

## COMPUTER MANUFACTURING ARCHITECTURE WITH TWO DATA- LOADING PROCESSES

### CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from Provisional application Ser. No. 60/053,455 filed Jul. 22, 1997, which is hereby incorporated by reference. However, the content of the present application is not identical to that of the priority application.

### BACKGROUND AND SUMMARY OF THE INVENTION

The present application relates to computer manufacturing, and particularly to the installation of software releases at remote computer manufacturing or test facilities.

#### Background: Software Installation

Software installation is normally a burden with new computers, and is often a source of frustration for consumers. Thus, pre-installation of software by the computer manufacturer is very welcome to consumers. Pre-installation also helps to avoid problems which might be caused by software incompatibilities or incorrect installation of software. Pre-installation of software also helps to avoid unnecessary service calls to the computer manufacturer which may be due to the consumer's difficulty in understanding the software installation instructions.

#### Software Management

Pre-installation of software to prevent incompatibilities or incorrect installation at the consumer level requires careful software management. This management takes place not only prior to but also during the manufacturing process.

Traditionally, pre-installation is accomplished through creation of disk images. A disk image is a file that holds a copy of all of the data, including partitioning and driver information, contained on a given storage medium (usually a hard disk drive). Disk images are usually prepared by a software engineering group once a personal computer has been configured with all of the appropriate components (operating system, applications, utilities, TSRs, etc.). This configured computer is referred to as a "master". The disk images themselves are then replicated and distributed to remote manufacturing sites for installation on consumer machines.

Configuration and installation takes place prior to packing the unit for shipping in order to provide the consumer with a unit that is operable ("ready to run") upon receipt. Configuration of the unit encompasses partitioning the unit's hard drive, setting up boot information, and adding file directory structure information. Installation is the process of writing the physical software files to the hard drive.

#### Background: Zip Deliverables

The role of a software distribution system is to facilitate the transfer of software, which is to be released to the consumer, to the manufacturing site. Once at the manufacturing site, the software will be installed and configured on a raw (unformatted) hard drive or the hard drive of a newly assembled personal computer.

Current distribution techniques depend on a batch delivery system. The batch is composed of a disk image (namely, the set of files released for installation consisting of all required components) which has been compressed into a single deliverable unit. Compression is a process by which

the disk image is condensed in order to take up less storage space. Such a unit is often referred to as a "zip deliverable", which is a reference to the compression utility, PKZIP™, most often used to create the compressed file deliverable.

Currently, zip deliverables are distributed in what is known as the drop method, that is, when any change is made to just one of the files constituting the zip deliverable, the entire deliverable must be rebuilt and redistributed (dropped) to the manufacturing site. Such a distribution method puts an even greater demand on transmission capabilities, since all rebuilt deliverables will need to be redistributed to the manufacturing facilities in a relatively short period of time. Without prompt updates, the manufacturer has to allocate greater resources to post-consumer fixes.

#### Background: Disk Image Disadvantages

The use of disk images for distribution of software has inherent disadvantages. First, the size of disk images needed to distribute complete system software configurations has grown almost exponentially in the past 10 years, from 30 megabytes to over 400 megabytes, due to the increased hard disk space requirements of more functional operating systems and feature-rich applications. Consequently, the storage media for the disk image must meet ever increasing capacity demands and distribution costs continue to rise.

Second, disk images are limited to one configuration. Changes in disk image configuration can result from any difference in hardware and software combinations. For each change in configuration, no matter how slight, an entirely new disk image must be built, replicated, and distributed. Most installation configurations tend to have one or more files in common, such as the operating system or user applications. This results in many files being duplicated and distributed multiple times. Large amounts of hardware storage space are required to store these common files multiple times, once for each minor difference in configuration.

Creating an installation configuration for each possible combination of software and hardware would be time consuming and demand an extraordinary amount of hardware storage space. Assumptions must therefore be made as to what hardware and software configurations will be requested by the customer, and these configurations built accordingly. Therefore, any machine that is tailored for a specific customer must either have a disk image created for it or have some software installed at pre-installation independently of the disk image. As discussed above, creating a disk image for each configuration would increase costs in terms of both time and storage space.

The alternative of installing more software after a disk image has been installed can also create problems. Software installed outside of a disk image may not be fully compatible with that installed from a disk image. This defeats one of the purposes of a disk image, which is to ensure that all of the software it includes functions properly together. Further, installing software outside of a disk image increases the amount of time required to produce a hard drive or computer that is ready to be shipped. Finally, installing software outside of a disk image can impact customer service responses. When non-standard software is installed, problems can arise that will not be familiar to customer services representatives. Their efforts to resolve the problems may take a longer amount of time or be unsuccessful altogether.

Without maintaining an "as-installed" character, the system cannot be guaranteed to function properly and diagnosis of any problems may become difficult. Further, by installing software outside of a zip deliverable package, the time advantage of a single installation process is lost.