NeXT's Professional Workstation Family
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NeXT Computer, Inc.'s family of professional workstation products offers the best price, feature and performance combination in the industry. Powered by the Motorola 68040 microprocessor running at 33 megahertz (MHz), and still offering the unprecedented array of hardware and software capabilities that define the NeXT computing platform, these new products — NeXTstation Turbo, NeXTstation Turbo Color, NeXTcube Turbo and NeXTdimension — surpass the speed of their predecessors, but with prices that are the same or even lower.

Product History

NeXT introduced its first product, the NeXT Computer, in October 1988 as a developers' and higher education machine. Release 1.0 of NeXTstep, NeXT's object-oriented system software, began shipping in September 1989 and made NeXT's systems available to all types of users.

Although the category had not yet been identified, the NeXT platform also launched a new market segment: professional workstations. Professional workstations are UNIX workstations, with all the power, multitasking, networking, standards compatibility and other characteristics associated with workstation-level performance. Instead of being designed for engineering and technical people, however, professional workstations are aimed at non-technical professionals, such as those in financial firms, publishing, medicine, law, government agencies and education institutions.

After listening carefully to customer feedback on its original machine, NeXT in September 1990 brought out a new family of NeXT computers to address this feedback. This new family — NeXTstation, NeXTstation Color, NeXTcube and NeXTdimension — was based on Motorola's more powerful 25 MHz 68040 microprocessor and offered customers a wider array of choices for expandability, configurations, price and color displays than the original NeXT Computer.

By listening to its customers, NeXT has been able to do two important things: improve upon features that needed attention, and reinforce the characteristics that all NeXT professional workstations share.

NeXT has now unveiled the third generation of its NeXT hardware family. These new machines, based on the 33 MHz version of the 68040 processor, have the word Turbo added to their names to denote their increased performance. They give NeXT the price, feature and performance lead in the professional workstation market, while also refining the core characteristics that define the NeXT platform.

What Makes a NeXT Computer a NeXT Computer

All NeXT products share a rich array of features that make up the core of every NeXT computer and that define what is quintessentially "NeXT" across the product family.

· **NeXTstep Release 3.0** — NeXTstep has two identities: To users, it is the graphical user interface that makes the complex UNIX operating system easy to use. To programmers, it is the object-oriented development environment that greatly speeds the creation of sophisticated applications and makes it easier to construct high-quality graphical user interfaces (GUIs).

Thanks to NeXTstep, any application that runs on one NeXT computer will run on any of them, without modification. This rule applies even to color; while color images will not actually show up on a monochrome monitor in color, the application will otherwise run perfectly whether it is in monochrome, 16-bit color or 32-bit color.

For a more complete description of Release 3.0, please refer to the separate document titled "NeXTstep Release 3.0: Strengthening NeXT's Object-Oriented Leadership."

· **Multimedia integration** — Multimedia may be one of the most used, and least understood, buzzwords in the computer industry. Rather than debate how many "media" can fit into a computer system, NeXT would prefer to consider levels of media integration. Clearly, the less effort that users have to expend to get multiple media (text, voice, graphics and so on) running on their computers, the more likely they will use the capabilities effectively, or at all.

NeXT's commitment to such integration is unmatched. For example, every NeXT workstation includes a Motorola 56001 DSP (digital signal processor) chip built in, so that developers can easily create applications that incorporate voice, sound and music and know that these applications will run on every NeXT computer. The DSP makes possible CD-quality sound, signal and image processing, data compression and voice recognition. Optional additional memory can be added to the DSP to make an even wider range of DSP applications possible.

NeXT has made sure that both its color and monochrome display screens are up to the task of handling complex graphics, drawings and diagrams, with 1120 x 832 pixel resolution, 92 dpi (dots per inch) and large size standard on every NeXT MegaPixel Display. In this way, users can see more of their work on the screen and see it more clearly.

· **Display PostScript** — The benefits of the industry-standard Adobe PostScript page description language for output devices has been accepted for some time. NeXT, working in conjunction with Adobe, helped develop the Display PostScript system and was the first company to introduce a computer that featured it. The Display PostScript system uses the industry-standard, "regular" PostScript language to control both printed images and their on-screen counterparts.

For users, this unified imaging model means that images on the screen look just as they will when printed, which greatly reduces the guesswork and number of "trial" versions the user must print. Other computers may have optional unified imaging models, but only the Display PostScript system takes advantage of the vast number of printers and other output devices that have already standardized on the PostScript language. For anyone who produces printed documents, the Display PostScript advantage cannot be overstated.

NeXTstep Release 3.0 adds a Level 2 Display PostScript interpreter, the most recent version of the Display PostScript unified imaging model, for calibrated, device-independent color output.

· **Transparent networking** — To be effective, networking must be not only built in, but also easy to install and maintain. By considering networking from the outset, NeXT has made it easy for users to connect groups of NeXT computers together, and to communicate with other types of computers over a network.

Each NeXT workstation includes everything necessary to hook up to TCP/IP and Ethernet networks, two of the most widely used standard networking protocols. NeXT's computers also feature both thin and 10BaseT twisted-pair Ethernet. Twisted-pair Ethernet is significant because most buildings are already equipped with twisted-pair (i.e., telephone) wiring, so that hooking NeXT computers into the network is simpler than ever.

The new family of computers, with NeXTstep Release 3.0, will also be able to work with the most popular IBM PC/compatible and Macintosh networks — Novell Netware and Apple's EtherTalk — through bundled Novell Client and AppleShare Client software. The two file servers appear in the NeXT browser, much as NFS servers have always done, giving NeXT users ready access to files and network resources such as printers.

· **Multitasking** — By basing its computer platform on the UNIX operating system, NeXT provides users with all the advantages delivered by UNIX. By masking the operating system beneath NeXTstep, NeXT has made these advantages accessible to all users, even those who do not have the time or inclination to learn the esoteric commands traditionally necessary to perform UNIX operations.

Multitasking, one of the primary benefits of the UNIX operating system, is the ability of a computer — and the person using it — to actually do more than one thing at the same time. As a result, people spend less time waiting for the computer to perform operations and can move easily and quickly among tasks.

Other important UNIX features include robust networking and interprocess communication, whereby different applications can "talk" to each other on the system. For example, when a user updates a document in one application (e.g., a spreadsheet), that same information can be updated automatically in a document created in a completely different application (e.g., that spreadsheet integrated into a report generated by a page layout program).

NeXT computers use the Mach operating system, which is compatible with Berkeley 4.3 UNIX, a widely used standard. Originally developed by researchers at Carnegie Mellon University, Mach was licensed and modified by NeXT, and was subsequently licensed by the Open Software Foundation (OSF).

· **2.88 MB floppy drive** — NeXT includes a floppy disk drive as standard with all its computers. NeXT uses a 2.88 MB drive, which can store twice the data of a 1.44 MB floppy drive and is expected to replace 1.44 MB capacity as the industry standard. It is compatible with 720K, 1.44 MB, MS-DOS, Macintosh and UNIX-formatted disks.

· **MegaPixel Display** — Whether monochrome or color, every NeXT display is of megapixel quality (1120 x 832 resolution), which ensures crisp, clear images. Also, the NeXT monochrome monitor features a built-in microphone so users can easily include voice annotation and other recorded sounds in NeXT applications and documents, and color systems feature sound-in capabilities via the NeXT Sound Box.

Optional components of the NeXT computer system are NeXT's **400 dpi Laser Printer**, which has raised the output quality and significantly reduced the price of PostScript laser printers; NeXT's new **Color Printer**, a 360 dpi, four-color printer that produces color "laser-quality" output for the cost of many 300 dpi black-and-white laser printers; and an **External CD-ROM Drive**.

With 300 dpi still the industry norm for laser printers, NeXT's 400 dpi black-and-white version produces nearly twice the resolution of the others (160,000 dots per square inch for NeXT, compared to 90,000 dots per square inch for a 300 dpi printer). This higher resolution smoothes curved lines and text characters and improves the appearance of gray scales in printed graphics. The $3,495 list price of this laser printer makes it affordable to individuals as well as work groups.

The NeXT Color Printer, described in more detail later in this document, sets a new standard for its combination of color quality, ease of use and low price point. The CD-ROM drive, also described later, provides a very convenient and cost-effective method for distributing NeXT system software and large files of information.

Turbo Hardware Gives NeXT a Price, Feature and Performance Edge

NeXT's significantly faster Turbo workstations are all powered by the new 33 megahertz (MHz) version of Motorola's 68040 microprocessor and offer 25 MIPS (million instructions per second) performance. (The original NeXT Computer used the 68030, and the 1990 machines used the 25 MHz version of the 68040.) The Turbo workstations also feature a new memory architecture supported by a new NeXT-designed ASIC (application-specific integrated circuit) and a new peripheral controller chip that off-loads input/output tasks from seven DMA (direct memory access) peripheral channels from the 040 processor.

NeXTstation Turbo (monochrome) users will notice a dramatic improvement in on-screen responses to typical actions such as opening applications, scrolling through documents, conducting database queries, cutting and pasting, performing calculations and printing to NeXT printers. In fact, all operations are "turbo charged" on the new machines, executing up to 60 percent faster than before.

In addition to the faster processor, NeXTstation Turbo systems have also had their minimum internal hard drive storage capacity increased from 105 megabytes (MB) to 250 MB, and now allow users to choose internal RAM capacities ranging from 8 to 128 MB.

NeXTstation Turbo Color includes the same improvements as NeXTstation Turbo, producing a perceived speed increase of 20 to 30 percent compared to the 25 MHz version of NeXTstation Color. In addition, all NeXTstation Turbo Color machines begin with at least a 250 MB hard drive and a minimum of 16 MB of RAM (previously they began with 12 MB), with prices still starting at $8,995.

The following chart shows some "dollars per MIPS" comparisons between

NeXTstation Turbo and NeXTstation Turbo Color systems, in both typical user and developer configurations, and their closest comparable counterparts from Sun Microsystems (note that the lower the $/MIPS number, the better the price/performance value):

			Model	**RAM (MB)**	**Disk (MB)**	**SRP**	**MIPS**	**$/MIPS**
User	Mono	NeXT	Turbo	16	250	$6,995	25	$280
		SUN	Sun IPX	16	207	$11,995	28.5	$421
	Color	NeXT	Turbo	16	250	$8,995	25	$360
		SUN	Sun Color IPX	16	207	13,495	28.5	$474
Developer	Mono	NeXT	Turbo	32	400	$9,995	25	$400
		SUN	SPARCstation 2	32	424	$15,495	28.5	$544
	Color	NeXT	Color Turbo	32	400	$13,495	25	$540
		SUN	SPARCstation 2	32	424	$20,495	28.5	$719

NeXT will continue to offer NeXTstation and NeXTstation Color computers built around 25 MHz 68040 processors as low-priced, entry-level workstations that will meet the computing needs of many NeXT customers. In fact, NeXT has even improved the architecture of these 25 MHz machines so that they run significantly faster than current versions. Prices still start at $4,995.

Color Printer and CD-ROM Drive

The NeXT Color Printer produces color "laser-quality" output for the cost of many 300 dpi PostScript black-and-white laser printers. The NeXT Color Printer, designed for business and presentation graphics, color publishing and technical graphs, uses Canon’s color bubble-jet technology. The four-color printer yields print quality of 360 dots per inch. It uses an advanced print head design that incorporates 64 nozzles, aligned in an array. This allows all four colors to print on a single pass, which improves printing throughput compared to printers that require four separate passes.

The NeXT Color Printer prints from letter-size (8 1/2 inches by 11 inches) up to ledger-size (11 inches by 17 inches) paper. This capability allows users to print two letter-size pages next to each other or one tabloid-size page, a useful size in a number of graphics-oriented applications. The printer also allows output onto transparencies and plain bond typing paper, as well as paper designed for laser printers.

Other features of the NeXT Color Printer include the use of a true black ink, so that text and graphics using black look far better than with printers that support only three colors; PostScript Level 2 imaging (the same imaging model used in NeXTstep Release 3.0 for the display), for high-quality, true-to-life colors; four individual color ink cartridges, so users can individually replace more frequently used colors, such as black; and connection through the NeXT computer’s SCSI port, which assures the high throughput necessary for color printing and allows users to connect both a NeXT Color Printer and a NeXT 400dpi Laser Printer to the same workstation simultaneously.

The NeXT External CD-ROM Drive provides immediate access to the vast amounts of information — up to 680 megabytes — that can be stored on a CD-ROM, as well as an efficient and inexpensive means for receiving updates to, and maintaining back-up copies of, NeXT’s system software. Beginning with Release 3.0, NeXT will distribute all system software via CD-ROM. With every NeXT computer shipped with Release 3.0 pre-installed, NeXT will include Release 3.0 on a CD-ROM disc for back-up.

An entire network can share a single NeXT External CD-ROM Drive, making it extremely cost-effective. The drive connects to a NeXT workstation’s SCSI port. Users can use industry-standard files — such as TIFF, EPS, RTF and text — contained on a CD-ROM disc in applications on a NeXT computer or copy them onto a hard disk, where the files can be edited using the full range of editing options available on the NeXT platform. These CD-ROM files include many clip art images designed for personal computers.

In addition, the NeXT External CD-ROM Drive supports the major CD-ROM standard file formats, High Sierra ISO 9660 and the new Rockridge format, so customers can automatically work with the extensive range of CD-ROM discs already available. These discs hold digitally recorded text, sound and graphics files, including high-quality color and PostScript image files. As a special bonus, users can listen to digital audio CDs on their NeXT External CD-ROM Drives by using the drive's RCA jacks or headphone jacks (with the appropriate software), while still computing.

Conclusion

NeXT's newest line of professional workstations meet customers' needs with the best available combination of price, features and performance available today. With these sophisticated computing tools NeXT is not only supporting current requirements but also helping to define computing for this decade, and beyond.

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