

NeXT's strategy for software distribution

by Kevin Wells

When NeXT releases NeXTstep 3 this year, software distribution and upgrades will be supported by compact disc-read only memory (CD-ROM) technology. In choosing CD-ROM as its primary system software distribution medium, NeXT has committed to an industry standard technology and has responded to our customers' clear message that CD-ROM is the medium of choice for distribution of large software releases.

This article discusses some of the advantages and disadvantages of various software distribution media and describes NeXT's current and future software product distribution plans.

software distribution media

Removable media serve three primary functions in a computer system: software distribution, software and data backup, and data transfer. Software distribution can be further divided into several categories: distribution of system software, distribution of applications, and distribution of data-intensive software, such as encyclopedias and multimedia libraries. In addition, nonremovable media, such as hard disks, are usually used for storage of and access to system software and data.

While convenient but relatively low-capacity media such as floppy disks are often optimal for distribution of application programs, system software and very large programs require much higher-capacity media for convenient and cost-effective distribution. In addition, it's desirable to distribute software on read-only media because the user is always assured of having a reliable copy without having to worry about archiving the software. Software and data backup also require high-capacity removable media, and reliability is critical. Lower-capacity media such as floppy disks generally suffice for data transfer. The following sections describe several software distribution media and discuss their benefits and drawbacks.

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magneto-optical disks

NeXT initially chose magneto-optical disks (ODs) as its system software distribution medium. ODs were also used as NeXT's sole removable media technology—they offered a low cost per megabyte, high reliability, large capacity, and transportability. NeXT was the first commercial computer manufacturer to integrate read-write-erasable optical disk technology into its hardware product line.

Unfortunately, NeXT was ahead of its time. It was impossible to adopt a standard magneto-optical disk technology—there was none at the time. For this reason, NeXT's OD drive required custom hardware support on the NeXT processor board, making NeXT's optical media format incompatible with more recently introduced optical disk drives. Because of this custom format, NeXT's OD drives were unable to take advantage of the cost reductions available in higher-volume drive production and thus remained relatively expensive. In addition, as technology has evolved since NeXT made its initial choices, it has become clear that optical technology faces other significant limitations. ODs have failed to perform at speeds suitable for a system disk, and their price has remained too high for a mass distribution medium. For these reasons, NeXT removed the optical disk drive as a standard feature of its product line, and future NeXT hardware and software products will no longer support the original NeXT optical disk drive.

Of course, all NeXT computers support external optical disk drives that use standard SCSI interfaces. ODs are still great as a reliable, high-capacity removable mass storage medium and have promise for the future. Hardware service and software support, through the Technical Support Hotline, will continue to be available to owners of original NeXT computers with OD drives.

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hard disks

Hard disks are clearly the price/performance winner over ODs for use as a system disk. All NeXT computer systems now ship with a hard disk with the current release of NeXTstep preinstalled, and NeXT recommends that all owners of NeXTcubes without hard disk drives—or with only 40MB accelerator drives—upgrade by purchasing a hard disk drive to use as a system disk.

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floppy disks

Floppy disks are convenient and economical. NeXT recognized these significant advantages by including a floppy disk drive as part of every standard configuration of its 68040-based product line. NeXT was the first vendor to offer a 2.88MB floppy disk drive, which other vendors are only beginning to offer almost a year later. NeXT's drives are backward-compatible with lower-capacity 1.44MB and 720KB floppy disks.

Floppy disks provide an ideal medium for distribution of applications, and nearly all of our independent software vendors (ISVs) use them. However, floppy disks are cumbersome and expensive for distribution of a large system software release that includes a UNIX[®] operating system, a complete development environment, and numerous bundled applications. As an illustration, the 46 floppy disks required to deliver the extended NeXTstep system software cost nearly as much as a CD-ROM drive!

Floppy disks also provide an ideal medium for data transfer and backup for individual users working with documents in a typical home or office environment. However, they don't provide a useful solution for backing up large amounts of data or for doing a general backup on a production information systems network. For more information, see ^aa foolproof guide to backups^o in this issue.

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CD-ROMs

NeXT has joined many major hardware and software vendors in recognizing that CD-ROM technology provides significant advantages as a software distribution medium. CD-ROM technology is based on the increasingly popular consumer compact disc technology used to distribute most recorded music today. A CD-ROM can hold an incredible amount of data (over 650 MB), is almost as convenient as a floppy disk, and is less expensive by orders of magnitude than most other media. The data is virtually indestructible unless the disk itself is destroyed. Thus, for distribution of large system software releases and large amounts of data, CD-ROMs provide a perfect solution. In addition, the cost of CD-ROM drives is dropping rapidly because CD-ROM technology is benefiting from the high-volume production of consumer electronics CD drive technology.

The major disadvantages of CD-ROM are that data access, while faster than with floppy

disks, is still slower than with hard disks, and the media cannot be written to without expensive mastering hardware. To address these concerns, CD-ROM drive manufacturers will offer drives with much improved performance in the near future. The disadvantage of using a read-only medium is also a benefit in terms of data reliability and the lack of a need to create separate archival copies of programs and data.

CD-ROM formats

NeXTstep Release 2 supports the ISO 9660 and High Sierra CD-ROM file system formats. These two formats are very similar and were adopted as standards primarily to serve computers running MS-DOS. As such, these formats lack enhanced file system features available under UNIX (such as file links, file ownership, and permissions). While sufficient for data distribution, these formats are generally unsuitable for distribution of system software and applications.

A group of UNIX systems vendors known as the Rock Ridge Group has recently proposed a set of extensions to the ISO 9660 standard designed to overcome its limitations for UNIX software. This proposal is backward-compatible with ISO 9660 such that a complete implementation of ISO 9660 can read Rock Ridge discs, but will have access only to the DOS file system features. NeXT will support the Rock Ridge standard in Release 3, and we encourage the use of this standard by our ISVs, internal corporate development groups, user groups, and other organizations providing data and applications for use on NeXT computers.

Unfortunately, it's very difficult to support booting a computer from a Rock Ridge CD-ROM. Because the ability to boot is critical in order to allow a CD-ROM to function as a backup for system software, Release 3 will also support booting from and reading CD-ROMs formatted using the NeXT UNIX file system. The Release 3 CD-ROM product will use this format and will allow a computer to boot with a minimal operating system environment in order to repair or reinstall the system software on the hard disk. NeXT will be one of the first vendors to offer this advanced CD-ROM booting capability.

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other media

CD-ROMs don't address the other requirements usually fulfilled by removable media,

such as software and data backup and data transfer. It's expected that affordable write-once CD-ROM systems will eventually fulfill the backup requirement. In the meantime, there are numerous SCSI-based tape and removable hard disk products available for this purpose that are completely compatible with NeXT hardware and software (again, see ^aa foolproof guide to backups^o). For data transfer, NeXT's high-capacity floppy disk drive serves the needs of general users very well. For larger amounts of data, SCSI-based tape and removable hard disk drives are often the media of choice. In many applications, users even transport data on external fixed-disk drives. While not as transportable as removable media, external fixed-disk drives provide the advantage that data does not have to be copied to be accessed with normal system performance.

NeXT software products

NeXT expects to produce major software releases roughly every 18 months, and all users are encouraged to upgrade to these releases. The upgrade path between major releases will rely primarily on CD-ROMs. To support new hardware products, minor software updates will be produced between major releases. In general, users will not need to update to those incremental releases. To the extent that updates are required, they will be provided on floppy disks.

NeXT recommends that all corporate and higher-education sites purchase CD-ROM drives for maintenance and upgrades. With Release 3, CD-ROM drives will be able to serve as network resources, thus allowing a single drive to be shared throughout a network. Software developers should also purchase a CD-ROM drive in order to be able to receive the large amount of software necessary to develop applications. Although ideally, each individual user would have access to a CD-ROM drive, it's impractical to expect each user to purchase a drive. For individual users without access to drives, support center programs will be available to provide upgrades and reinstall corrupted software.

current Release 2 products

In order to offer a choice of hard disk sizes in its product line, NeXT chose to split NeXTstep into a basic release plus extensions. The extensions are offered in four packages: developer software, documentation, literature, and demonstration programs. The basic release is installed on all hard disks, but the extensions are installed only on

hard disks over 300 MB. In addition to installing software on hard disks, NeXT offers several separate software products related to Release 2: the Release 2 Extended Upgrade, the Release 2 License-Only Upgrade, the Release 2 and Release 2 Extensions Installation Sets, and a special NeXTedgeSM tool for support centers—the Release 2.2 Disk Recovery Tool Set.

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Software Release 2 Extended Upgrade

The Release 2 Extended Upgrade (N5507) is an OD that allows customers to upgrade NeXTcubes from Release 1 to Release 2. This disk can also be used as a system disk for OD-only systems. This product includes Release 2 user documentation.

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Software Release 2 License-Only Upgrade

In addition to the OD-based product, NeXT offers a License-Only Upgrade (N5516) to customers who wish to upgrade multiple computers from Release 1 to Release 2 but would like to avoid the expense of purchasing an OD for each one. Customers purchasing this product must have purchased at least one copy of the OD upgrade.

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Release 2 and Release 2 Extensions Installation Sets

The Release 2 and Release 2 Extensions Installation Sets are two separate floppy disk products that together include all of Release 2 Extended. The Release 2 Installation Set (N5512) contains the base release on 13 floppy disks. One of these disks is bootable and allows users to boot a computer and reinstall Release 2 software, even if the computer's hard disk has been corrupted. Release 2 Extension Installation Set (N5513) contains the Release 2 extensions on 33 floppy disks. This product allows users to add the extension software as four individual packages to a base Release 2 system (assuming that the hard disk has sufficient space available). Together these products act as a system software backup for Release 2. Unfortunately, because of the large number of floppy disks required, these products are expensive and cumbersome.

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Release 2.2 Disk Recovery Tool Set

NeXTedge has made Release 2.2, the most recent incremental upgrade to Release 2, available to support centers on a CD-ROM. This special tool, called the Release 2.2 Disk Recovery Tool Set (E1058), marks the first NeXT software to be released on CD-ROM. The product consists of Software Release 2.2, a bootable extended-density floppy disk, and ExtenderDan application that allows selective loading of extended software packages. Created to support our Turbo products, 2.2 is completely backward compatible and runs on any NeXT hardware. The floppy disk can be used to boot a minimal UNIX environment. The CD-ROM disk drive can then be accessed to install Release 2.2 system software on the local hard disk drive.

new Release 3 products

Beginning with NeXTstep Release 3, all NeXT system software will be distributed on CD-ROM. (For information about new Release 3 features, see the article [a preview of Release 3 and more.](#)⁹) The NeXTstep Release 3 CD-ROM will be included with each new computer as a backup to the software preinstalled on the computer's hard disk and will be available separately as an upgrade product.

The Release 3 CD-ROM will provide a user-friendly, safe upgrade procedure that will preserve all user data, applications, and configuration files. Network upgrades will also be supported so that a single CD-ROM drive can be connected to a server and used to upgrade multiple computers without physically carrying the drive to each computer. The network upgrade procedure will be nearly identical to upgrading with a locally connected CD-ROM drive and will also preserve all user files. In addition, users who don't have access to a CD-ROM drive may upgrade their computers by purchasing the CD-ROM upgrade product and having a service or support center perform the upgrade.

The Release 3 CD-ROM will also support booting directly from the CD-ROM itself in order to recover a corrupted hard disk, and will include software to reinstall Release 3 on such a disk.

Like Release 2, Release 3 will be configured as a base release plus extensions. The base release will be preinstalled on all hard disks, and the extensions will be installed on all disks larger than 300 MB. The Release 3 CD-ROM will contain installable packages for each extension. Thus, unlike with Release 2, users of Release 3 will have access to all the Release 3 software on the Release 3 CD-ROM.

In addition to the system software preinstalled on each hard disk and the CD-ROM included with each new computer system, NeXT will offer two Release 3 upgrade products±Software Release 3 Upgrade and Release 3 Installation Set. Note, also, that NeXT will not offer Release 3 on optical disk.

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Software Release 3 Upgrade

The Release 3 Upgrade will use the same CD-ROM that ships with each computer. This product will also include a floppy disk that will enable computers with a ROM monitor version earlier than 3.0 to boot from the CD-ROM. Version 3.0 or later of the ROM monitor will be able to boot directly from the CD-ROM without this floppy disk.

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Release 3 Installation Set

NeXT will offer the Release 3 Installation Set on floppy disks. This product will only allow complete installation of Release 3 without extensions on a hard disk±user data, applications, and configuration files won't be preserved. NeXT will not offer complete Release 3 Extended software on floppy disks. With CD-ROM technology available, the relative cost of this product would be prohibitive.

summing up

CD-ROM technology provides a convenient, cost-effective, and reliable means of distributing, archiving, and transporting system and data-intensive software. CD-ROMs offer significant benefits over both optical and floppy disks for these purposes and provide an excellent solution to the difficult problem of distributing a very large system software release.