'e': case 'i': case 'o': case 'u': return FALSE;
    case 'y': return (i==k0) ? TRUE : !cons(i-1);
    default: return TRUE;
  }
}
```

```
/* m() measures the number of consonant sequences between k0 and j. if c is
   a consonant sequence and v a vowel sequence, and <..> indicates arbitrary
   presence,
```

```
<c><v> gives 0
<c>vc<v> gives 1
<c>vcvc<v> gives 2
<c>vcvcvc<v> gives 3
```



```

    ....
*/

int m()
{ int n = 0;
  int i = k0;
  while(TRUE)
  { if (i > j) return n;
    if (! cons(i)) break; i++;
  }
  i++;
  while(TRUE)
  { while(TRUE)
    { if (i > j) return n;
      if (cons(i)) break;
      i++;
    }
    i++;
    n++;
    while(TRUE)
    { if (i > j) return n;
      if (! cons(i)) break;
      i++;
    }
    i++;
  }
}

/* vowelinstem() is TRUE <=> k0,...j contains a vowel */

int vowelinstem()
{ int i; for (i = k0; i <= j; i++) if (! cons(i)) return TRUE;
  return FALSE;
}

/* doublec(j) is TRUE <=> j,(j-1) contain a double consonant. */

int doublec(int j)
{ if (j < k0+1) return FALSE;
  if (b[j] != b[j-1]) return FALSE;
  return cons(j);
}

```

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/* cvc(i) is TRUE <=> i-2,i-1,i has the form consonant - vowel - consonant
and also if the second c is not w,x or y. this is used when trying to
restore an e at the end of a short word. e.g.

cav(e), lov(e), hop(e), crim(e), but
snow, box, tray.

*/

```
int cvc(int i)
{ if (i < k0+2 || !cons(i) || cons(i-1) || !cons(i-2)) return FALSE;
  { int ch = b[i];
    if (ch == 'w' || ch == 'x' || ch == 'y') return FALSE;
  }
  return TRUE;
}
```

/* ends(s) is TRUE <=> k0,...k ends with the string s. */

```
int ends(char * s)
{ int length = s[0];
  if (s[length] != b[k]) return FALSE; /* tiny speed-up */
  if (length > k-k0+1) return FALSE;
  if (memcmp(b+k-length+1,s+1,length) != 0) return FALSE;
  j = k-length;
  return TRUE;
}
```

/* setto(s) sets (j+1),...k to the characters in the string s, readjusting
k. */

```
void setto(char * s)
{ int length = s[0];
  memmove(b+j+1,s+1,length);
  k = j+length;
}
```

/* r(s) is used further down. */

```
void r(char * s) { if (m() > 0) setto(s); }
```

/* step1ab() gets rid of plurals and -ed or -ing. e.g.

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caresses -> caress
ponies -> poni
ties -> ti
caress -> caress
cats -> cat

feed -> feed
agreed -> agree
disabled -> disable

matting -> mat
mating -> mate
meeting -> meet
milling -> mill
messaging -> mess

meetings -> meet

*/

```
void step1ab()
{ if (b[k] == 's')
  { if (ends("\04" "sses")) k -= 2; else
    if (ends("\03" "ies")) setto("\01" "i"); else
    if (b[k-1] != 's') k--;
  }
  if (ends("\03" "eed")) { if (m() > 0) k--; } else
  if ((ends("\02" "ed") || ends("\03" "ing")) && vowelinstem())
  { k = j;
    if (ends("\02" "at")) setto("\03" "ate"); else
    if (ends("\02" "bl")) setto("\03" "ble"); else
    if (ends("\02" "iz")) setto("\03" "ize"); else
    if (doublec(k))
    { k--;
      { int ch = b[k];
        if (ch == 'l' || ch == 's' || ch == 'z') k++;
      }
    }
  }
  else if (m() == 1 && cvc(k)) setto("\01" "e");
}
}
```

/* step1c() turns terminal y to i when there is another vowel in the stem. */

```
void step1c() { if (ends("\01" "y") && vowelinstem()) b[k] = 'i'; }
```

```
/* step2() maps double suffices to single ones. so -ization (= -ize plus
-ation) maps to -ize etc. note that the string before the suffix must give
m() > 0. */
```

```
void step2() { switch (b[k-1])
{
  case 'a': if (ends("\07" "ational")) { r("\03" "ate"); break; }
            if (ends("\06" "tional")) { r("\04" "tion"); break; }
            break;
  case 'c': if (ends("\04" "enci")) { r("\04" "ence"); break; }
            if (ends("\04" "anci")) { r("\04" "ance"); break; }
            break;
  case 'e': if (ends("\04" "izer")) { r("\03" "ize"); break; }
            break;
  case 'l': if (ends("\03" "bli")) { r("\03" "ble"); break; } /*-DEPARTURE-*/

  /* To match the published algorithm, replace this line with
  case 'l': if (ends("\04" "abli")) { r("\04" "able"); break; } */

            if (ends("\04" "alli")) { r("\02" "al"); break; }
            if (ends("\05" "entli")) { r("\03" "ent"); break; }
            if (ends("\03" "eli")) { r("\01" "e"); break; }
            if (ends("\05" "ousli")) { r("\03" "ous"); break; }
            break;
  case 'o': if (ends("\07" "ization")) { r("\03" "ize"); break; }
            if (ends("\05" "ation")) { r("\03" "ate"); break; }
            if (ends("\04" "ator")) { r("\03" "ate"); break; }
            break;
  case 's': if (ends("\05" "alism")) { r("\02" "al"); break; }
            if (ends("\07" "iveness")) { r("\03" "ive"); break; }
            if (ends("\07" "fulness")) { r("\03" "ful"); break; }
            if (ends("\07" "ousness")) { r("\03" "ous"); break; }
            break;
  case 't': if (ends("\05" "aliti")) { r("\02" "al"); break; }
            if (ends("\05" "iviti")) { r("\03" "ive"); break; }
            if (ends("\06" "biliti")) { r("\03" "ble"); break; }
            break;
  case 'g': if (ends("\04" "logi")) { r("\03" "log"); break; } /*-DEPARTURE-*/
}
```

/* To match the published algorithm, delete this line */

} }

/* step3() deals with -ic-, -full, -ness etc. similar strategy to step2. */

```
void step3() { switch (b[k])
{
  case 'e': if (ends("\05" "icate")) { r("\02" "ic"); break; }
            if (ends("\05" "ative")) { r("\00" ""); break; }
            if (ends("\05" "alize")) { r("\02" "al"); break; }
            break;
  case 'i': if (ends("\05" "iciti")) { r("\02" "ic"); break; }
            break;
  case 'l': if (ends("\04" "ical")) { r("\02" "ic"); break; }
            if (ends("\03" "ful")) { r("\00" ""); break; }
            break;
  case 's': if (ends("\04" "ness")) { r("\00" ""); break; }
            break;
} }
```

/* step4() takes off -ant, -ence etc., in context <c>vcvc<v>. */

```
void step4()
{ switch (b[k-1])
  { case 'a': if (ends("\02" "al")) break; return;
    case 'c': if (ends("\04" "ance")) break;
              if (ends("\04" "ence")) break; return;
    case 'e': if (ends("\02" "er")) break; return;
    case 'i': if (ends("\02" "ic")) break; return;
    case 'l': if (ends("\04" "able")) break;
              if (ends("\04" "ible")) break; return;
    case 'n': if (ends("\03" "ant")) break;
              if (ends("\05" "ement")) break;
              if (ends("\04" "ment")) break;
              if (ends("\03" "ent")) break; return;
    case 'o': if (ends("\03" "ion") && (b[j] == 's' || b[j] == 't')) break;
              if (ends("\02" "ou")) break; return;
              /* takes care of -ous */
    case 's': if (ends("\03" "ism")) break; return;
    case 't': if (ends("\03" "ate")) break;
              if (ends("\03" "iti")) break; return;
    case 'u': if (ends("\03" "ous")) break; return;
  }
```

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```

    case 'v': if (ends("\03" "ive")) break; return;
    case 'z': if (ends("\03" "ize")) break; return;
    default: return;
  }
  if (m() > 1) k = j;
}

/* step5() removes a final -e if m() > 1, and changes -ll to -l if
m() > 1. */

void step5()
{ j = k;
  if (b[k] == 'e')
  { int a = m();
    if (a > 1 || a == 1 && !cvc(k-1)) k--;
  }
  if (b[k] == 'l' && doublec(k) && m() > 1) k--;
}

/* In stem(p,i,j), p is a char pointer, and the string to be stemmed is from
p[i] to p[j] inclusive. Typically i is zero and j is the offset to the last
character of a string, (p[j+1] == '\0'). The stemmer adjusts the
characters p[i] ... p[j] and returns the new end-point of the string, k.
Stemming never increases word length, so i <= k <= j. To turn the stemmer
into a module, declare 'stem' as extern, and delete the remainder of this
file.
*/

int stem(char * p, int i, int j)
{ b = p; k = j; k0 = i; /* copy the parameters into statics */
  if (k <= k0+1) return k; /*-DEPARTURE-*/

  /* With this line, strings of length 1 or 2 don't go through the
  stemming process, although no mention is made of this in the
  published algorithm. Remove the line to match the published
  algorithm. */

  step1ab(); step1c(); step2(); step3(); step4(); step5();
  return k;
}

/*-----stemmer definition ends here-----*/

```

```
stemArray(char **list, int arrayLen)
{
int i;
for (i = 0; i < arrayLen; i++)
    if (list[i] != NULL)
        stemWord(list[i]);
}
```

```
stemWord( char * s)
{
s[stem(s,0, strlen(s) - 1) + 1] = 0;
}
```

dialog.c: This is main program of dialog module

```
/******
```

dialog.c : The main function for the interactive dialog program. loads all the global arrays and variables before calling the interactive function.

Arguments are:

1. The Configuration file for Thesaurus. contains Prompts, index, basic thesaurus etc.
2. The Learning Thesaurus. - used to store learnt words and to refer to them.

```
*****/
```

```
#include <stdio.h>
#include <string.h>
#include "arraylib.h"
```

```
int numColumn, numRows, numIndex, numMenu;
int startPoint, eofFlag, topValues;
char **rowTerms, **columnTerms, **prompts, **stopWords;
float **matrix, **cosine, phoneThreshold, webThreshold;
int **indexList, **menuList, **thesaurus;
int numStopWord, numOrgRow;
int numForms, numPF;
struct form **formlist;
char ***Fprompts, *formfile;
int **scoring, numScore = 0;
char *cfg, *lcfg, *fdoc, *xdoc, *sdoc;
int minPromptCount = 1, timeout = 30;
```

```
void Interactive(char *);
```

```

main(int argc, char *argv[])
{
int i = 0;

/*if (argc != 5)
{
printf("Usage Instructions: dialog config_file learn_file\n");
printf("*** Exiting, goodbye.\n");
exit(1);
}*/
if (argc != 2)
{
printf("Usage Instructions: d <ini-file>\n");
printf("*** Exiting, goodbye.\n");
exit(1);
}
readini(argv[1]);
formfile = fdoc;
loadStopWords(sdoc);
numPF = loadFormsList(xdoc);
numForms = loadForms(fdoc);
loadData(cfg, lcfg);
Interactive(lcfg);
}

/*****
loaddata : This function will read the configuration files and load the
information into the relevant global arrays.
*****/
loadData(char *filenm, char *file2)
{
char buf[256], word[20];
int i, j, k, l;
int numext;
FILE *fp, *f2;

/***** open configuration file *****/
fp = fopen(filenm, "r");

/***** open learn(extended thesaurus) file *****/
f2 = fopen(file2, "r");

```



```
prompts = columnTerms = rowTerms = NULL;
scoring = thesaurus = indexList = menuList = NULL;
```

```
/* read data in the arrays */
```

```
numMenu = loadMenuTree(fp, "[MENUTREE]");
numIndex = readArray(fp, "[PROMPTS]", &prompts, 1, NULL, 0, 0);
numColumn = readArray(fp, "[INDEX]", &columnTerms, 1, &indexList, numIndex, 0);
numOrgRow = readArray(fp, "[THESAURUS]", &rowTerms, 1, &thesaurus, numColumn, 0);
numRow = readArray(f2, "[EXT-THESAURUS]", &rowTerms, 1, &thesaurus, numColumn,
numOrgRow);
numScore = readArray(f2, "[SCORING]", NULL, 0, &scoring, numColumn + 1, 0);
```

```
fclose(fp);
fclose(f2);
}
```

```
/******
```

```
readArray : Reads the file and fills the rows and columns of the given arrays
```

```
*****/
```

```
int readArray(FILE *fp, char *head, char ***ch_array, int ccount, int ***int_array, int icount, int
sp)
```

```
{
char buf[256];
int i, j, start = 0, wc = 0;
int k, c;
char **tmparray; /*To store the pointers to the words/numbers from the string*/
c = sp;
```

```
if (icount != 0)
    tmparray = (char **)malloc((icount + 1) * sizeof(char *));
```

```
fseek(fp, 0, 0); /* Go to Top */
```

```
while (fgets(buf, 255, fp) != NULL) /* read lines till end of file */
```

```
{
    allTrim(buf);
    j = strlen(buf);
    if (buf[j - 1] == '\n') buf[j - 1] = 0;
    if (start)
    {
        if (strlen(buf) == 0) /* if blank line, stop reading */
            break;
        if (icount == 0) /* i.e. no integer array */
```

```

        addWord(ch_array, buf, ++c);
    else /* read first word string */
        { /* rest are columns of int array */
        wc = readValues(buf, tmparray);
        c++;
        (*int_array) = (int **)realloc(*int_array, c * sizeof(int *));
        (*int_array)[c - 1] = (int *)malloc(ccount * sizeof(int));
        if (ccount != 0)
            addWord(ch_array, tmparray[0], c);
        else
            (*int_array)[c - 1][0] = atoi(tmparray[0]);
        for (k = 1; k < ccount; k++)
            if (k < wc)
                (*int_array)[c - 1][k - ccount] = atoi(tmparray[k]);
            else
                (*int_array)[c - 1][k - ccount] = 0;
        }
    }
    else
    if (!strcmp(head, buf))
        start = 1;
    }
return c;
}

```

```

/*****
loadMenuTree : loads the menutree from file to menuList array
*****/
int loadMenuTree (FILE *fp, char *head)
{
char buf[256];
int i, j, start = 0, count = 0;
fseek(fp, 0, 0);
while (fgets(buf, 255, fp) != NULL)
    {
    j = strlen(buf);
    if (buf[j - 1] == '\n')
        buf[j - 1] = 0;
    if (start)
        {
        if (strlen(buf) == 0)
            break;
        menuList = (int **)realloc(menuList, (count + 1) * sizeof(int *));

```

```

        menuList[count] = (int *)malloc(3 * sizeof(int));
        sscanf(buf, "%d,%d,%d\n", &menuList[count][0],
&menuList[count][1],&menuList[count][2]);
        count++;
    }
    else
        if (!strcmp(head, buf))
            start = 1;
    }
return count ;
}

```

```

readini(char * filenm)
{
    FILE * fp;
    char buf[80], key[80], value[80], comment[80];
    int cnt;
    if ((fp=fopen(filenm,"r"))==NULL)
    {
        perror(filenm);
        exit(1);
    }
    while (fgets(buf,79,fp)!=NULL)
    {
        sscanf(buf,"%s %s %s",key,value, comment);
        if (!strcmp(key, "sdoc"))
            sdoc=strdup(value);
        if (!strcmp(key, "fdoc"))
            fdoc=strdup(value);
        if (!strcmp(key, "xdoc"))
            xdoc=strdup(value);
        if (!strcmp(key, "cfg"))
            cfg=strdup(value);
        if (!strcmp(key, "lcfg"))
            lcfg=strdup(value);
        if (!strcmp(key, "minprompt"))
            minPromptCount=atoi(value);
        if (!strcmp(key, "timeout"))
            timeout=atoi(value);
    }
}

```

interactive.c: This program contains functions related to user interaction

/******

Interactive : function to accept a sentence from the user and then
generate the response.

thesaurusFlag = is 1 if there is atleast 1 thesaurus/learned word in query
updateFlag = is set to 1 if the program needs to learn (i.e. main menu was
selected during the prompt navigation)

interPrompts = Intersection of prompts
unionPrompts = Union of prompts
interUnionPrompts = Intersection of Union
numInter = number of prompts in InterPrompts
numInterUnion = num of prompts in Intersection of Union
numUnion = num of prompts in Union
numUnknown = num of unknown words

*****/

```
#include <stdio.h>
#include <signal.h>
#include <string.h>
#include <unistd.h>
#include "globalvar.h"
#include "arraylib.h"
#include "forms.h"
```

```
#define max(a,b) (a > b)? a: b
#define min(a,b) (a < b)? a: b
#define swap(a,b) (a ^= b, b ^= a, a ^= b)
```

```
extern int numScore, **scoring;
int updateFlag = 0, learnFlag, numQueryList = 0;
FILE *lf, *pf;
char ** uWList=NULL, *queryTerms[50];
int uWNum;
extern int minPromptCount, timeout;
char query[256], **queryList = NULL;
char *affirmWords[] = { "yes", "right", "correct" };
char *negWords[] = { "no", "neither" };
extern char * fdoc;
int otheFlag = 0;
int unknownWords[20], numQuery = 0, numUnknown;
char **uWords; // Added this array to facilitate learning wven if lateral shift
int numUW; // Added this to facilitate learning wven if lateral shift
void sayOther();
```

```

void Interactive(char *flnm)
{
    int InterPrompts[20], unionPrompts[20], t1Prompts[20];
    int interUnionPrompts[20], numInterUnion, t2Prompts[20], numT2;
    int i, j, k, l;
    int start, numUnion, numInter, numT1;
    int n, selectedPrompt, thesaurusFlag = 0;
    char *interlog, *processlog, c;

    numUnknown = numUW = 0;
    for(i=0; i < 20; i++)
        unknownWords[i] = 0;
    uWords=NULL;

    if ((interlog = (char *)getenv("TIMEOUT")) != NULL)
        timeout = atoi(interlog);

    if ((interlog = (char *)getenv("MINPROMPT")) != NULL)
        minPromptCount = atoi(interlog);

    if ((interlog = (char *)getenv("INTERLOG")) == NULL)
        interlog = "test.html";

    if ((processlog = (char *)getenv("PROCESSLOG")) == NULL)
        processlog = "process.html";

    signal(SIGALRM, &sayOther);
    lf = fopen(interlog, "w");

    pf = fopen(processlog, "w");
    fprintf(lf, "<HTML>\n<TITLE>%s</TITLE>\n<BODY><FONT SIZE=5>\n", interlog);
    fprintf(pf, "<HTML>\n<TITLE>%s</TITLE>\n<BODY><FONT SIZE=5>\n", processlog);

    system("clear");
    printf("Thank you for calling the New Herald.\n");
    printf("How may we help you?\n\n");
    fprintf(lf, "\nThank you for calling the New Herald.<BR>");
    fprintf(lf, "How may we help you. <P>");
    fgets(query, 255, stdin); /* accept the user input */

    while (1)
        {

```

```

addWord(&queryList, query, ++numQueryList);
numQuery = thesaurusFlag = 0;
if (strlen(query) == 0)
    break;
fprintf(lf, "<I> %s</I> <P>", query);

numQuery = createArray(query, queryTerms);

/*****
fprintf(pf, "Terms in Query: ");
for (j = 0; j < numQuery; j++)
    fprintf(pf, " %s", queryTerms[j]);
fprintf(pf, "<BR>");
*****/

/* initialize InterPrompts and unionPrompts array */
for (i = 0; i < 20; i++)
    {
        t2Prompts[i] = t1Prompts[i] = 0;
        InterPrompts[i] = unionPrompts[i] = interUnionPrompts[i] = 0;
    }
start = 1;
numInterUnion = numT2 = numT1 = numInter = numUnion = 0;

/* Scan thru all the words to generate union/intersection of prompts*/
for (i = 0; i < numQuery; i++)
    {
        /* if not in index words check thesaurus */
        if (!inArray(columnTerms, queryTerms[i], numColumn))
            {
                learnFlag = numT1 = numT2 = 0;
                scanThesaurus(queryTerms[i], t1Prompts, t2Prompts, &numT1,
&numT2);

                /* if unknown/learned word save it to array */
                if (learnFlag)
                    {
                        unknownWords[numUnknown] = i, numUnknown++;
                        addWord(&uWords, queryTerms[i], ++numUW);
                        if (numT1 == 0 && numT2 == 0)
                            continue;
                        else
                            thesaurusFlag = 1;
                    }
            }
    }

```

```

else
    thesaurusFlag = 1;
}
else
{
numT1 = fetchPrompts(queryTerms[i], t1Prompts);
numT2 = fetchPrompts(queryTerms[i], t2Prompts);
/*****/
fprintf(pf, "%s (index) :", queryTerms[i]);
for (j = 0; j < numT1; j++)
    fprintf(pf, " %d", t1Prompts[j]);
fprintf(pf, "<BR>");
fflush(pf);
/*****/
}

if (start) /* if first word */
{
numInter = PromptUnion(InterPrompts, t2Prompts, numInter, numT2);
numUnion = PromptUnion(unionPrompts, t1Prompts, numUnion,
numT1);
numInterUnion = PromptUnion(interUnionPrompts, t1Prompts,
numInterUnion, numT1);
start = 0;
}
else
{
numInter = PromptIntersection(InterPrompts, t2Prompts, numInter,
numT2);
numUnion = PromptUnion(unionPrompts, t1Prompts, numUnion,
numT1);
numInterUnion = PromptIntersection(interUnionPrompts, t1Prompts,
numInterUnion, numT1);
}
}
/*****/
fprintf(pf, "Final Intersection Result: ");
for (j = 0; j < numInter; j++)
    fprintf(pf, " %d", InterPrompts[j]);
fprintf(pf, "<BR>");
fprintf(pf, "Final Intersection of Union Result: ");
for (j = 0; j < numInterUnion; j++)

```

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```

        fprintf(pf, " %d", interUnionPrompts[j]);
    fprintf(pf, "<BR>");
    fprintf(pf, "Final Union Result: ");
    for (j = 0; j < numUnion; j++)
        fprintf(pf, " %d", unionPrompts[j]);
    fprintf(pf, "<BR>");
    fflush(pf);
    /*****

    if (numInter < minPromptCount && thesaurusFlag)
        {
            if (numInterUnion < minPromptCount)
                numInter = PromptUnion(InterPrompts, unionPrompts, numInter,
numUnion);
            else
                numInter = PromptUnion(InterPrompts, interUnionPrompts,
numInter, numInterUnion);
        }

    fprintf(pf, "Final Selection : ");
    fflush(pf);
    for (j = 0; j < numInter; j++)
        fprintf(pf, " %d", InterPrompts[j]);
    fprintf(pf, "<BR>");
    fflush(pf);
    numInter = orderPrompts(InterPrompts, numInter);
    numInter = removeChild(InterPrompts, numInter);
    // eliminate prompts > 3
    for (j = 3; j < numInter; j++)
        InterPrompts[j] = 0;
    numInter = min(numInter, 3);
    fprintf(pf, "Selection After Elimination of descendants: ");
    fflush(pf);
    for (j = 0; j < numInter; j++)
        fprintf(pf, " %d", InterPrompts[j]);
    fprintf(pf, "<BR>");
    fflush(pf);
    selectedPrompt = GetPrompt(InterPrompts, numInter);
    if (selectedPrompt == 100)
        continue;

    // if (updateFlag)
    learnThesaurus(selectedPrompt, unknownWords, numUnknown, flnm);

```


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```

        updateFlag = 0;
    for(j = 0; (j < numMenu) && (menuList[j][1] != selectedPrompt); j++);
    if (menuList[j][2] >= 99)
    {
        for (i = 0; i < numPF; i++)
        {
            if (!strcmp(Fprompts[i][1],prompts[selectedPrompt - 1]))
            {
                for(k = 0; k < numForms; k++)
                    if (!strcmp(Fprompts[i][0],formlist[k]->name))
                    {
                        fillForm(formlist[k], queryList, numQueryList);
                        processForm(formlist[k]);
                        break;
                    }
                break;
            }
        }
        if (i == numPF)
        {
            system("clear");
            printf("\nYour query has been understood.\n");
            printf("Please wait to be transferred to the relevant department.\n\n");
            fprintf(1f,"<P>Your query has been understood.<L>");
            fprintf(1f,"Please wait to be transferred to the relevant department.<HR>");
            break;
        }
    }
else
    {
        printf("\n%s\n\n",prompts[menuList[j][2] - 1]);
        fprintf(1f, "\n<P>%s<HR>",prompts[menuList[j][2] - 1]);
    }
    // modified for the loop
    printf("Do you have another query?\n\n");
    fgets(query,80,stdin);
    if (!chkNegtn(query))
    {
        for(i = 0; i < numQueryList; i++)
            free(queryList[i]);
        for(i = 0; i < numForms; i++)
            free(formlist[i]);
        free(formlist);
    }

```



```

        learnFlag = 1;
    }
else
    fprintf(pf, "%s (thesaurus):<BR>", word);

for (j = 0; thesaurus[l][j] && j < numRows; j++)
    {
    m = fetchPrompts(columnTerms[thesaurus[l][j] - 1], tp);
    /*****/
    fprintf(pf, "<LI>%s (index) :", columnTerms[thesaurus[l][j] - 1]);
    for (k = 0; k < m; k++)
        fprintf(pf, " %d", tp[k]);
    fprintf(pf, "<BR>");
    /*****/

    *n1 = PromptUnion(t1Prompts, tp, *n1, m);
    if (sflg)
        {
        *n2 = PromptUnion(t2Prompts, tp, *n2, m);
        sflg = 0;
        }
    else
        {
        *n2 = PromptIntersection(t2Prompts, tp, *n2, m);
        }
    }
    fprintf(pf, "Union Result: ");
    for (k = 0; k < *n1; k++)
        fprintf(pf, " %d", t1Prompts[k]);
    fprintf(pf, "<BR>");
    fprintf(pf, "Intersection Result: ");
    for (k = 0; k < *n2; k++)
        fprintf(pf, " %d", t2Prompts[k]);
    fprintf(pf, "<BR>");
    }

return k;

}
/*****/
PromptUnion : does a union of arrays pointed by p1 and p2 and
               stores in p1. returns the total elements in result
/*****/

```

```
int PromptUnion(int *p1, int *p2, int n1, int n2)
{
    int i, j;
    for (i = 0; i < n2; i++)
    {
        for (j = 0; j < n1; j++)
            if (p1[j] == p2[i])
                break;
        if (j == n1)
        {
            p1[j] = p2[i];
            n1++;
        }
    }
    return n1;
}
```

```
/******
PromptIntersection : does a intersection of arrays pointed by p1 and p2 and
                    stores in p1. returns the total elements in result
******/
```

```
int PromptIntersection(int *p1, int *p2, int n1, int n2)
{
    int i, j;
    for (i = 0; i < n1; i++)
    {
        for (j = 0; j < n2; j++)
            if (p1[i] == p2[j])
                break;
        if (j == n2) /* not there */
        {
            for (j = i; j < n1; j++)
                p1[j] = p1[j + 1];
            n1--;
            i--;
        }
    }
    return n1;
}
```

```
/******
fetchPrompts : Will fetch all the prompts for 'word' into
              Arraylist pointed by t1Prompts;
******/
```

```
int fetchPrompts(char *word, int *t1Prompts)
{
int i, j, k, l;
for (i = 0; i < 20; i++)
    t1Prompts[i] = 0;
if ((i = inArray(columnTerms, word, numColumn)) == 0)
    return 0;
i--;
for (j = 0; (t1Prompts[j] = indexList[i][j]) && (j < numIndex); j++);
return j;
}
```

GetPrompt: Returns the final prompt selected by user

*****/

```
int GetPrompt(int *Parray, int pcnt)
{
int i, j, k, l;
int mmflag = 0, af = 0;
char ans[80];

while (1)
{
system("clear");
printf("\n");
fprintf(lf, "<P>");
// Removed the comments to reintroduce last prompt
if (pcnt == 1 && isLeaf(Parray[0]) && numUnknown > 0)
    af = 1;
// -----
if ((pcnt > 1) || (pcnt == 1 && af == 1))
{
    // sortPrompts(Parray, pcnt);
    orderPrompts(Parray, pcnt);
    for (i = 0; i < pcnt; i++)
    {
        printf("%s\n\n", prompts[Parray[i] - 1]);
        fprintf(lf, "<LI>%s", prompts[Parray[i] - 1]);
    }
    if (!mmflag)
    {
        otheFlag = 0;
        alarm(timeout);
    }
}
}
```

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```

    }
    fgets(ans, 80, stdin); /* accept the user input */
    alarm(0);
    fprintf(lf, "<P><I>%s</I><P>", ans);
    fflush(lf);
    if (otheFlag == 1 && chkAfrm(ans))
        j = 0;
    else
    {
        if (chkNegtn(ans) && otheFlag != 1)
            j = 0;
        else
        {
            addWord(&queryList, ans, ++numQueryList);
            j = chkAns(ans, Parray, pcnt);
        }
        otheFlag = 0;
    }
    if (j == -99)
    {
        updateFlag = 1;
        return 100;
    }
    if (j < 0)
    {
        pcnt = removeZeros(Parray, pcnt);
        continue;
    }
    mmflag = 0;
}
else
    j = pcnt;
if (j == 0)
{
    pcnt = getNodes(j, Parray);
    mmflag = updateFlag = 1;
}
else
{
    if (isLeaf(Parray[j - 1]))
    {
        return Parray[j - 1];
    }
}

```

```

        else
            pcnt = getNodes(Parray[j - 1], Parray);
    }
    af = 1;
}
}

/*****
isLeaf: Returns 1 if 'node' is a leaf in the menutree, else 0
*****/
int isLeaf(int node)
{
    int i;
    for (i = 0; i < numMenu; i++)
        if (menuList[i][1] == node)
            break;
    if (i == numMenu)
        return 0;
    return menuList[i][2];
}

int getNodes(int pNode, int *parray)
{
    int i, j;
    for (i = 0, j = 0; i < numMenu; i++)
        if (menuList[i][0] == pNode)
            {
                parray[j] = menuList[i][1];
                j++;
            }
    parray[j] = 0;
    return j;
}

/*****
learnThesaurus : re-writes the thesaurus with relearned pattern and newly
learned word.
*****/
learnThesaurus(int pmpt, int unknownWords[], int numUnknown, char *flnm)
{
    int i, j, k, l;
    FILE *fp;
    int *tmpList, tmpCount;

```

```

/* create and initialize a tmp Array */
tmpList = (int *)calloc(numColumn, sizeof(int));
for (i = tmpCount = 0; i < numColumn; i++)
    tmpList[i] = 0;

/* scan thru the query words and gather a list of unique keywords in tmp array*/
tmpCount = getKeyWords(queryTerms, numQuery, tmpList);
/* Locate the row for select prompt. if not create new row */
for (k = 0; k < numScore && scoring[k][0] != pmpt; k++);
if (k >= numScore)
{
    scoring = (int **)realloc(scoring, (k + 1) * sizeof(int *));
    scoring[k] = (int *) malloc((numColumn + 1) * sizeof(int));
    for (j = 0; j <= numColumn; j++)
        scoring[k][j] = 0;
    numScore++;
}

scoring[k][0] = pmpt;
for (j = 0; j < tmpCount; j++)
    scoring[k][tmpList[j]]++;

/*****/
for (i = tmpCount = 0; i < numColumn; i++)
    tmpList[i] = 0;

for (j = i = 0; j < numColumn; j++)
{
    for (k = 0; k < numIndex && indexList[j][k] != 0; k++)
        if (indexList[j][k] == pmpt)
            break;
    if (k < numIndex && indexList[j][k] != 0)
    {
        tmpList[i] = j + 1;
        i++;
    }
}

tmpCount = i;
fp = fileOpen(flnm, "w");
fprintf(pf, "<BR><B>Learned words</B><BR>");
fprintf(fp, "[%s]\n", "EXT-THESAURUS");

```



```

for (i = numOrgRow; i < numRows; i++)
{
    fprintf(fp, "%s: ", rowTerms[i]);

    if (updateFlag && inArray(uWords, rowTerms[i], numUW))
    {
        fprintf(pf, "%s (relearned)<BR>original: ", queryTerms[unknownWords[j]]);
        for (k = 0; k < numColumn; k++)
        {
            if (thesaurus[i][k] != 0)
                fprintf(pf, " %d", thesaurus[i][k]);
            if (thesaurus[i][k] == 0)
                break;
        }
        fprintf(pf, "<BR>");
        k = PromptUnion(thesaurus[i], tmpList, k, tmpCount);
        fprintf(pf, "new :");
        for (j = 0; j < k; j++)
            fprintf(pf, " %d", thesaurus[i][j]);
        fprintf(pf, "<BR><BR>");
    }

    for (j = 0; j < numColumn; j++)
    {
        if (thesaurus[i][j] == 0)
            break;
        fprintf(fp, "%d,", thesaurus[i][j]);
    }
    fprintf(fp, "\n");
}
for (i = 0; updateFlag && i < numUW; i++)
{
    if (inArray(rowTerms, uWords[i], numRows))
        continue;

    fprintf(fp, "%s: ", uWords[i]);
    fprintf(pf, "%s(new-learned) :", uWords[i]);
    addWord(&rowTerms, uWords[i], ++numRow);
    thesaurus = (int **)realloc(thesaurus, numRows * sizeof(int *));
    thesaurus[numRow - 1] = (int *)malloc(numColumn * sizeof(int));
    for (j = 0; j < numColumn; j++) thesaurus[numRow - 1][j] = 0;
    for (j = 0; j < tmpCount; j++)
    {

```

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```

        thesaurus[numRow - 1][j] = tmpList[j];
        fprintf(fp, "%d", tmpList[j]);
        fprintf(pf, " %d", tmpList[j]);
    }
    fprintf(fp, "\n");
    fprintf(pf, "<BR><BR>");
}

fprintf(fp, "\n");

/* write the scoring in the file */
fprintf(fp, "[%s]\n", "SCORING");
for (i = 0; i < numScore; i++)
    {
        fprintf(fp, "%d", scoring[i][0]);
        for(j = 1; j <= numColumn; j++)
            fprintf(fp, "%d", scoring[i][j]);
        fprintf(fp, "\n");
    }
fprintf(fp, "\n");
fclose(fp);
}

/*****
removeChild: removes descendents of all the elements from the list
*****/
int removeChild(int *array, int tot)
{
    int i, j, k, cnt = 0;
    int *tmparray, rn = 99;

    tmparray = (int *)calloc(numIndex, sizeof(int));

    /* Remove any prompts that are responses rather than choices */
    for (i = 0; i < tot; i++)
        {
            for(j = 0; j < numMenu; j++)
                if (menuList[j][1] == array[i] && menuList[j][2] == 100)
                    array[i] = 0;
        }

    /* Remove any prompts that are root node and have a child which is not a leaf rather than
    choices */

```

```

for (i = 0; i < tot; i++)
{
    if (array[i] == 0) /* already removed so go to next */
        continue;

    /* if (isLeaf(array[i]))
        continue; */

    m = array[i];
    while(1)
    {
        for(j = 0; j < numMenu; j++)
            if (menuList[j][1] == m)
                break;
        if (menuList[j][0] == 0)
            break;
        m = menuList[j][0];
    }
    if ( m != array[i])
    {
        for (j = 0; j < tot; j++)
        {
            if (array[j] == m)
                array[j] = 0;
        }
    }
}

for (i = 0; i < tot; i++)
{
    if (array[i] == 0) /* already removed so go to next */
        continue;
    for (j = 0; j < numIndex; j++) /* initialize tmparray */
        tmparray[j] = 0;
    cnt = getChildren(array[i], tmparray); /* get children & grand-children of i */
    for (j = 0; j < tot; j++) /* scan thru the array to check for child */
        if (j != i) /* ignore self from checking */
            for (k = 0; k < cnt; k++)
                if (array[j] == tmparray[k])
                {
                    array[j] = 0; /* if j is child of i, make it 0 */
                    break;
                }
}

```

```

    }
}
/* Shift All non-zeroes upwards */
for (i = 0; i < tot; i++)
{
    if (array[i] == 0)
    {
        for (j = i + 1; j < tot; j++)
            if (array[j] != 0)
                break;
        if (j < tot)
        {
            array[i] = array[j];
            array[j] = 0;
        }
    }
}
/* count no of elements */
for (j = 0; j < tot; j++)
{
    if (array[j] == 0)
        break;
}
return j;
}

```

```

/*****
getChildren: fetches all the descendents of pmpt into array
*****/
int getChildren(int pmpt, int *array)
{
    int i, j, k, l;
    int t, t1, t2;
    int *tmparray1, *tmparray2;

    if (isLeaf(pmpt)) /* if node is leaf no children so return 0 */
        return 0;

    tmparray1 = (int *)calloc(numIndex, sizeof(int)); /* child of child in every loop */
    tmparray2 = (int *)calloc(numIndex, sizeof(int)); /* union of all scanned children */
    t = t1 = t2 = 0;
    for (i = 0; i < numMenu; i++)
    {

```

```

    if (menuList[i][0] == pmpt && menuList[i][2] != 100)
        {
            array[t] = menuList[i][1];
            t1 = getChildren(array[t], tmparray1);
            t2 = PromptUnion(tmparray2, tmparray1, t2, t1);
            t++;
        }
    }
t = PromptUnion(array, tmparray2, t, t2);
return t;
}

int chkAns (char * ans, int * Parray, int pcnt)
{
char locquery[256];
int i, j, tmp1cnt = 0, tmp2cnt = 0;
char *resWords[50], start = 'Y';
int numWords, tmpArray1[20], tmpArray2[20];
int uwFlag = 0, rowOrColWord = 0;

strcpy(locquery,ans);
numWords = breakStr(ans, resWords);
if ( strcmp(resWords[0],"other") == 0 && strcmp(resWords[1],"options") == 0)
    {
        return 0;
    }
numWords = processArray(resWords, numWords, 1);
for (i = 0; i < 20; i++)
    tmpArray1[i] = tmpArray2[i] = 0;
fprintf(pf,"<i>Initialized Temp Array\n"); fflush(pf);

for (i = 0; i < numWords; i++)
    {
        if (!inArray(columnTerms, resWords[i], numColumn))
            {
                if (!inArray(rowTerms,resWords[i],numColumn))
                    {
                        if (!inArray(uWList, resWords[i], uWNum))
                            {
                                addWord(&uWList, resWords[i], ++uWNum);
                                fflush(lf);
                            }
                    }
            }
    }

```

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```

        else
            {
                fprintf(pf,"<i>Unknown Word: %s\n",resWords[i]);
                fflush(pf);
                uwFlag = 1; /* unKnown word encountered twice */
            }
        }
    else
        rowOrColWord++;
    continue;
}
else
    rowOrColWord++;
tmp1cnt = fetchPrompts(resWords[i], tmpArray1);
if (start == 'Y')
    {
        tmp2cnt = PromptUnion(tmpArray2, tmpArray1, tmp2cnt, tmp1cnt);
        start='N';
    }
else
    tmp2cnt = PromptIntersection(tmpArray2, tmpArray1, tmp2cnt, tmp1cnt);

tmp2cnt = PromptIntersection(tmpArray2, Parray, tmp2cnt, pcnt);
}
if (tmp2cnt != 1)
    {
        if (tmp2cnt == 0 && pcnt == 1 && numWords == 1) // i.e. only one prompt &
not selected
            {
                strcpy(ans, locquery);
                if (chkAfrm(ans))
                    return 1;
            }
        if (tmp2cnt > 1) // i.e. multiple prompt selection then do score
            {
                strcpy(ans, locquery);
                return checkscore(ans, Parray, pcnt);
            }
    }

if (uwFlag)
    if (AskforOp())
        return -99;

```

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```

        else
            return -1;
    else
        if (rowOrColWord)
            {
                strcpy(query,locquery);
                return -99;
            }
    }
    for (i = 0; Parray[i]; i++)
        if (Parray[i] == tmpArray2[0])
            return i + 1;
    }

int AskforOp()
{
    int i, j ;
    char *resWords[50];
    int numWords ;

    system("clear");
    printf("Your request was not understood.\n");
    printf("Would you prefer to speak to an operator or try again with a new request?\n");
    fprintf(lf, "<P>Your request was not understood.<LI>");
    fprintf(lf, "Would you prefer to speak to an operator or try again with a new request?\n");
    fflush(lf);
    fgets(query, 255, stdin); /* accept the user input */
    addWord(&queryList, query, ++numQueryList);
    fprintf(lf, "<P><I> %s</I>", query);
    numWords = breakStr(query, resWords);
    if ( inArray(resWords,"operator",numWords))
        {
            printf("\n\nPlease wait for the operator ... \n");
            fprintf(lf, "<P>Please wait for the operator ...");
            fflush(lf);
            exit(0);
        }
    if( inArray(resWords,"try",numWords) && inArray(resWords,"again",numWords))
        {
            system("clear");
            printf("Please tell us your new request\n");
            fprintf(lf, "<P>Please tell us your new request\n");
            fflush(lf);

```

```

    fgets(query, 255, stdin); /* accept the user input */
    addWord(&queryList, query, ++numQueryList);
}
return 1;
}

void sayOther()
{
printf("\nWould you like to hear other options?\n\n");
fprintf(If, "<LI>Would you like to hear other options?<P>");
otheFlag = 1;
}

int checkscore(char *ans, int *Parray, int pcnt)
{
    char * resWords[50], *pmptWords[50];
    int i, j, *score, *score1;
    int numWords, numpWords, maxscore;

    score = (int *)malloc(pcnt * sizeof(int));
    score1 = (int *)malloc(pcnt * sizeof(int));
    for (i = 0; i < pcnt; i++)
        score[i] = score1[i] = 0;

    numWords = breakStr(ans, resWords);
    for (i = 0; i < pcnt; i++)
    {
        numpWords = breakStr(prompts[Parray[i]-1], pmptWords);
        for (j = 0; j < numWords; j++)
            if (inArray(pmptWords,resWords[j], numpWords))
                score[i]++;
    }
    for (i = maxscore = 0; i < pcnt; i++)
        maxscore = (maxscore < score[i])?score[i]:maxscore;
    for (i = j = 0; i < pcnt; i++)
        j += (score[i] == maxscore)?1:0;

    if (j == 1) /* single prompt selection */
    {
        for (i = 0; i < pcnt; i++)
            if (score[i] == maxscore)
                return i + 1;
    }
}

```


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```

else
{
    for (i = 0; i < pcnt; i++)
    {
        numpWords = breakStr(prompts[Parray[i] - 1], pmptWords);
        score1[i] = getscore1(resWords, numWords, pmptWords, numpWords);
    }
    maxscore = 0;
    for (i = 0; i < pcnt; i++)
        maxscore = (score1[i] > maxscore)?score1[i]:maxscore;
    for (i = j = 0; i < pcnt; i++)
        j += (score1[i] == maxscore)?1:0;
    if (j == 1) /* single prompt selection */
    {
        for (i = 0; i < pcnt; i++)
            if (score1[i] == maxscore)
                return i + 1;
    }
    else
    {
        for (i = 0; i < pcnt; i++)
            if (score[i] != maxscore)
                Parray[i] = 0;
        return -1;
    }
}

}

int chkAfrm( char * str)
{
    int i,j, numWords;
    char * resWords[50];

    numWords = breakStr(str, resWords);
    for (i = 0; i < numWords; i++)
        if (inArray(affirmWords, resWords[i], 3))
            return 1;
    return 0;
}

int chkNegtn( char * str)
{

```

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```

int i,j, numWords;
char * resWords[50];

numWords = breakStr(str, resWords);
for (i = 0; i < numWords; i ++)
    if (inArray(negWords, resWords[i], 2))
        return 1;
return 0;
}

int getscore1(char **Word1, int num1, char **Word2, int num2)
{
    int i, j, scr = 0;
    int lsmatch = 0;

    for(i = 0; i < num1; i++)
    {
        for(j = lsmatch; j < num2; j++)
            if (!strcmp(Word1[i], Word2[j]))
            {
                scr++;
                break;
            }
        if (j < num2)
            lsmatch = j + 1;
    }

    return scr;
}

int orderPrompts(int *InterPrompts, int numInter)
{
    int i, j, k, l;
    int *tmpArray[2]; /* 0 - score ; 1 - level; 3 - menu order */
    int *tmpList, tmpCount;

    tmpArray[0] = (int *)malloc(numInter * sizeof(int));
    tmpArray[1] = (int *)malloc(numInter * sizeof(int));

    tmpList = (int *)malloc(numColumn * sizeof(int));
    for (i = 0; i < numColumn; i++)
        tmpList[i] = 0;
    // get the list of keywords from queryTerms

```

```

tmpCount = getKeyWords(queryTerms, numQuery, tmpList);

for (i = 0; i < numInter; i++)
{
    /* get the maxscore for the prompt */
    tmpArray[0][i] = 0;
    for (j = 0; (j < numScore) && (scoring[j][0] != InterPrompts[i]); j++);
    /* if any previous scoring present */
    if ((j < numScore) && (scoring[j][0] == InterPrompts[i]))
    {
        // get the max score
        for (k = 0; k < tmpCount; k++)
            tmpArray[0][i] = max(tmpArray[0][i], scoring[j][tmpList[k]]);
    }
    tmpArray[1][i] = getLevel(InterPrompts[i]);
}

// sort the array in order of score, level and menu-order
for (i = 0; i < (numInter - 1); i++)
{
    for (j = i + 1; j < numInter; j++)
        if (!gThan(tmpArray[0][i], tmpArray[1][i], InterPrompts[i],
tmpArray[0][j], tmpArray[1][j], InterPrompts[j]))
            {
                swap(tmpArray[0][i], tmpArray[0][j]);
                swap(tmpArray[1][i], tmpArray[1][j]);
                swap(InterPrompts[i], InterPrompts[j]);
            }
}

return numInter;
}

int getKeyWords(char **queryTerms, int numQuery, int *tmpList)
{
    int i, j, k, l;
    int count = 0;

    for (j = 0; j < numQuery; j++)
    {
        /* Check if the word is keyword */
        if ((k = inArray(columnTerms, queryTerms[j], numColumn)) != 0)
        {

```

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```

    /* add in temp list only if not present */
    for (i = 0; i < count && tmpList[i] != k ; i++);
    if (i >= count)
        tmpList[count++] = k;
    continue;
}

/* check if the word is Thesaurus/Learned Word */
if ((k = inArray(rowTerms, queryTerms[j], numRows)) != 0)
{
    /* pick-up all keywords for that word */
    for (i = 0; thesaurus[k - 1][i] != 0; i++)
    {
        for (l = 0; l < count && tmpList[l] != thesaurus[k - 1][i] ; l++);
        if (l >= count)
            tmpList[count++] = thesaurus[k - 1][i];
    }
}

}

return count;
}

int getLevel(int pmpt)
{
    int i, k, l;

    for (i = 0; i < numMenu && menuList[i][1] != pmpt; i++);
    k = menuList[i][0];
    for (l = 0; k > 0; l++)
    {
        for (i = 0; i < numMenu && menuList[i][1] != k; i++);
        k = menuList[i][0];
    }
    return l;
}

int gThan(int a, int b, int c, int p, int q, int r)
{
    if (a > p) return 1; // Desc order here
    if (a < p) return 0; // Desc order here
    if (b > q) return 0; // Asc order here
}

```

```

    if (b < q) return 1; // Asc order here
    if (c > r) return 0; // Asc order here
    return 1; // Asc order here
}

```

formlib.c: This program contains functions for forms processing

```

#include <stdio.h>
#include <string.h>
#include "arraylib.h"

struct input {
char *Type;
char *APrompt;
char *RPrompt;
char *Name;
char *Value;
char **Choice;
int numChoice;
};

struct form {
char * name;
struct input **fields;
int numFields;
};

char * split(char * , char );

int loadForm(FILE *f, struct form *frm, char *name)
{
int j, start=0;
char buf[512];
char fname[20];

sprintf(fname,"[%s]",name);
fseek(f,SEEK_SET,0);
while(fgets(buf,512,f) != NULL) {
    j = strlen(buf);
    if (buf[j - 1] == '\n') buf[j - 1] = 0;
    if (start)
        {

```

```

        if (strlen(buf) == 0) /* if blank line, stop reading */
            break;
        frm->numFields++;
        frm->fields = (struct input **)realloc(frm->fields, (frm->numFields) *
sizeof(struct input *));
        frm->fields[frm->numFields-1] = (struct input *)malloc(sizeof(struct input));
        loadInput(frm->fields[frm->numFields-1], buf);
    }
    else
        if (!strcmp(fname, buf)) {
            start = 1;
            frm->name = strdup(name);
            frm->numFields=0;
            frm->fields=NULL;
        }
    }
return start;
}

```

```

loadInput(struct input *inp, char * str)
{
char ***list, *tmpstr1, *tmpstr2;
int i, j, len;

inp->Type = inp->APrompt = inp->RPrompt = inp->Name = inp->Value = NULL;
list = (char ***)malloc(2 * sizeof(char **));
list[0] = (char **)malloc(2 * sizeof(char *));
list[1] = (char **)malloc(2 * sizeof(char *));
list[0][0] = str;
for(i=0;(list[i+1][0] = split(list[i][0],':'))!=NULL;i++)
    {
        list[i][1] = split(list[i][0],'=');
        list = (char ***)realloc(list,(i+3)*sizeof(char**));
        list[i+2] = (char **)malloc(2 * sizeof(char *));
    }
    list[i][1] = split(list[i][0],'=');
len = i + 1;
for(i=0; i < len;i++)
    {
        if (!strcmp("Type",list[i][0]))
            mystrcp(&inp->Type,list[i][1]);
        if (!strcmp("APrompt",list[i][0]))
            mystrcp(&inp->APrompt,list[i][1]);
    }
}

```

```

if (!strcmp("RPrompt",list[i][0]))
    mystrcp(&inp->RPrompt,list[i][1]);
if (!strcmp("Name",list[i][0]))
    mystrcp(&inp->Name,list[i][1]);
if (!strcmp("Value",list[i][0]))
    mystrcp(&inp->Value,list[i][1]);
if (!strcmp("Choice",list[i][0]))
    {
        mystrcp(&tmpstr1, list[i][1]);
        tmpstr2 = tmpstr1;
        inp->Choice = NULL;
        inp->numChoice=0;
        for(j=0;tmpstr1[j];j++)
            {
                if (tmpstr1[j]=='\')
                    {
                        tmpstr1[j]=0;
                        inp->Choice = (char **)realloc(inp->Choice,(inp-
>numChoice+1)*sizeof(char *));
                        inp->Choice[inp->numChoice++] = strdup(tmpstr2);
                        allTrim(inp->Choice[inp->numChoice-1]);
                        tmpstr2=tmpstr1+j+1;
                    }
            }
        inp->Choice = (char **)realloc(inp->Choice,(inp-
>numChoice+1)*sizeof(char *));
        inp->Choice[inp->numChoice++] = strdup(tmpstr2);
        allTrim(inp->Choice[inp->numChoice-1]);
    }
}
}

```

```

mystrcp(char **str1, char *str2)
{
int len, i, j;

```

```

len = strlen(str2);
if(str2[0]==" " && str2[len-1]==" ") // i.e. quoted string;
    for (i = str2[--len] = 0; (str2[i] = str2[i + 1]); i++);
*str1 = (strlen(str2)==0)?NULL:strdup(str2);
}

```

```

char * split(char * str, char dlm)

```

```
{
int i;
for (i = 0; str[i]; i++)
    if (str[i] == dlm)
        {
            str[i] = 0;
            return str + i + 1;
        }
return NULL;
}
```

```
acceptForm(struct form *frm)
```

```
{
int i;
char ans[256];
struct input cnfm;
```

```
cnfm.Type = "MChoice";
cnfm.APrompt = strdup("Is this information correct?");
cnfm.numChoice = 4;
cnfm.Choice = (char **)malloc(2 * sizeof(char *));
cnfm.Choice[0] = strdup("no");
cnfm.Choice[1] = strdup("yes");
cnfm.Choice[2] = strdup("right");
cnfm.Choice[3] = strdup("correct");
cnfm.Value = NULL;
```

```
system("clear");
```

```
printf("\n");
```

```
for(i = 0; i < frm->numFields; i++)
```

```
{
    if (!strcmp(frm->fields[i]->Type,"Say"))
        sayText(frm->fields[i]);
    if (frm->fields[i]->Value != NULL)
        continue;
    if (!strcmp(frm->fields[i]->Type,"AcceptResponse"))
        getText(frm->fields[i]);
    if (!strcmp(frm->fields[i]->Type,"MChoice"))
        getChoice(frm->fields[i]);
}
```

```
while (1)
```

```
{
    system("clear");
```



```

printf("\n");
for(i = 0; i<frm->numFields; i++)
    {
        if (!strcmp(frm->fields[i]->Type,"AcceptResponse"))
            sayText(frm->fields[i]);
        if (!strcmp(frm->fields[i]->Type,"MChoice"))
            sayText(frm->fields[i]);
    }
printf("\n");
getChoice(&cnfm);
if (strcmp(cnfm.Value,"no"))
    return 1;
system("clear");
printf("\n");
for(i = 0; i<frm->numFields; i++)
    {
        if (!strcmp(frm->fields[i]->Type,"AcceptResponse"))
            getText(frm->fields[i]);
        if (!strcmp(frm->fields[i]->Type,"MChoice"))
            getChoice(frm->fields[i]);
    }
}
}

```

```

getText(struct input * inp)
{
char buf[256];
printf("\n%s\n\n",inp->APrompt);
fgets(buf,255,stdin);
allTrim(buf);
inp->Value = strdup(buf);
}

```

```

sayText(struct input * inp)
{
if (inp->RPrompt != NULL)
    printf("%s",inp->RPrompt);
if (inp->Value != NULL)
    printf("%s",inp->Value);
if (inp->RPrompt != NULL || inp->Value != NULL)
    printf("\n");
}

```

```

fillForm(struct form * frm, char ** Array, int arrCount)
{
int i, j, wrdCount = 0, tmpCount = 0;
char **wordList = NULL;
char *tmparray[50];
for(i = 0; i < arrCount; i++)
    {
        tmpCount = breakStr(Array[i], tmparray);
        wrdCount = mergeArray(&wordList,tmparray, wrdCount, tmpCount);
    }
wrdCount = processArray(wordList, wrdCount, 1);
for(i = 0; i < frm->numFields; i++)
    if(!strcmp(frm->fields[i]->Type,"MChoice"))
        selectValue(frm->fields[i], wordList, wrdCount);
}

int selectValue(struct input * inp, char **array, int arrCount)
{
int i, j, *score;
char *tmparray[20] ;
int max, maxcount, tmpCount;

score = (int *) malloc(inp->numChoice * sizeof(int));
for (i = 0; i < inp->numChoice; i++)
    {
        score[i] = 0;
        tmpCount = breakStr(inp->Choice[i], tmparray);
        if (tmpCount > 1) // Basically to avoid filtering of 'yes', 'no' etc
            filterStopWords(tmparray, tmpCount);
        tmpCount = processArray(tmparray, tmpCount, 0);
        for(j = 0; j < tmpCount; j++)
            if (inArray(array, tmparray[j], arrCount))
                score[i]++;
    }
for(i = max = 0; i < inp->numChoice; i++)
    if (score[i] > max) max = score[i];
for(i = maxcount = 0; i < inp->numChoice; i++)
    if (score[i] == max) maxcount++;
if (maxcount != 1)
    return 0;
for(i = 0; i < inp->numChoice; i++)
    if (score[i] == max)
        {

```

```

        inp->Value = strdup(inp->Choice[i]);
        break;
    }
return 1;
}

processForm (struct form *frm)
{
int i, j;
char *formType = NULL, *formAction = NULL;

for(i = 0; i<frm->numFields; i++)
    {
        if (frm->fields[i]->Value == NULL)
            continue;
        if (!strcmp(frm->fields[i]->Type, "FormType"))
            formType = strdup(frm->fields[i]->Value);
        if (!strcmp(frm->fields[i]->Type, "FormAction"))
            formAction = strdup(frm->fields[i]->Value);
    }

// If not defined the form type use 'AcceptFrom' as default.
if (formType == NULL)
    formType = strdup("AcceptForm");

if (!strcmp(formType, "AcceptForm"))
    j = acceptForm(frm);

if (!strcmp(formType, "ResponseForm"))
    j = responseForm(frm);

if (j != 0 && formAction != NULL)
    performAction(frm, formAction);
}

responseForm(struct form *frm)
{
int i;

system("clear");
printf("\n");
for (i = 0; i < frm->numFields; i++)
    {

```

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```

        if (strcmp("Say",frm->fields[i]->Type))
            continue;
        sayText(frm->fields[i]);
    }
printf("\n");
}

getChoice(struct input * inp)
{
char buf[256], *tmparray[50];
int tmpCount;

while (1)
    {
    printf("\n%s\n\n", inp->APrompt);
    fgets(buf,255,stdin);
    tmpCount = breakStr(buf, tmparray);
    if (tmpCount > 1) // Basically to avoid filtering of 'yes', 'no' etc
        filterStopWords(tmparray, tmpCount);
    tmpCount = processArray(tmparray, tmpCount, 0);
    if (selectValue(inp, tmparray, tmpCount))
        return;
    }
}

performAction(struct form *frm, char *action)
{
struct form f;
char * cmd = NULL;
char buf [256];
int i, j, len1, len2;
FILE *pd;

sprintf(buf, "%s <<EOD\n", action);
cmd = strdup(buf);
for (i = 0; i < frm->numFields; i++)
    {
    if (frm->fields[i]->Name == NULL)
        continue;
    sprintf(buf,"%s=%c%s%c\n",frm->fields[i]->Name,"",frm->fields[i]->Value,"");
    len1 = strlen(buf);
    len2 = strlen(cmd);
    cmd = (char *) realloc(cmd, (len1 + len2 + 1) * sizeof(char));

```

```

        strcat(cmd, buf);
    }
    sprintf(buf, "EOD\n");
    len1 = strlen(buf);
    len2 = strlen(cmd);
    cmd = (char *) realloc(cmd, (len1 + len2 + 1) * sizeof(char));
    strcat(cmd, buf);
    if ((pd = popen(cmd, "r")) == NULL)
    {
        fprintf(stderr, "Error in command execution\n");
        exit(1);
    }
    f.name = NULL;
    f.numFields = 0;
    f.fields = NULL;
    while ((fgets(buf, 255, pd) != NULL))
    {
        j = strlen(buf);
        if (buf[j - 1] == '\n') buf[j - 1] = 0;
        if (strlen(buf) == 0) /* if blank line, stop reading */
            continue;
        f.numFields++;
        f.fields = (struct input **)realloc(f.fields, (f.numFields) * sizeof(struct input *));
        f.fields[f.numFields-1] = (struct input *)malloc(sizeof(struct input));
        loadInput(f.fields[f.numFields-1], buf);
    }
    pclose(pd);
    processForm(&f);
}

```

HEADER FILES (C)

globalvar.h: Header file for global variables

```

extern FILE *webDoc, *phoneDoc;
extern int numColumn, numRows, numIndex, numMenu;
extern int startPoint, eofFlag, topValues;
extern char **rowTerms, **columnTerms, **prompts, **stopWords;
extern double **matrix, **cosine;
float phoneThreshold, webThreshold;
extern int **indexList, **menuList, **thesaurus;

```

```
extern int numStopWord, numOrgRow;
void stemArray(char **list, int arrayLen);
extern int numForms, numPF;
int stemWord(char *);
extern char ***Fprompts;
extern int numForms, numPF;
extern struct form **formlist;
```

process.h: Header file declaring functions in process.c

```

/*****\
* Process.h:                                     *
\*****/
```

```
int processFile(char *filename, char ***cArray, float threshold);
void loadStopWords( char * filename) ;
// int allTrim( char *str);
void fillIndex();
void updateThesaurus( char *str, int pmpt);
void createMatrix(char * filename);
// int readPara(FILE *fp );
// int wordsInPara (FILE *fp);
void calcCosine();
int eraseZeroes();
void createThesaurus();
// void floatSort(int *colnum, float *tmpcos, int numRows);
void saveData(char *filenm);
```

arraylib.h: Header file declaring functions in arraylib.c

```

/*****\
* ArrayLib.h                                     *
\*****/
```

```
int fetchWord(FILE *f, char * wrd);
int inArray(char **array, char *word, int length);
int removeNulls(char **strarray, int numWords);
int mergeArray(char ***Array1, char **Array2, int numArray1, int numArray2);
int readValues(char *str, char **array);
void sortArray(char *allwords[], int numwords);
int loadPrompts(char *filename);
void loadStopWords(char *);
```

```
FILE * fileOpen( char *filename, char *mode);
void addWord(char *** cArray, char * word, int c);
int breakStr(char * str, char **strarray);
void filterStopWords(char ** strarray, int numWords);
void filterDuplicates(char ** strarray, int numWords);
int loadFormsList( char *filename);
int loadForms(char * filename);
int allTrim( char *str);
int createArray(char *, char **);
int processArray( char **, int, int);
```

forms.h: Header file declaring functions in formlib.c

```
#include <stdio.h>
```

```
extern struct input {
char *Type;
char *APrompt;
char *RPrompt;
char *Name;
char *Value;
char **Choice;
int numChoice;
} a;
```

```
extern struct form {
char * name;
struct input **fields;
int numFields;
} b;
```

```
char * split(char * , char );
int loadForm(FILE *, struct form *, char *);
```

```
void loadInput(struct input *, char * );
void mystrcp(char **, char *);
void dumpInput(FILE *, struct input *);
void dumpForm(FILE *, struct form *);
void acceptForm(struct form *);
void getText(struct input * );
void fillForm(struct form * frm, char ** Array, int arrCount);
```

MAKE FILE

makefile: Makefile for compiling the source code.

```
all: t d demorun
t: main.o process.o arraylib.o stemlib.o formlib.o
    cc -g main.o process.o arraylib.o stemlib.o formlib.o -o t -lm
d: dialog.o interactive.o arraylib.o stemlib.o formlib.o
    cc -g dialog.o interactive.o arraylib.o stemlib.o formlib.o -o d
demorun: demorun.c
    cc demorun.c -o demorun
main.o: main.c process.h arraylib.h forms.h
    cc -c -g main.c
process.o: process.c globalvar.h forms.h
    cc -c -g process.c
arraylib.o: arraylib.c globalvar.h
    cc -c -g arraylib.c
dialog.o: dialog.c arraylib.h
    cc -c -g dialog.c
interactive.o: interactive.c globalvar.h
    cc -c -g interactive.c
stemlib.o: stemlib.c
    cc -c -g stemlib.c
formlib.o: formlib.c
    cc -c -g formlib.c
clean:
    rm -f *.o t d core demorun
bkup: clean
    tar cvzf ../stem`date "+%d%m"`.tgz .
```

PARAMETER FILES

t.ini: This file contains parameters required for program 't'

```
pdoc p # phonedoc
wdoc w # webdoc
sdoc s # stopwords
fdoc f # forms
xdoc x # link of forms & prompts
cfg z.cfg # config file
pt 0.02 # phoneThreshold
wt 0.0006 # webThreshold
tv 5 # topValues for cosine
```


d.ini: This file contains parameters required for program 'd'

cfg t.cfg # config file
lcfg l.cfg # learn file
sdoc s # stopwords
fdoc f # forms
xdoc x # x
minprompt 2 # minimum no of prompts
timeout 30 # timeout secs for other options

DATA FILES

p: Document 'p'

Are you calling about subscriptions?

 Would you like to order a subscription?

 Would you like to pay your subscription fees?

 Would you like to give a gift subscription?

 Would you like to change your address or change any other information?

 Do you have any billing enquiries or concerns?

 Would you like information about your account balance or your payments?

 Would you like to speak to a customer care representative?

 Would you like to temporarily suspend your delivery?

Is there a problem with your paper or delivery?

 Did you miss today's paper?

 Did you miss yesterday's newspaper and would you like credit for yesterday?

 Did you receive a wet paper?

Would you like information about the New Herald website?

 Would you like to obtain your New Herald website password?

 The website address is www.newherald.com. Would you like any other information about the website?

Are you calling about advertisements?

 Would you like to advertise in the New Herald?

 Is it a classified ad?

 Is it a full-page, half-page, or quarter-page ad?

 Would you like to place an ad?

 Is it a classified ad?

 Is it a full-page, half-page, or quarter-page ad?

Are you calling about something else?

 Would you like to write to the New Herald?

 Would you like to submit an article to the op-ed page?

 Please email your article to oped@newherald.com.

 Would you like to send a letter to the editor?

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Please email your letter to letters@newherald.com.

Would you like to work for the New Herald?

Would you like to write for the New Herald?

Would you like to work for the editorial division or for the administrative division?

w: Document 'w'

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- * Reporting missed deliveries
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LARGE TYPE WEEKLY

Developed especially for people with low vision, The New Herald Large Type Weekly offers a select package of the week's news printed in 16-point type--about twice the size of the regular type size. With its updated, color-enhanced design, The Large Type Weekly is a striking--and clearly readable way to enjoy The New Herald. A mail subscription of The New Herald Large Type Weekly makes a great gift for yourself or someone you care for.

To order, select a country/region below and submit.

Order Home Delivery at 50% Off (US Customers Only)

With convenient home delivery, you can start each day with all the news, the views, the wit and the wisdom you expect from The New Herald. And, through this special offer, you can save 50% on the first eight weeks when you order today. It's a smart, easy way to keep up with The Herald.

This offer expires December 31, 2001 and is valid in areas served by The New Herald' delivery service. Subscribers who have had Herald home delivery within the past 90 days are not eligible for this introductory offer. To subscribe enter your ZIP code below and submit.

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ZIP Code:

GIFT SUBSCRIPTION OFFER

There's no present like The Herald. And, when you order a gift subscription of 12-week home delivery of The New Herald, you'll save 50% on the regular rate. Hurry. This offer expires December 31, 2001. To order, enter the ZIP code of the gift recipient below and submit.

ZIP Code:

LARGE TYPE WEEKLY

Developed especially for people with low vision, The New Herald Large Type Weekly offers a select package of the week's news printed in 16-point type--about twice the size of the regular type size. With its updated, color-enhanced design, The Large Type Weekly is a striking--and clearly readable way to enjoy The New Herald. A mail subscription of The New Herald Large Type Weekly makes a great gift for yourself or someone you care for.

To order, select a country/region below and submit.

Country:

The New Herald Book Review

Get a head start on the latest book reviews, the acclaimed New Herald Best Sellers lists and everything new and noteworthy in the literary world. When you order a mail subscription to The New Herald Sunday Book Review, you'll receive it days in advance of the Sunday New Herald.

To order, select a country/region below and submit.

Country:

To Subscribe - Foreign Mail Subscriptions

Stay informed with all the news in the United States and throughout the world, including sharp analyses, reports and reviews from the world of business, sports and the arts. Discerning readers across the country and around the globe depend on The Herald for inside revelations, outside opinions, all sides of the story. Now you can too -- with the convenience of home delivery by mail. Order now.

To change your address, method of billing or any of the account information featured below, please enter the updated information in the appropriate box. Once you have completed all

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information requested, please click Submit at the bottom of the page. (Please note: It is necessary for all bold fields to be filled out to process your updated information.)

Your billing and payment history provides an at-a-glance summary of your account and makes it simple to check on your balance, last payment and new charges. Recent invoices are listed below for your review. Questions may be submitted to our customer care billing representatives by going to the Complaints page. Please be sure to indicate Billing Inquiry as the nature of your complaint.

Did you miss a paper? The New Herald is committed to making sure you get every issue you've ordered. If you did not receive your paper or any of its sections, simply select one of the following redelivery options so that we may deliver one to you.

Please note: Only same day redelivery is available on-line; you must submit this information on the same day on which your paper or section was to be delivered. For credits on past issues, please phone our customer care representatives at 1(800) 555-9876.

I would like to have today's paper delivered tomorrow. Please credit my account for today's missed paper.

Did you miss a paper? The New Herald is committed to making sure you get every issue you've ordered. If you did not receive your paper or any of its sections, simply select one of the following redelivery options so that we may deliver one to you.

Please note: Only same day redelivery is available on-line; you must submit this information on the same day on which your paper or section was to be delivered. For credits on past issues, please phone our customer care representatives at 1(800) 555-9876.

PAPER NOT RECEIVED

I did not receive today's paper.

ACCOUNT NUMBER: 060095544

Reason:

Select One: I would like to have today's paper delivered tomorrow.

Please credit my account for today's missed paper.

SECTIONS NOT RECEIVED

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I received today's paper with the section(s) checked below missing

Sections not received: ARTS & LEISURE BUSINESS
 DINING IN/OUT MAIN NEWS SEC
 METROPOLITAN SPORTS

Select One: I would like to have today's paper delivered tomorrow.

Please credit my account for today's missed paper.

As a newspaper home delivery subscriber, you may suspend your service for any amount of time. When you suspend your home delivery service, you may elect to take part in our vacation donation program (see description below). Please indicate your suspension

and restart dates below:

ACCOUNT NUMBER: 060095544

SUSPEND/RESUME

Suspend:

Resume:

Vacation Donation Program

During your next vacation, sit back, relax -- and at the same time enrich your community. Through The New Herald Newspaper in Education program, you can donate your subscription to students for the time period in which you will be out of town. For each copy you donate, at least two students will receive their own copy of The New Herald. To donate your vacation copies, please indicate below.

Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation. SUSPEND/RESUME 2

Suspend:

Resume:

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Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation. SUSPEND/RESUME 3

Suspend:

Resume:

Choose One: Donate the vacation period papers to local schools through the Newspapers in Education program. Credit my account for the period of my vacation.

To best provide you with responsive, accessible customer service, we encourage your comments and suggestions. Please let us know about any dissatisfaction you may have with your delivery or billing service. Customers who have not received a paper can order another paper or receive credit for today by clicking here.

For all other subscription concerns, please use the form below to send us an email indicating the nature of your complaint and explaining how we may help you. A customer care representative will respond to your request within 24 hours to the email address provided on this form.

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f: Document 'f'

[FORM1]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="Please tell us your account number.":Value="":RPrompt="Your account number is "
 Type="AcceptResponse":Name="date":APrompt="When would you like to start suspending the paper?":Value="":RPrompt="The delivery will stop on "
 Type="MChoice":Name="Duration":APrompt="Would you like to suspend the paper for one month, two months, or three months?":Choice="one month,two months,three months":Value="":RPrompt="The delivery will be suspended for "
 Type="FormAction":Value="/susp_deli"

[FORM2]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="Name":APrompt="Please tell us your name.":Value="":RPrompt="Your name is "
 Type="AcceptResponse":Name="Address":APrompt="What city do you live in?":Value="":RPrompt="You live in "
 Type="MChoice":Name="SubType":APrompt="Would you like the newspaper daily or just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday newspaper":RPrompt="You have opted for "
 Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual subscription?":Value="":Choice="a half-yearly subscription,an annual subscription":RPrompt="You have chosen "
 Type="FormAction":Value="/add_acct"

[FORM3]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="FormAction":Value="/acct_info"

[FORM4]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="FormAction":Value="/get_pymt"

[FORM5]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="Name":APrompt="Whom would you like to gift the subscription to?":Value="":RPrompt="You are gifting this subscription to "

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Type="AcceptResponse":Name="Address":APrompt="In which city does the person live?":Value="":RPrompt="The person lives in "
 Type="MChoice":Name="SubType":APrompt="Would you like to give a daily newspaper or just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday newspaper":RPrompt="You have opted for "
 Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual subscription?":Value="":Choice="a half-yearly subscription,an annual subscription":RPrompt="You have chosen "
 Type="FormAction":Value="/add_acct"

[FORM6]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="MChoice":Name="preference":APrompt="Would you like the newspaper or would you prefer credit for it?":Value="":Choice="the newspaper,credit":RPrompt="You prefer "
 Type="FormAction":Value="/prefer"

[FORM7]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="Hidden":Name="preference":Value="credit"
 Type="FormAction":Value="/prefer"

[FORM8]

Type="FormType":Value="AcceptForm"
 Type="AcceptResponse":Name="AcctNo":APrompt="What is your account number?":Value="":RPrompt="Your account number is "
 Type="FormAction":Value="/chg_acct"

x: Document 'x'

FORM1:Would you like to temporarily suspend your delivery?
 FORM2:Would you like to order a subscription?
 FORM3:Would you like information about your account balance or your payments?
 FORM4:Would you like to pay your subscription fees?
 FORM5:Would you like to give a gift subscription?
 FORM6:Did you miss today's paper?
 FORM6:Did you receive a wet paper?
 FORM7:Did you miss yesterday's newspaper and would you like credit for yesterday?
 FORM8:Would you like to change your address or change any other information?

a: Datafile 'a' contains data about subscription

1|1|2|01-01-2002|365|315|01-01-2002|50|||Frege|Jena
 2|2|2|01-02-2002|52|32|01-02-2002|20|||Russell|Cambridge
 3|2|2|01-02-2002|52|32|01-02-2002|20|||Wittgenstein|Vienna
 4|1|2|01-04-2002|364|314|01-04-2002|50|||Austin|Oxford
 5|1|2|01-05-2002|365|264|01-05-2002|100|||Grice|Berkeley
 6|1|1|01-06-2002|180|49|01-06-2002|130|||Parikh|New York

CONFIGURATION FILES

t.cfg: Thesaurus configuration file. This is generated by program 't'

[PROMPTS]

Are you calling about subscriptions?
 Would you like to order a subscription?
 Would you like to pay your subscription fees?
 Would you like to give a gift subscription?
 Would you like to change your address or change any other information?
 Do you have any billing enquiries or concerns?
 Would you like information about your account balance or your payments?
 Would you like to speak to a customer care representative?
 Would you like to temporarily suspend your delivery?
 Is there a problem with your paper or delivery?
 Did you miss today's paper?
 Did you miss yesterday's newspaper and would you like credit for yesterday?
 Did you receive a wet paper?
 Would you like information about the New Herald website?
 Would you like to obtain your New Herald website password?
 The website address is www.newherald.com. Would you like any other information about the website?
 Are you calling about advertisements?
 Would you like to advertise in the New Herald?
 Is it a classified ad?
 Is it a full-page, half-page, or quarter-page ad?
 Would you like to place an ad?
 Are you calling about something else?
 Would you like to write to the New Herald?
 Would you like to submit an article to the op-ed page?
 Please email your article to oped@newherald.com.
 Would you like to send a letter to the editor?
 Please email your letter to letters@newherald.com.
 Would you like to work for the New Herald?

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Would you like to write for the New Herald?

Would you like to work for the editorial division or for the administrative division?

[MENUTREE]

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```

cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
    exit 0
fi
line=`grep "^$acctno|" a`
echo 'Type="FormType":Value="ResponseForm"'

name=`echo $line | cut -d'|' -f 11`
echo 'Type="Say":RPrompt="Your last name is ":Value=""$name"'
city=`echo $line | cut -d'|' -f 12`
echo 'Type="Say":RPrompt="You live in ":Value=""$city"'
sub_type=`echo $line | cut -d'|' -f 2`
if [ $sub_type -eq 1 ]
then
    sub_type="a daily newspaper"
else
    sub_type="the Sunday newspaper"
fi
echo 'Type="Say":RPrompt="You have subscribed for ":Value=""$sub_type"'
sub_prd=`echo $line | cut -d'|' -f 3`
sdate=`echo $line | cut -d'|' -f 4`
if [ $sub_prd -eq 1 ]
then
    sub_prd="six months"
else
    sub_prd="one year"
fi
echo 'Type="Say":RPrompt="The subscription starts on '$sdate' for a period of
":Value=""$sub_prd"'

fee=`echo $line | cut -d'|' -f 5`
echo 'Type="Say":RPrompt="The subscription fee is $":Value=""$fee"'
bal=`echo $line | cut -d'|' -f 6`
echo 'Type="Say":RPrompt="Your balance is $":Value=""$bal"'
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
echo 'Type="Say":RPrompt="Your last payment was '$pymt' on ":Value=""$pdate"'
sdate=`echo $line | cut -d'|' -f 9`
if [ "X$sdate" != "X" ]

```

```

then
    suprd=`echo $line | cut -d'|' -f 10`
    case $suprd in
        1) suprd="one month";;
        2) suprd="two months";;
        3) suprd="three months";;
        esac
    echo 'Type="Say":RPrompt="Your account is suspended from '$sudate' for
":Value="$suprd"'
fi

```

add_acct: Script to add new account into 'a'

```

#!/bin/sh
# arrange all the values of input into a single line
cp /dev/null /tmp/param
cut -d=' ' -f 2 | sed "s^/^/g
s/ ^\\\\\\\\/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param
done
echo "" >>/tmp/param

# now transfer them into env variables.
read NAME CITY SUB_TYPE SUB_PRD < /tmp/param
if [ "$SUB_TYPE" = "a daily newspaper" ]
then
    SUB_TYPE=1
    FEE=182
else
    SUB_TYPE=2
    FEE=26
fi
if [ "$SUB_PRD" = "a half-yearly subscription" ]
then
    SUB_PRD=1
else
    SUB_PRD=2
    FEE=`expr $FEE \\* 2`
fi
cnt=1
while true

```

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```
do
  if [ "`grep -c \"^$cnt|\" a`" -ne 0 ]
  then
    cnt=`expr $cnt + 1`
    continue
  fi
  echo $cnt|$SUB_TYPE|$SUB_PRD|`date +%d-%m-%Y`|$FEE|$FEE||0||$NAME|$CITY" >> a
  echo 'Type="FormType":Value="AcceptForm"'
  echo 'Type="Say":RPrompt="Your subscription request has been entered":Value=""'
  echo 'Type="Say":Name="acct_no":RPrompt="Your account number is ":Value=""$cnt"'
  echo 'Type="Say":RPrompt="Your fee for the subscription is $":Value=""$FEE"'
  echo 'Type="AcceptResponse":Name="payment":APrompt="Your minimum initial
payment is $25. How much would you like to pay now?":Value=""':RPrompt="You have chosen
to pay $"
  echo 'Type="FormAction":Value="/updt_pymt"'
  break
done
#rm /tmp/param
```

chg_acct: Script to generate a form to change account information

```
#!/bin/sh
acctno=`cut -d=' ' -f 2 | sed s/^//g`
#echo $acctno
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
  echo 'Type="FormType":Value="ResponseForm"'
  echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
  exit 0
fi
line=`grep "^$acctno|" a`
echo 'Type="FormType":Value="AcceptForm"'
echo 'Type="Hidden":Name="acctno":Value="$acctno"'
#----- Response info
name=`echo $line | cut -d'|' -f 11`
echo 'Type="Say":RPrompt="Your last name is ":Value=""$name"'
city=`echo $line | cut -d'|' -f 12`
echo 'Type="Say":RPrompt="You live in ":Value=""$city"'
sub_type=`echo $line | cut -d'|' -f 2`
```

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```

if [ $sub_type -eq 1 ]
then
    sub_type="a daily newspaper"
else
    sub_type="the Sunday newspaper"
fi
echo 'Type="Say":RPrompt="You have subscribed for ":Value="$sub_type"'
sub_prd=`echo $line | cut -d'|' -f 3`
sdate=`echo $line | cut -d'|' -f 4`
if [ $sub_prd -eq 1 ]
then
    sub_prd="six months"
else
    sub_prd="one year"
fi
echo 'Type="Say":RPrompt="The subscription starts on '$sdate' for a period of
":Value="$sub_prd"'

fee=`echo $line | cut -d'|' -f 5`
echo 'Type="Say":RPrompt="The subscription fee is $":Value="$fee"'
bal=`echo $line | cut -d'|' -f 6`
echo 'Type="Say":RPrompt="Your balance is $":Value="$bal"'
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
echo 'Type="Say":RPrompt="Your last payment was '$pymt' on ":Value="$pdate"'
sudate=`echo $line | cut -d'|' -f 9`
if [ "X$sudate" != "X" ]
then
    suprd=`echo $line | cut -d'|' -f 10`
    case $suprd in
    1) suprd="one month";;
    2) suprd="two months";;
    3) suprd="three months";;
    esac
    echo 'Type="Say":RPrompt="Your account is suspended from '$sudate' for
":Value="$suprd"'
fi
#-----
echo 'Type="AcceptResponse":Name="Name":APrompt="What name would you like to
use?":Value="":RPrompt="The name you would like to use is "'
echo 'Type="AcceptResponse":Name="Address":APrompt="What city would you like the
newspaper sent to?":Value="":RPrompt="The city you would like the newspaper sent to is "'

```

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```
echo 'Type="MChoice":Name="SubType":APrompt="Would you like the newspaper daily or
just the Sunday paper?":Value="":Choice="a daily newspaper,the Sunday
newspaper":RPrompt="You have opted for "'
echo 'Type="MChoice":Name="SubPrd":APrompt="Would you like a half-yearly or annual
subscription?":Value="":Choice="a half-yearly subscription,an annual
subscription":RPrompt="You have chosen "'
echo 'Type="FormAction":Value="/updt_acct"'
```

get_pymt: Script to generate a form to accept payment for a particular account

```
#!/bin/sh
acctno=`cut -d=' ' -f 2 | sed s/^//g`
#echo $acctno
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
    exit 0
fi

line=`grep "^$acctno|" a`

fee=`echo $line | cut -d'|' -f 5`
bal=`echo $line | cut -d'|' -f 6`
pdate=`echo $line | cut -d'|' -f 7`
pymt=`echo $line | cut -d'|' -f 8`
if [ $bal -le 0 ]
then
    echo 'Type="FormType":Value="ResponseForm"'
else
    echo 'Type="FormType":Value="AcceptForm"'
fi
echo 'Type="Say":RPrompt="The subscription fee is $":Value="$fee"'
echo 'Type="Say":RPrompt="Your last payment was '$pymt' on":Value="$pdate"'
echo 'Type="Say":RPrompt="Your balance is $":Value="$bal"'
if [ $bal -ne 0 ]
then
    echo 'Type="Hidden":Name="acctno":Value="$acctno"'
    echo 'Type="AcceptResponse":Name="payment":APrompt="How much would you like
to pay now?":Value="":RPrompt="You have paid $"'
```



```

echo 'Type="FormAction":Value="/updt_pymt"'
fi

```

updt_pymt: Script to update the data file 'a' using form information

```

#!/bin/sh
cp /dev/null /tmp/param1
cut -d=' ' -f 2 | sed "s/^"//g
s/ ^\\\\\\\\\\\\/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno payment < /tmp/param1
touch /tmp/tmpa
echo "no" > /tmp/found
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo "yes" > /tmp/found
        echo -n $cacno'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 2`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 3`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 4`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 5`'|' >> /tmp/tmpa
        bal=`echo $line | cut -d'|' -f 6`
        bal=`expr $bal - $payment`
        echo -n $bal'|' >> /tmp/tmpa
        echo -n `date +%d-%m-%Y`'|' >> /tmp/tmpa
        echo -n $payment'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 9`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 10`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 11`'|' >> /tmp/tmpa
        echo `echo $line | cut -d'|' -f 12` >> /tmp/tmpa
    else
        echo $line >> /tmp/tmpa
    fi
done
mv /tmp/tmpa a
read ans < /tmp/found

```

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```
if [ "$ans" = "yes" ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Thank you for the subscription":Value=""'
else
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
fi
rm /tmp/param1 /tmp/found
```

susp_deli: Script to suspend delivery for a particular account

```
#!/bin/sh
cp /dev/null /tmp/param1
cut -d=' ' -f 2 | sed "s/^//g
s/^\s\s\s\s/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno sdate period < /tmp/param1
if [ "$period" = "one month" ]
then
    period=1
fi
if [ "$period" = "two month" ]
then
    period=2
fi
if [ "$period" = "three months" ]
then
    period=3
fi
echo "no" > /tmp/found
touch /tmp/tmpa
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo "yes" > /tmp/found
```

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```

echo -n $carno'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 2`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 3`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 4`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 5`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 6`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 7`'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 8`'| >> /tmp/tmpa
echo -n $sdate'| >> /tmp/tmpa
echo -n $period'| >> /tmp/tmpa
echo -n `echo $line | cut -d'|' -f 11`'| >> /tmp/tmpa
echo `echo $line | cut -d'|' -f 12` >> /tmp/tmpa
else
    echo $line >> /tmp/tmpa
fi
done
mv /tmp/tmpa a
read ans < /tmp/found
if [ "$ans" = "yes" ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Thank you. The information has been updated":Value=""'
else
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
fi

rm /tmp/param1 /tmp/found

```

updt_acct: Script to update data file 'a' with changed information

```

#!/bin/sh
# arrange all the values of input into a single line
cp /dev/null /tmp/param
cut -d=' ' -f 2 | sed "s/^//g
s/ \\\\\\\\\\\\\\\\\ /g" | while read aa
do
    echo -n $aa' ' >> /tmp/param
done
echo "" >>/tmp/param
cp /dev/null /tmp/tmpa

```

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```

read acctno name city sub_type sub_prd < /tmp/param
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo -n $cacno'| >> /tmp/tmpa
        if [ "$sub_type" = "a daily newspaper" ]
        then
            sub_type=1
            newfee=182
        else
            sub_type=2
            newfee=26
        fi
        echo -n $sub_type'| >> /tmp/tmpa
        if [ "$sub_prd" = "a half-yearly subscription" ]
        then
            sub_prd=1
        else
            sub_prd=2
            newfee=`expr $newfee \* 2`
        fi
        echo -n $sub_prd'| >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 4`'| >> /tmp/tmpa
        echo -n $newfee'| >> /tmp/tmpa
        oldfee=`echo $line | cut -d'|' -f 5`
        oldbal=`echo $line | cut -d'|' -f 6`
        newbal=`expr $newfee - $oldfee + $oldbal`
        echo $newfee' '$newbal > /tmp/newbal
        if [ $newbal -gt 0 ]
        then
            echo -n $newbal'| >> /tmp/tmpa
        else
            echo -n '0'| >> /tmp/tmpa
        fi
        #echo -n `date +%d-%m-%Y`'| >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 7`'| >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 8`'| >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 9`'| >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 10`'| >> /tmp/tmpa
        echo -n $name'| >> /tmp/tmpa
        echo $city >> /tmp/tmpa
    
```

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```

else
    echo $line >> /tmp/tmpa
fi
done
mv /tmp/tmpa a
echo 'Type="FormType":Value="ResponseForm"'
read newfee newbal < /tmp/newbal
echo 'Type="Say":RPrompt="Your fee for the subscription is $":Value="$newfee"'
if [ $newbal -lt 0 ]
then
    newbal=`expr $newbal \* -1`
    echo 'Type="Say":RPrompt="A cheque of '$newbal' will be sent to you to compensate
for excess balance"'
else
    echo 'Type="Say":RPrompt="Your balance is $":Value="$newbal"'
fi
echo 'Type="Say":RPrompt="Thank you":Value=""'
rm /tmp/param /tmp/newbal

```

prefer: Script to generate form for damaged / missing newspaper complaint

```

#!/bin/sh
cp /dev/null /tmp/param1
cut -d=' ' -f 2 | sed "s/^//g"
s/ ^\\\\\\\\/g" | while read aa
do
    echo -n $aa' ' >> /tmp/param1
done
echo "" >>/tmp/param1
read acctno preference < /tmp/param1
cnt=`grep -c "^$acctno|" a`
if [ $cnt -eq 0 ]
then
    echo 'Type="FormType":Value="ResponseForm"'
    echo 'Type="Say":RPrompt="Sorry, the account number you provided does not
exist":Value=""'
    exit 0
fi

if [ "$preference" = "the newspaper" ]
then
    echo 'Type="FormType":Value="ResponseForm"'

```

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```

echo 'Type="Say":RPrompt="You will be sent today\'s newspaper":Value=""'
echo 'Type="Say":RPrompt="Thank you":Value=""'
exit 0
fi
touch /tmp/tmpa
cat a | while read line
do
    cacno=`echo $line | cut -d'|' -f 1`
    if [ $cacno -eq $acctno ]
    then
        echo "yes" > /tmp/found
        echo -n $cacno'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 2`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 3`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 4`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 5`'|' >> /tmp/tmpa
        bal=`echo $line | cut -d'|' -f 6`
        bal=`expr $bal - 1`
        echo -n "$bal"|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 7`'|' >> /tmp/tmpa
        echo -n `echo $line | cut -d'|' -f 8`'|' >> /tmp/tmpa
        echo -n $sdate'|' >> /tmp/tmpa
        echo $period >> /tmp/tmpa
    else
        echo $line >> /tmp/tmpa
    fi
done
mv /tmp/tmpa a
echo 'Type="FormType":Value="ResponseForm"'
echo 'Type="Say":RPrompt="Your account has been credited":Value=""'
echo 'Type="Say":RPrompt="Thank you":Value=""'
rm /tmp/param1 /tmp/found

```

WE CLAIM:

SUB A17

1. A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement comprising:

at a first node, receiving an input from a user of the system, the input containing at least one word identifiable with at least one keyword from among multiple keywords,

identifying at least one node, other than the first node, that is not directly connected to the first node but is associated with the at least one keyword, and

jumping to the at least one node.

2. The method of claim 1 further comprising:

providing a verbal description associated with the at least one node to the user.

3. The method of claim 1 further comprising:

searching a thesaurus correlating keywords with synonyms.

4. The method of claim 3 wherein the searching further comprises:

identifying the at least one word as synonymous with the at least one keyword.

5. The method of claim 1 further comprising:

determining that the at least one word is neither a keyword nor a synonym of any

keyword; and

learning a meaning for the word so that the word will be treated as a learned synonym for at least one particular keyword of the multiple keywords.

6. The method of claim 5 further comprising:
adding the word to a thesaurus so that, when the word is input by a subsequent user, the word will be treated as synonymous with the at least one particular keyword.

7. A method performed in connection with an arrangement of nodes representable as a hierarchical graph containing vertices and edges connecting at least two of the vertices, the method comprising:

receiving an input from a user as a response to a verbal description associated with a first vertex;

analyzing the input to identify a meaningful term that can be associated with at least one keyword;

selecting a vertex in the graph structure that is not connected by an edge to the first vertex, based upon an association between the meaningful term and the at least one keyword and a correlation between the at least one keyword and the vertex; and

jumping to the vertex.

8. A method performed in connection with an arrangement of nodes representable as a hierarchical graph comprising:

correlating keywords with nodes in which the keywords appear to create an inverted index so that the keywords each appear only once and all nodes containing each of the keywords are indexed to those keywords;

maintaining a thesaurus of synonyms for at least some of the keywords;

receiving an input from a user containing a meaningful word;

searching the inverted index to determine whether the meaningful word is a keyword and, if the meaningful word is a keyword, jumping to a node identified in the inverted index as correlated to that keyword, otherwise,

searching the thesaurus to determine if the meaningful word is a synonym for at least one particular keyword and, if the meaningful word is the synonym, using the synonym to identify the at least one particular keyword, and

jumping to at least one node correlated to the at least one particular keyword.

9. The method of claim 8 further comprising:

creating the thesaurus by analyzing at least two files and determining synonymy among application meaningful words contained therein based upon a frequency of co-occurrence among the application meaningful words.

10. A system comprising:
a hierarchically arranged series of nodes;
an inverted index correlating keywords with the nodes;
a thesaurus correlating at least some keywords with synonyms for those keywords;
a processor executable learning procedure configured to, upon receipt of a term that is identified as neither a synonym nor a keyword based upon a search of both the inverted index and the thesaurus,

(a) identify the term as at least one particular synonym for at least one particular keyword and

(b) correlate the term with the at least one particular keyword,
so that when a subsequent user provides the term the system will operate as if the term was synonymous with the at least one particular keyword.

11. The system of claim 10 further comprising:

a set of verbal descriptions for at least some of the nodes.

12. The system of claim 10 wherein at least one of the nodes is a service node.

13. The system of claim 10 further comprising an interactive voice response system and wherein the hierarchically arranged series of nodes is part of the interactive voice response system.

14. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a file system browser application.

15. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a navigation system for television listings.

16. The system of claim 10 wherein the hierarchically arranged series of nodes is part of one of a document navigation or a document retrieval system.

17. The system of claim 10 wherein the hierarchically arranged series of nodes is part of a geographic information system.

18. A transaction processing system, having a hierarchical arrangement of nodes and configured to interact with a user so that the user can navigate among the nodes in the hierarchy, the system comprising:

an inverted index correlating keywords with at least some of the nodes in the hierarchical arrangement so that when the user interacts with the system and provides an input in response to a verbal description from one node in the hierarchy and the response includes a meaningful word correlatable with a keyword, the system will identify at least one node that is correlated to the meaningful word by the inverted index and jump to that at least one node without first traversing any other node.

19. The system of claim 18 further comprising:
a thesaurus correlating at least some of the keywords with synonyms for the at least some
keywords.
20. The system of claim 18 further comprising:
at least one stored learned word correlated to a keyword.
21. A method performed by a program executed by a processor to navigate among a
hierarchically arranged group of nodes, each of the nodes having an associated verbal
description, the method comprising:
eliminating stop words and duplicates from the verbal descriptions to create a list of
keywords;
creating a list of thesaurus words;
creating a first matrix comprising a correlation of at least some thesaurus words with at
least some keywords;
creating a second matrix by calculating cosine values from a co-occurrence analysis of
the entries in the first matrix;
determining a synonymy among the at least some thesaurus words and the at least some
keywords; and
creating a thesaurus configured as an inverted index based upon the synonymy.

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22. The method of claim 21 further comprising:
tracking frequency of use of the nodes.
23. The method of claim 22 further comprising:
ranking the nodes based upon a result of the tracking.
24. The method of claim 21 further comprising:
pruning a node from the group of nodes based upon a frequency of usage criterion.
25. The method of claim 21 further comprising:
adding a synonym entry into the thesaurus based upon a result of an unknown word
analysis.
26. The method of claim 21 wherein the thesaurus further comprises at least some
learned entries, the method further comprising:
deleting a learned entry based upon satisfaction of a frequency of use criterion.

ABSTRACT

A method performed in a system having multiple navigable nodes interconnected in a hierarchical arrangement involves receiving an input containing at least one word identifiable with at least one keyword, identifying at least one node, other than the first node, not directly connected to the first node, but associated with the at least one keyword, and jumping to the identified node. A transaction processing system having a hierarchical arrangement of nodes and is configured for user navigation among the nodes. The system has an inverted index correlating keywords with at least some nodes in the arrangement so that when the user provides an input in response to a verbal description and the response includes a meaningful word correlatable with a keyword, the system will identify at least one node correlated to the meaningful word by the inverted index and jump to that node without first traversing any other node.

**COMBINED DECLARATION AND POWER OF ATTORNEY FOR
ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,
DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM**

the specification of which

- a. is attached hereto.
- b. was filed on _____ as application Serial No. _____ and was amended on _____ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

- c. was described and claimed in International Application No. ___ filed on _____ and as amended on _____. (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. § 1.56.

I hereby specify the following as the correspondence address to which all communications about this application are to be directed:

SEND CORRESPONDENCE TO:

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- Address Shown (see below)

MORGAN & FINNEGAN, L.L.P.
345 Park Avenue
New York, N.Y. 10154



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- I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a)-(d) or under § 365(b) of any foreign application(s) for patent or inventor's certificate or under § 365(a) of any PCT international application(s) designating at least one country other than the U.S. listed below and also have identified below such foreign application(s) for patent or inventor's certificate or such PCT international application(s) filed by me on the same subject matter having a filing date within twelve (12) months before that of the application on which priority is claimed:
- The attached 35 U.S.C. § 119 claim for priority for the application(s) listed below forms a part of this declaration.

Country/PCT	Application Number	Date of filing (day, month, yr)	Date of issue (day, month, yr)	Priority Claimed
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N
				<input type="checkbox"/> Y <input type="checkbox"/> N

- I hereby claim the benefit under 35 U.S.C. § 119(e) of any U.S. provisional application(s) listed below.

Provisional Application No.	Date of filing (day, month, yr)

ADDITIONAL STATEMENTS FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART OR PCT INTERNATIONAL APPLICATION(S DESIGNATING THE U.S.)

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) or under § 365(c) of any PCT international application(s) designating the U.S. listed below.

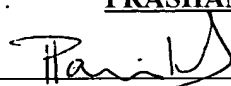
US/PCT Application Serial No.	Filing Date	Status (patented, pending, abandoned)/ U.S. application no. assigned (For PCT)

- In this continuation-in-part application, insofar as the subject matter of any of the claims of this application is not disclosed in the above listed prior United States or PCT international application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or Imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys and/or agents with full power of substitution and revocation, to prosecute this application, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith: David H. Pfeffer (Reg. No. 19,825), Harry C. Marcus (Reg. No. 22,390), Robert E. Paulson (Reg. No. 21,046), Stephen R. Smith (Reg. No. 22,615), Kurt E. Richter (Reg. No. 24,052), J. Robert Dailey (Reg. No. 27,434), Eugene Moroz (Reg. No. 25,237), John F. Sweeney (Reg. No. 27,471), Arnold I. Rady (Reg. No. 26,601), Christopher A. Hughes (Reg. No. 26,914), William S. Feiler (Reg. No. 26,728), Joseph A. Calvaruso (Reg. No. 28,287), James W. Gould (Reg. No. 28,859), Richard C. Komson (Reg. No. 27,913), Israel Blum (Reg. No. 26,710), Bartholomew Verdirame (Reg. No. 28,483), Maria C.H. Lin (Reg. No. 29,323), Joseph A. DeGirolamo (Reg. No. 28,595), Michael P. Dougherty (Reg. No. 32,730), Seth J. Atlas (Reg. No. 32,454), Andrew M. Riddles (Reg. No. 31,657), Bruce D. DeRenzi (Reg. No. 33,676), Mark J. Abate (Reg. No. 32,527), John T. Gallagher (Reg. No. 35,516), Steven F. Meyer (Reg. No. 35,613), Kenneth H. Sonnenfeld (Reg. No. 33,285), Tony V. Pezzano (Reg. No. 38,271), Andrea L. Wayda (Reg. 43,979), Walter G. Hanchuk (Reg. No. 35,179), John W. Osborne (Reg. No. 36,231), Robert K. Goethals (Reg. No. 36,813), Peter N. Fill (Reg. No. 38,876), Mary J. Morry (Reg. No. 34,398) and Kenneth S. Weitzman (Reg. No. 36,306) of Morgan & Finnegan, L.L.P. whose address is: 345 Park Avenue, New York, New York, 10154; and Michael S. Marcus (Reg. No. 31,727), and John E. Hoel (Reg. No. 26,279), of Morgan & Finnegan, L.L.P., whose address is 1775 Eye Street, Suite 400, Washington, D.C. 20006.

- I hereby authorize the U.S. attorneys and/or agents named hereinabove to accept and follow instructions from us as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and/or agents and me. In the event of a change in the person(s) from whom instructions may be taken I will so notify the U.S. attorneys and/or agents named hereinabove.

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Full name of second inventor:	<u>STANLEY PETERS</u>	
Inventor's signature*	<u><i>Stanley Peters</i></u>	<u>13 Nov. 2002</u> Date
Residence:	<u>128 Hillside Avenue, Menlo Park, CA 94025</u>	
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ATTACHED IS ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY THIRD AND SUBSEQUENT INVENTORS FORM.

*Before signing this declaration, each person signing must:

1. Review the declaration and verify the correctness of all information therein; and
2. Review the specification and the claims, including any amendments made to the claims.

After the declaration is signed, the specification and claims are not to be altered.

To the inventor(s):

The following are cited in or pertinent to the declaration attached to the accompanying application:

Title 37, Code of Federal Regulation, §1.56

Duty to disclose information material to patentability

- (a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and

- (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
- (i) Opposing an argument of unpatentability relied on by the Office, or
- (ii) Asserting an argument of patentability.
- (iii) A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.
- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:
- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.
- (e) In any continuation-in-part application, the duty under this section includes the duty to disclose to the Office all information known to the person to be material to patentability, as defined in paragraph (b) of this section, which became available between the filing date of the prior application and the National or PCT international filing date of the continuation-in-part application.

Title 35, U.S. Code § 101

Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Title 35 U.S. Code § 102

Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless --

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States, or
- (c) The has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
- (e) The invention was described in--
 - (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
 - (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a); or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g) (1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Title 35, U.S. Code § 103

103. Conditions for patentability; non obvious subject matter

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
- (b) (1) Notwithstanding subsection (a), and upon timely election by the applicant for patent to proceed under this subsection, a biotechnological process using or resulting in a composition of matter that is novel under section 102 and nonobvious under subsection (a) of this section shall be considered nonobvious if—

- (A) claims to the process and the composition of matter are contained in either the same application for patent or in separate applications having the same effective filing date; and
 - (B) the composition of matter, and the process at the time it was invented, were owned by the same person or subject to an obligation of assignment to the same person.
- (2) A patent issued on a process under paragraph (1)—
- (A) shall also contain the claims to the composition of matter used in or made by that process, or
 - (B) shall, if such composition of matter is claimed in another patent, be set to expire on the same date as such other patent, notwithstanding section 154.
- (3) For purposes of paragraph (1), the term "biotechnological process" means--
- (A) a process of genetically altering or otherwise inducing a single- or multi-celled organism to--
 - (i) express an exogenous nucleotide sequence,
 - (ii) inhibit, eliminate, augment, or alter expression of an endogenous nucleotide sequence, or
 - (iii) express a specific physiological characteristic not naturally associated with said organism;
 - (B) cell fusion procedures yielding a cell line that expresses a specific protein, such as a monoclonal antibody; and
 - (C) a method of using a product produced by a process defined by subparagraph (A) or (B), or a combination of subparagraphs (A) and (B).
- (c) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Title 35, U.S. Code § 112 (in part)

Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly printing out and distinctly claiming the subject matter which the applicant regards as his invention.

Title 35, U.S. Code, § 119

Benefit of earlier filing date; right of priority

- (a) An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, or in a WTO member country, shall have the same effect as the same

application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; but no patent shall be granted on any application for patent for an invention which had been patented or described in a printed publication in any country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country more than one year prior to such filing.

(b)

- (1) No application for patent shall be entitled to this right of priority unless a claim is filed in the Patent and Trademark Office, identifying the foreign application by specifying the application number on that foreign application, the intellectual property authority or country in or for which the application was filed, and the date of filing the application, at such time during the pendency of the application as required by the Director.
- (2) The Director may consider the failure of the applicant to file a timely claim for priority as a waiver of any such claim. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed claim under this section.
- (3) The Director may require a certified copy of the original foreign application, specification, and drawings upon which it is based, a translation if not in the English language, and such other information as the Director considers necessary. Any such certification shall be made by the foreign intellectual property authority in which the foreign application was filed and show the date of the application and of the filing of the specification and other papers.

(c) In like manner and subject to the same conditions and requirements, the right provided in this section may be based upon a subsequent regularly filed application in the same foreign country instead of the first filed foreign application, provided that any foreign application filed prior to such subsequent application has been withdrawn, abandoned, or otherwise disposed of, without having been laid open to public inspection and without leaving any rights outstanding, and has not served, nor thereafter shall serve, as a basis for claiming a right of priority.

(d) Applications for inventors' certificates filed in a foreign country in which applicants have a right to apply, at their discretion, either for a patent or for an inventor's certificate shall be treated in this country in the same manner and have the same effect for purpose of the right of priority under this section as applications for patents, subject to the same conditions and requirements of this section as apply to applications for patents, provided such applicants are entitled to the benefits of the Stockholm Revision of the Paris Convention at the time of such filing.

(e)

- (1) An application for patent filed under section 111(a) or section 363 of this title for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in a provisional application filed under section 111(b) of this title, by an inventor or inventors named in the provisional application, shall have the same effect, as to such invention, as though filed on the date of the provisional application filed under section 111(b) of this title, if the application for patent filed under section 111(a) or section 363 of this title is filed not later than 12 months after the date on which the provisional application was filed and if it contains or is amended to contain a specific reference to the provisional application. No application shall be entitled to the benefit of an earlier filed provisional application under this subsection unless an amendment containing the specific reference to the earlier filed provisional application is submitted at such time during the pendency of the application as required by the Director. The Director may consider the failure to submit such an amendment within that time period as a waiver of any benefit under this subsection. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this subsection during the pendency of the application.
- (2) A provisional application filed under section 111(b) of this title may not be relied upon in any

proceeding in the Patent and Trademark Office unless the fee set forth in subparagraph (A) or (C) of section 41(a)(1) of this title has been paid.

- (3) If the day that is 12 months after the filing date of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, the period of pendency of the provisional application shall be extended to the next succeeding secular or business day.
- (f) Applications for plant breeder's rights filed in a WTO member country (or in a foreign UPOV Contracting Party) shall have the same effect for the purpose of the right of priority under subsections (a) through (c) of this section as applications for patents, subject to the same conditions and requirements of this section as apply to applications for patents.
- (g) As used in this section--
 - (1) the term "WTO member country" has the same meaning as the term is defined in section 104(b)(2) of this title; and
 - (2) the term "UPOV Contracting Party" means a member of the International Convention for the Protection of New Varieties of Plants.

Title 35, U.S. Code, § 120

Benefit of earlier filing date in the United States

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application. No application shall be entitled to the benefit of an earlier filed application under this section unless an amendment containing the specific reference to the earlier filed application is submitted at such time during the pendency of the application as required by the Director. The Director may consider the failure to submit such an amendment within that time period as a waiver of any benefit under this section. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this section.

Please read carefully before signing the Declaration attached to the accompanying Application. If you have any questions, please contact Morgan & Finnegan, L.L.P.

PATENT

Docket No. 4428-4001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Prashant Parikh
Stanley Peters

Serial No.: To Be Assigned

Examiner: To Be Assigned

Filed: Herewith

Group Art Unit: To Be Assigned

For: NAVIGATION IN A HIERARCHICAL
STRUCTURED TRANSACTION PROCESSING SYSTEM

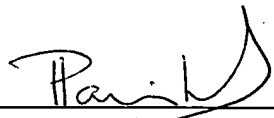
Commissioner Of Patents
Washington, D.C. 20231

ASSOCIATE POWER OF ATTORNEY (37 C.F.R. 1.34)

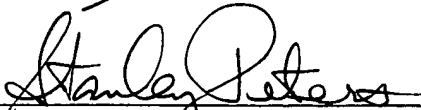
Please recognize as an Associate Practitioner in this case:

Richard Straussman
Morgan & Finnegan, LLP
345 Park Avenue
New York, NY 10154
Reg. No.: 39,847

Date: 18 Nov. 2002

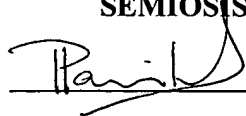
Signed: 
Prashant Parikh

Date: 13 Nov. 2002

Signed: 
Stanley Peters

SEMIOSIS L.L.C.

Date: 18 Nov. 2002

Signed: 

Name (Print): PRASHANT PARIKH

Its (Title): CHAIRMAN + CEO

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PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

11/21/2002 DEMMANU1 00000082 10299359

01 FC:2001	370.00 OP
02 FC:2201	126.00 OP
03 FC:2202	54.00 OP

PTO-1556
(5/87)

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2001

Application or Docket Number

4428-4001

CLAIMS AS FILED - PART I

(Column 1) (Column 2)

TOTAL CLAIMS	26	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	26 minus 20 = *	6
INDEPENDENT CLAIMS	6 minus 3 = *	3
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

SMALL ENTITY TYPE

OR OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	370.00
X\$ 9=	54
X42=	126
+140=	
TOTAL	550

RATE	FEE
BASIC FEE	740.00
X\$18=	
X84=	
+280=	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>					

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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	Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>					

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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	Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>					

RATE	ADDITIONAL FEE
X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

IPR2019-01304