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Shuff

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[54] **LOCAL AREA NETWORK AND NETWORK OPERATING SYSTEM FOR FORMATTING A CLIENT DISK AND INSTALLING A CLIENT OPERATING SYSTEM**

[75] Inventor: **Patrick R. Shuff**, Houston, Tex.

[73] Assignee: **Sun Microsystems, Inc.**, Mountain View, Calif.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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[22] Filed: **Jul. 7, 1995**

[51] **Int. Cl.**[6] **G06F 9/445**

[52] **U.S. Cl.** **395/712**; 395/652

[58] **Field of Search** 395/652, 712

[56] **References Cited**

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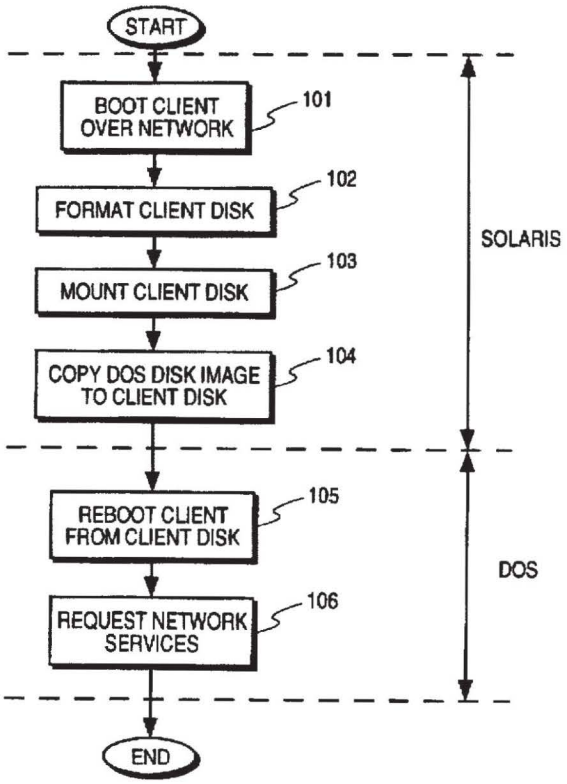
Primary Examiner—Emanuel Todd Voeltz
Assistant Examiner—John Q. Chavis
Attorney, Agent, or Firm—Blakely Sokoloff Taylor & Zafman

[57] **ABSTRACT**

Unattended initialization of client disks according to foreign operating systems is supported. The data written on the client disk is provided from a server disk across a local area network (LAN), rather than from floppy disks. The client system is booked over the LAN with a first, network-oriented operating system, such as the UNIX-based Solaris™ operating system developed by Sun Microsystems, Inc. Solaris™ is then used to format the client disk. This formatting is done according to the file access table (FAT) file system. Then Solaris™ copies a disk image to the client disk from the server disk via the LAN. The disk image copied includes a second, client-oriented operating system, such as Windows™ that uses the FAT file system. Then the client system is rebooted with Windows™. Network services, such as naming services or remote file access, can then be provided to Windows™ running on the client by Solaris™ running on the server.

6 Claims, 3 Drawing Sheets



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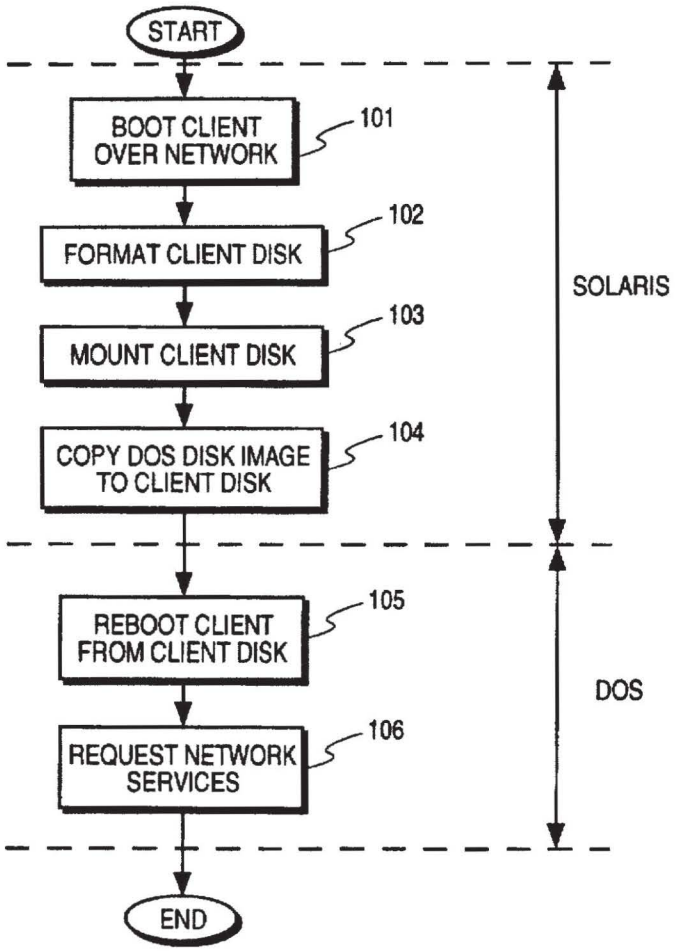

FIG. 1

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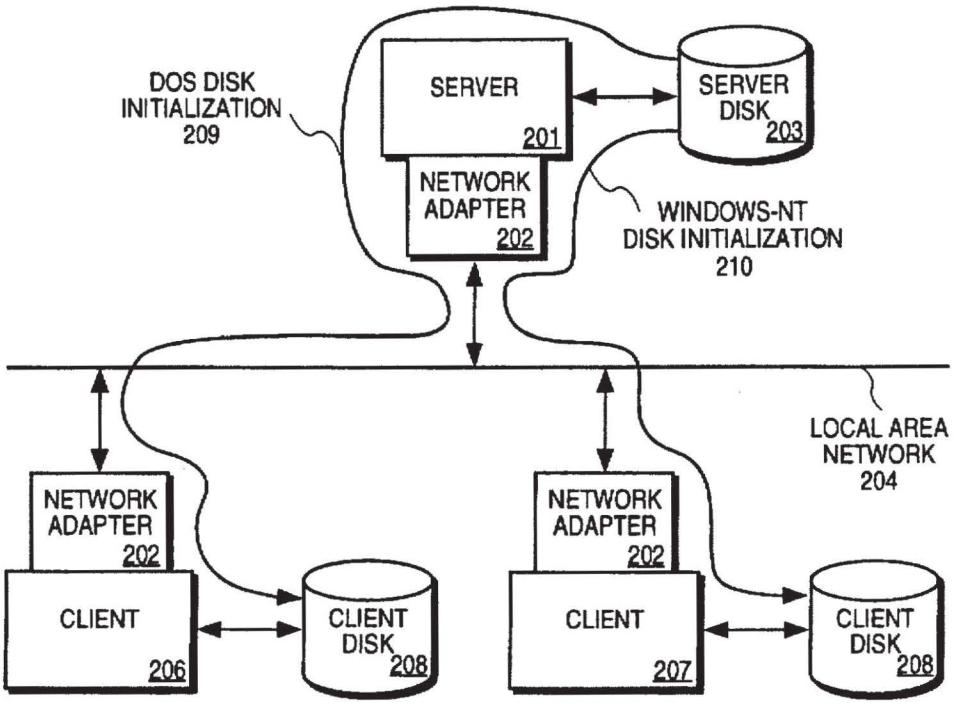

FIG. 2

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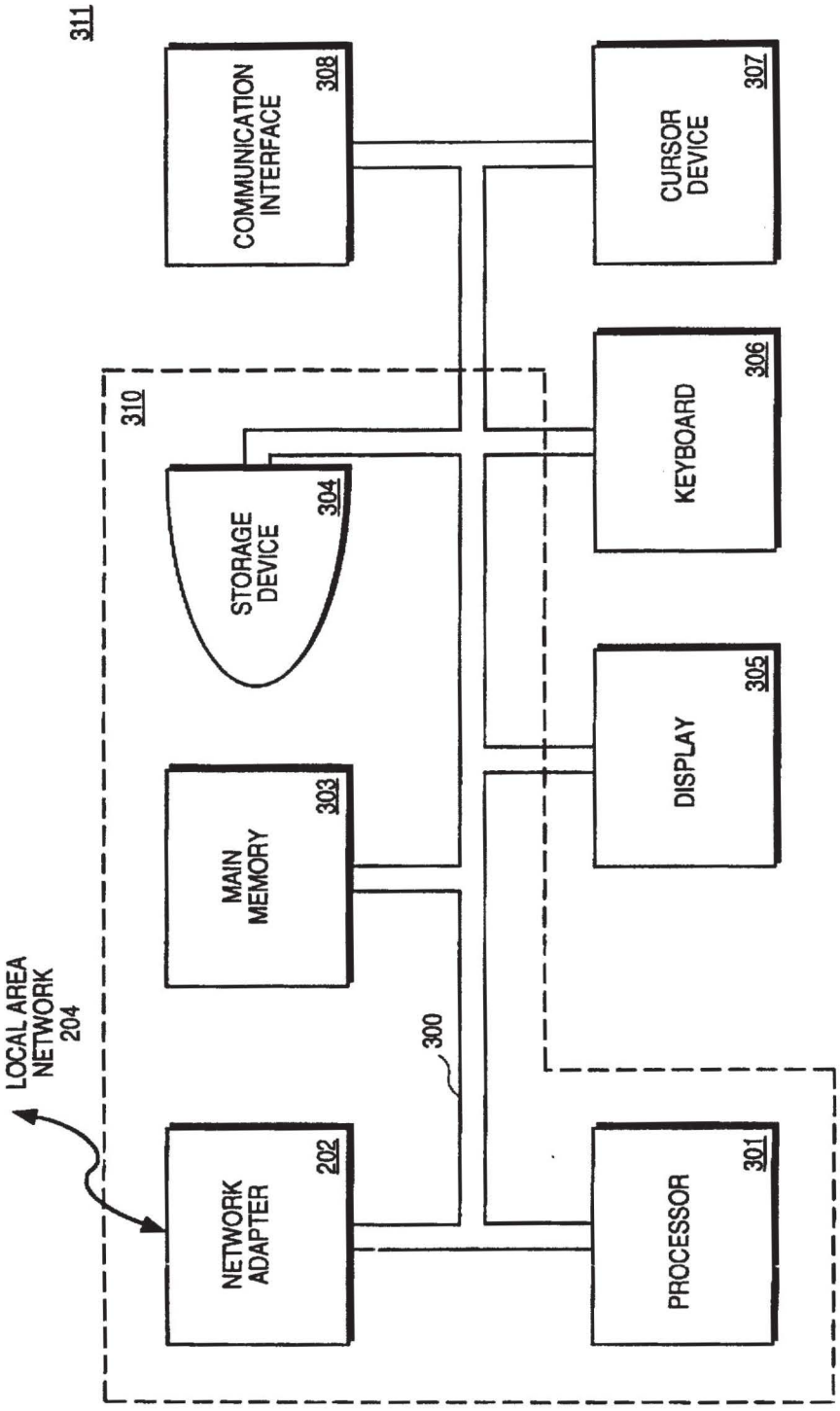

FIG. 3

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LOCAL AREA NETWORK AND NETWORK OPERATING SYSTEM FOR FORMATTING A CLIENT DISK AND INSTALLING A CLIENT OPERATING SYSTEM

FIELD OF THE INVENTION

The present invention relates generally to methods and apparatus for initializing a disk on a computer system attached to a local area network. In particular, it relates to using the local area network and a first network-oriented operating system to initialize such a disk and install thereon a second client-oriented operating system.

BACKGROUND OF THE INVENTION

Many home PCs are purchased with an attached hard disk drive that is already formatted, that already has installed thereon DOS or Windows™, and that already has installed thereon several applications programs, such as a word processor, a spreadsheet or a network access program. Most business PCs, when first turned over to the business end user, also come with an attached, formatted hard disk with a similar suite of pre-installed software.

In both of these cases, a trained technician, probably not the end user, has initialized the disk. That is, a trained person takes a hard disk and

(i) formats the disk;

(ii) copies onto the disk the boot record and the hidden and regular files that the operating system to be run on the PC requires on its boot disk (e.g. for MS-DOS™, the files named IO.SYS, MSDOS.SYS, and COMMAND.COM are the absolute minimum requirements);

(iii) copies onto the disk any networking software to be used;

(iv) reboots the system; and

(v) installs onto the disk the applications programs.

Installing software onto a hard disk is often performed by means of an installation script or program. Installation scripts may interact with the person executing them to allow optional installation of some features: For example, character fonts that are less often used may be installed only if the user answers "yes" to the appropriate on-screen prompt. Installation scripts may also interact with the user to learn the system configuration: for example, the software being installed may need to know what type of audio reproduction hardware is available on this system.

Whether or not interactive installation scripts or programs are used, the installation process spends the majority of its time copying files onto the hard disk. Typically the files a PC operating system or program requires are obtained from floppy disks, which have relatively slow data transfer rates and relatively small data storage capacity. It is not unusual for the installation process to require the user to change floppy disks—after the files contained on each floppy are copied to the hard disk, it must be manually removed and another floppy inserted.

Installing a DOS operating system requires an installation process involving three floppies and perhaps ten minutes. Installing networking software may require perhaps eight floppy disks inserted over a twenty-minute period. A reasonably sized application program may require the same. Windows NT™ takes the place of both DOS and the networking software. It requires reading approximately twenty floppy disks. In total, initializing a PC disk, i.e. formatting it and installing an operating system, networking software and several applications programs, may require one to two hours, or more.

Thus, there is a need to speed up the PC disk initialization process, particularly by avoiding changing floppy disks and interacting with the user.

PCs can be considered to have client-oriented operating systems in that PCs started as stand alone computers, which subsequently evolved into computers interconnected via a local area network (LAN). In contrast, engineering workstations can be considered to have network-oriented operating systems in that engineering workstations started as multicomputer networks.

Early engineering workstation networks often included client computer systems without a local hard disk. Thus they had to boot over the network. That is, their network-oriented operating system and their hardware LAN interface had to be capable of running the operating system after portions of it are loaded into main memory via the LAN from the disk of a server computer system.

In this engineering workstation environment, it is both feasible and desirable to automate the process of installing the network-oriented operating system from a server disk onto a client disk via a LAN. (See, for example, *Automating Solaris Installations*, pp. 1–22).

Thus there is a need to use a first, network-oriented operating system to initialize client disks that contain and are to be used with a second, client-oriented operating system.

SUMMARY OF THE INVENTION

Unattended initialization of client disks according to foreign operating systems is supported. The data written on the client disk is provided from a server disk across a LAN, rather than from floppy disks.

First, the client system is booted over the LAN with a first, network-oriented operating system. The network-oriented operating system executes on the client to format the client disk. This formatting is done according to a second, client-oriented operating system.

Windows™ is one preferred choice for the client-oriented operating system, due to its popularity and the range of applications software written for that environment. The UNIX-based Solaris™ operating system developed by Sun Microsystems, Inc. is one preferred choice for the network-oriented operating system because of its ability to be booted over a LAN, to format disks according to the file access table (FAT) file system commonly used on PCs, and to write FAT files.

The operating systems that are prevalent today for personal computers (PCs) are based on the FAT file system. The FAT file system was originated by Microsoft Corporation's well known Microsoft—Disk Operating System (MS-DOS™) operating system. Today, there are several additional operating systems based on the FAT file system, including DOS-compatible operating systems from other vendors, Microsoft's Windows™, Windows for Workgroups™ and Windows-NT™ operating systems.

Next the network-oriented operating system executes on both the client and the server to copy a disk image to the client disk from the server disk via the local area network (LAN). The disk image is written on the server disk according to the client-oriented operating system. The disk image copied includes all files required to execute the client-oriented operating system as well as all files required for any networking software and for any applications programs that are to reside on the client disk.

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