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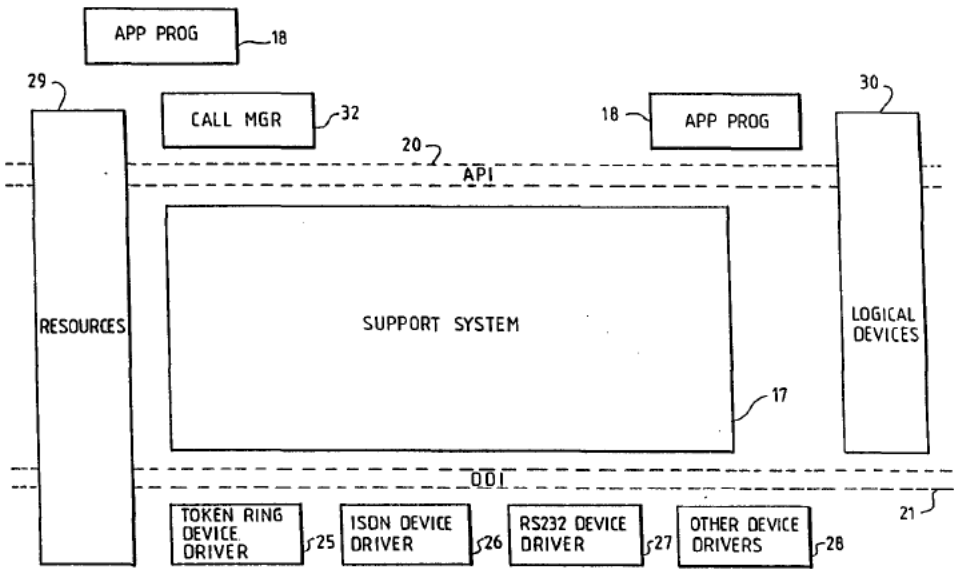

(57) Abstract

A programmable workstation for collaborative working in a network comprises a conventional operating system and a network control program layer. Additionally, the workstation includes a collaborative application support subsystem for interfacing with application programs. The subsystem is responsive to predetermined application program calls to create a logical network model of a collaborative environment. The model comprises sharing sets of application programs, which share data and resources across nodes and logical dedicated data channels connecting members of the sharing set. The subsystem cooperates with the network layer to establish the physical links necessary to implement the model in a physical network, transparently to the application program.

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COLLABORATIVE WORKING IN A NETWORK

DESCRIPTION

This invention relates to collaborative working in a network and more specifically to a programmable workstation and a method for use in such a collaborative working environment.

Background of the Invention

Personal computers are now widespread throughout the business community and many are able to intercommunicate, either through fixed connections e.g. local area networks, or through dynamically established links e.g. ISDN or async lines over the public switched telephone network. Increasingly, these connected personal computers can be used to enhance collaborative working between remote individuals; a typical example being the use of desk top conferencing software. Successful collaborative work generally requires more than a simple data link between the participants; voice capabilities are normally essential and video links are frequently required. Thus remote collaborative working can often be regarded as an extension to the traditional telephone call - it being enhanced with the data and programs available at the desktop via the personal computer - and, on occasions, enriched with video services.

A broad spectrum of collaborative applications can be envisaged, ranging from utilities taking advantage of the data and applications on a workstation, e.g. sharing of screen windows and files, through to new collaborative applications designed to meet the needs of specific classes of remote user e.g. just-in-time education, remote presentations, executive broadcasts or help desk. The common requirements behind these examples are:

- the support of a wide variety of personal computer platforms - both hardware and software.
- operation over the existing communication networks.
- group communications and multi-media data services.

Although desk top conferencing systems employing multi-media devices and communications channels exist, generally they are provided with a fixed set of system software and utility applications which is insufficiently

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flexible to meet the needs of all potential applications.

Accordingly the present invention provides a programmable workstation for collaborative working in a network of workstations forming the nodes of the network, the network being connected by physical links for the transmission of data between nodes;

the workstation comprising an operating system;

a network control program layer, running on the operating system, for controlling physical routing of multi-media data between nodes; and

a collaborative application support program layer for interfacing with application programs running on the workstation and responsive to predetermined application program calls to create a logical network model of a collaborative environment comprising sharing sets of application programs, which share data and resources within and across nodes, and logical dedicated data channels connecting members of a sharing set of application programs, each data channel being defined by a sending port and a receiving port each associated with an application program, the collaborative application support program layer being adapted to cooperate with the network control program layer to establish the physical links necessary to implement the logical network model in a physical network, transparently to the application programs.

According to another aspect, the invention also provides A method in which, in response to a predetermined program call by a first application program through which data is being transferred, via receiving and sending ports of the first application, between two other applications, the receiving port of the first application is reversibly directly connected to its sending port so that the data transfer bypasses the first application programs.

The invention will now be described by way of example only with reference to Figures 1-25 of the accompanying drawings.

Detailed Description of the Invention

In Figure 1 are shown two programmable workstations 10 and 12 connected by link 11 in a network, such as a LAN or WAN. The principal components of the workstations are conventionally described as layers, starting with the hardware 13. The hardware which is not illustrated in detail, consists of a processor unit with main memory, secondary storage such as a disk file, a display unit and input/output devices such as keyboard and mouse. Device support software 14 enables the hardware devices to function within a known operating system 15, such as IBM's Operating System/2 (OS/2).

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Also part of a conventional workstation, when used in a network, is networking software 16 for supporting connection to the network 11 and communication over the network between workstations. Typical networking software 16 could be the Netbios program product from IBM. Up to this point all that has been described is a conventional networking workstation capable of executing application programs 18.

In order to implement the present invention, each workstation also includes collaborative application support system software 17 which facilitates the development of application programs for creating a distributed collaborative working environment. In this environment, end-users of the workstation may communicate with users of other workstations in the network over multi-media channels and may work collaboratively on shared data and tasks.

The overall structure of support system 17 in relation to other software components of the workstation with which it interfaces directly is shown in Figure 2. Further details of the internal structure of the support system are shown in Figure 10. Broadly speaking, the main functional components of system 17 lie between two interfaces 20 and 21, illustrated by dashed lines.

An application programming interface 20 allows applications 18 to request support services. A device driver interface 21 allows the system to support an extensible range of software and hardware communications sub-systems through device drivers such as token ring driver 25, ISDN driver 26, RS232 driver 27 and other device drivers 28. Link support modules 228, 229 interface with the device drivers. These are replaceable, (Figure 10 shows only a possible selection) depending on the hardware options available at the workstation, and serve to isolate the support system from needing to know precisely which hardware is present. Through an implicit resources interface, (not illustrated) details of the communications network, such as node addresses and directory data may be requested by both the support system, the applications and the device drivers from resource files 29.

The API 20 allows applications 18 to initiate peer applications and share resources, on a variety of hardware and software platforms, located on nodes across a diverse and complex communications networks. It allows them to define multiple dedicated logical data channels between shared applications, suitable to a broad range of multi-media traffic, independently of the structure of the underlying physical network. It

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