

[54] METHOD OF HIERARCHICAL LDAP SEARCHING WITH RELATIONAL TABLES

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[51] Int. Cl.⁷ G06F 17/30

[52] U.S. Cl. 707/3; 707/101

[58] Field of Search 707/1-3, 100, 707/101, 200, 205

[56] References Cited

U.S. PATENT DOCUMENTS

4,945,475	7/1990	Bruffey et al.	707/1
5,291,583	3/1994	Bapat	395/705
5,295,261	3/1994	Simonetti	707/2
5,379,419	1/1995	Heffernan et al.	707/4
5,386,559	1/1995	Eisenberg et al.	707/201
5,404,518	4/1995	Gilbertson et al.	707/3
5,448,727	9/1995	Annevelink	707/101
5,467,471	11/1995	Bader	707/1
5,504,879	4/1996	Eisenberg et al.	707/100
5,511,186	4/1996	Carhart et al.	707/2
5,530,957	6/1996	Koenig	707/100
5,581,756	12/1996	Nakabayashi	707/2
5,592,661	1/1997	Eisenberg et al.	707/104
5,594,899	1/1997	Knudsen et al.	707/2
5,600,832	2/1997	Eisenberg et al.	707/203
5,644,740	7/1997	Kiuchi	345/357
5,675,784	10/1997	Maxwell et al.	707/100
5,708,806	1/1998	DeRose et al.	707/104
5,724,577	3/1998	Exley et al.	707/100
5,943,668	8/1999	Malloy et al.	707/3

FOREIGN PATENT DOCUMENTS

802491	4/1996	European Pat. Off.	G06F 17/30
7271825	3/1994	Japan	G06F 17/30
8235194	2/1995	Japan	G06F 17/30
9605704	8/1994	WIPO	G06F 17/30

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin, "Tree Traversal Techniques to Implement Enhanced Searches in Tree View," vol. 38, No. 02, Feb. 1995.

IBM Technical Disclosure Bulletin, "Relational Access Method Supporting Nested Data View," vol. 27, No. 6, Nov. 1984.

Herrin, E.H. II et al., "Schema and tuple trees: an intuitive structure for representing relational data," Computing Systems, vol. 9, No. 2, pp. 92-118, Spring 1996.

Kitakami, H. et al., "Building and search system for a large-scale DNA database," IEE Colloquium on 'Molecular Bioinformatics', Digest No. 1994/029, pp. 6/1-6/9, 1994.

(List continued on next page.)

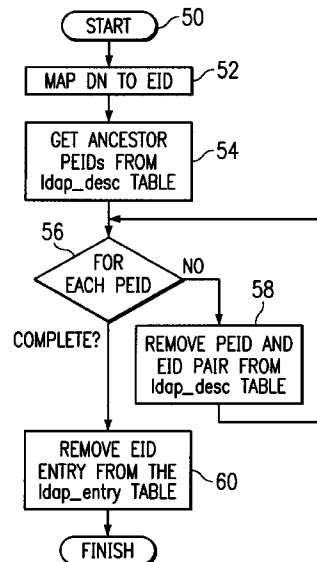
Primary Examiner—Maria N. Von Buhr

Attorney, Agent, or Firm—Jeffrey S. LaBaw; David H. Judson

[57] ABSTRACT

A method of hierarchical LDAP searching in an LDAP directory service having a relational database management system (DBMS) as a backing store. According to the invention, entries in a naming hierarchy are mapped into first and second relational tables: a parent table, and a descendant table. These tables are used to "filter" lists of entries returned from a search to ensure that only entries within a given search scope are retained for evaluation. Thus, for example, the parent table is used during an LDAP one level search, and the descendant table is used during an LDAP subtree search. In either case, use of the parent or descendant table obviates recursive queries through the naming directory.

27 Claims, 5 Drawing Sheets



OTHER PUBLICATIONS

Waugh, T.C., et al., "The GEOVIEW design: a relational database approach to geographical data handling," Proceedings of the Second International Symposium on Spatial Data Handling, pp. 193-212, 1986.

Severance, C., "Could LDAP be the next killer DAP?" Computer, vol. 30, No. 8, pp. 88-89, Aug. 1997.

Gaffin, A. et al., "Intranets," Network World, vol. 4, No. 12, pp. 26-28, 30, 32, Feb. 1997.

Blum, D.J., "LDAP: helping directories get along," Business Communications Review, vol. 26, No. 12, pp. 37-40, Dec. 1996.

Jose, R.J.P. et al., "Providing multiple external views on directory user interfaces," Computer Networks and ISDN Systems, vol. 28, No. 4, pp. 543-550, Feb. 1996.

FIG. 1
(PRIOR ART)

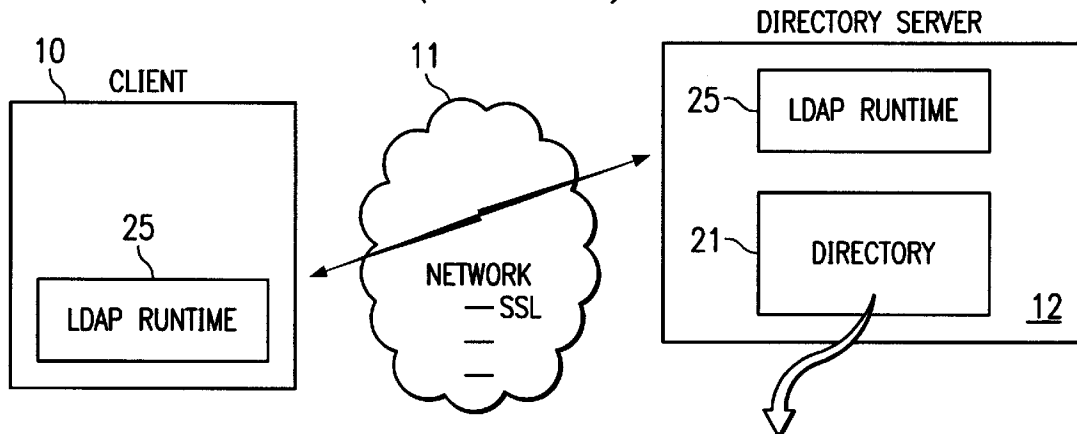


FIG. 2
(PRIOR ART)

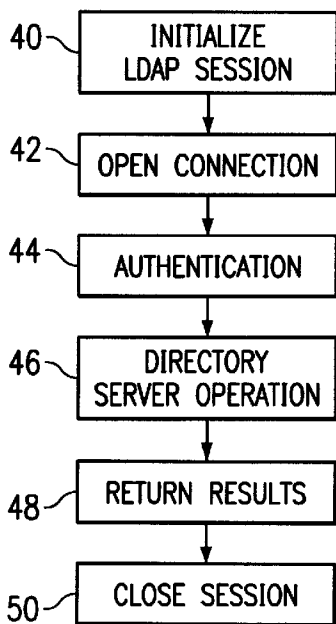
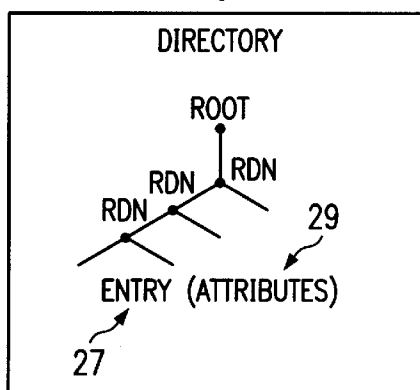


FIG. 3
(PRIOR ART)

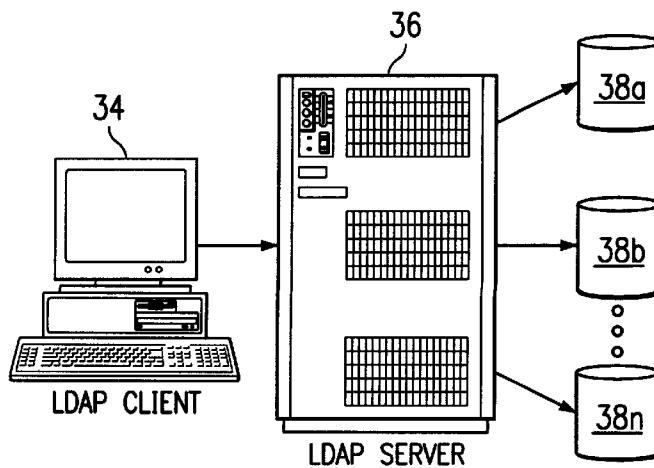


FIG. 4A

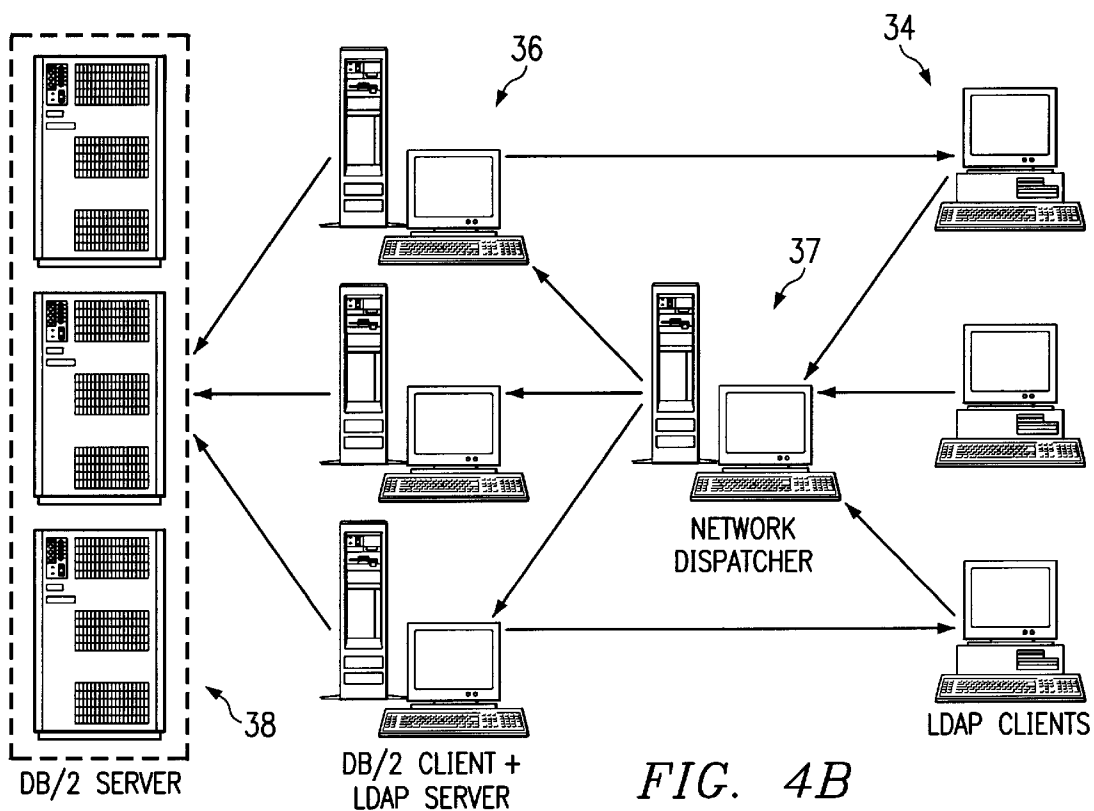


FIG. 4B

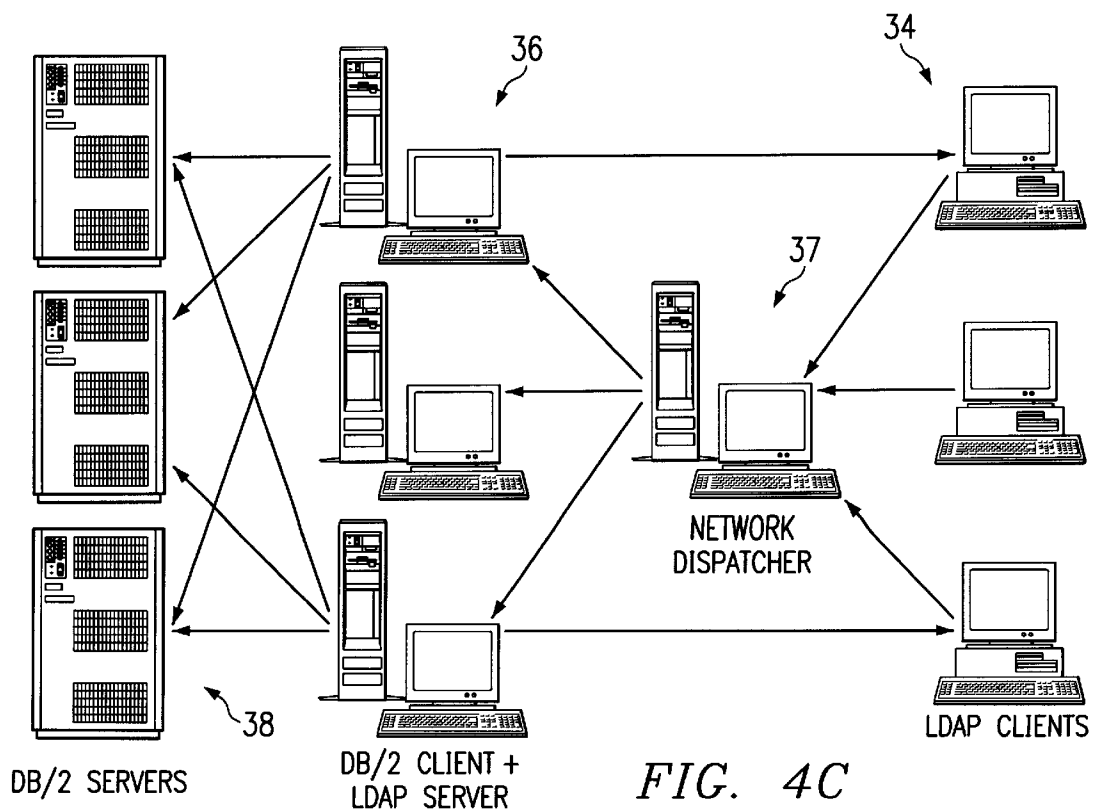
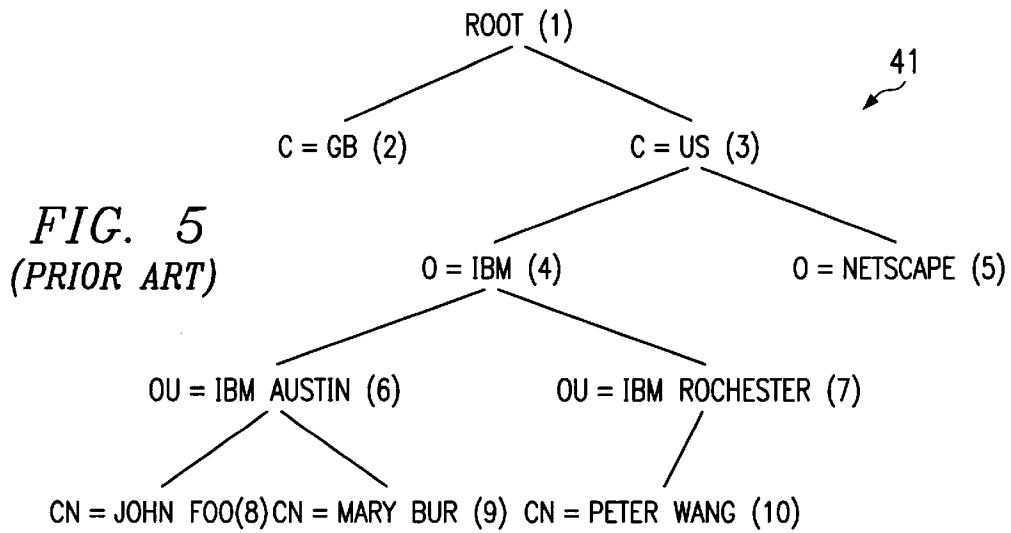


FIG. 4C



43

PEID	EID
1	2
1	3
3	4
3	5
4	6
4	7
6	8
6	9
7	10

FIG. 6A

45

AEID	DEID
1	2
1	3
1	4
1	5
1	6
1	7
1	8
1	9
1	10
3	4
3	5
3	6
3	7
3	8
3	9
3	10
4	6
4	7
4	8
4	9
4	10
6	8
6	9
7	10

FIG. 6B

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