

Turbo NeXTstation Color Computer

This Review may make you question whether you still want a SPARC system on your desk.

Differentiation is always a significant challenge in any market, and in the computer marketplace, it has seemed a particular problem, with the fundamental similarities of most machines. Differences in speed, display quality, and the like seem relatively trivial for many of the more common applications. Indeed, text editing is usually faster on a smaller, slower computer like a PC than a big complex system like a Sun. And vendors are left with a difficult challenge. One of the more popular differentiators has become the interface, and with good reason: Most computers are still difficult to use.

Enter Steve Jobs, the father of the successful Apple Macintosh, with its trend-setting, friendly graphical interface design. Entranced with his own vision of a powerful Unix system, with the help of some wealthy friends and partners, he created NeXT Computer Inc. and released the NeXTCube. Poorly received, it was completely incompatible (for example, it had a large magneto-optical drive, but no floppy). Its shortcomings caused many people, myself included, to dismiss NeXT as a noncompetitor.

Having now had the opportunity to use the TurboNeXTstation Color Computer, a 68040-based Mach workstation, has not only changed my mind, but is causing me to question whether I even want to continue having a SPARC system on my desk at all. In a word, Wow! With a second word appended: "but..."

What it is

The Unix marketplace is surprisingly full of different workstations, systems that are intended to fit on a desk, have a 17- to 20-inch display, and a considerable amount of CPU power. The Turbo NeXTstation Color is in that category, with the system evaluated including 16 megabytes of RAM, a 409-megabyte disk, a 17-inch color monitor, and a core CPU using the popular Motorola 68040 running at 33 MHz. The footprint is pretty typical for a desktop system; indeed the CPU box looks like a black Sun pizza box. What's exciting about the NeXT isn't the hardware, however, but the technology and environment itself.

Designing a system from the ground up, NeXT has really had the opportunity to add some exciting and important new technologies, like an integrated digital signal processing chip (a DSP), which offers brilliant audio capabilities, including high-quality speech. Perhaps more importantly, the NeXT systems include a custom chip that just does blit graphics on the display, allowing for fast, smooth graphic movement. The most obvious win is that window motion is flawless, and indeed, when moving windows, icons, or any other image on the screen, you actually move the image rather than a hard-to-see outline. The screen on our test system was a 17-inch megapixel display, with 1120- by 832-pixel resolution at an impressive 92 dpi. (Dots per inch, this indicates the density of pixels in a given

space: Higher is always better.)

NeXTOS is based on the Mach operating system, which is a Unix-like variant designed at Carnegie Mellon University in the late 1980s. Intended to return to the original vision of the Unix operating system, Mach offers a considerably smaller kernel than on a traditional Unix system, sophisticated interprocess communication, inter- and intra-process multitasking (called *threads* and *lightweight processes* in Mach parlance, these are just starting to migrate into SunOS), and sophisticated memory manager. Indeed, one of the slick things that the Mach memory manager does is fully utilize all available memory for running tasks, so if you're just running an editor, you might have an OS that is using 10 to 20 megabytes of RAM for file system cache.

Building on the Mach platform, NeXT added a complete and pervasive object-oriented environment, based on the nonstandard Objective-C object extensions to the C programming language. Among the capabilities available are very fast prototyping, easy, highquality interface construction, a high degree of compatibility across applications, and a well thought-out drag-and-drop implementation. For example, if you've received a multimedia message from someone, you can easily click on a graphic and drag it, as a TIFF object, into another document, without any further action. Colors can be dragged about in an analogous fashion too, though the use of color on the Color NeXTstation is poor.

Over and above the object oriented design of the OS is NeXTstep, its much discussed graphical interface. Offering some of the most beautiful computer icons available (thanks to the shrewd decision to hire a computer artist to design and create them all) the smooth feel of the interface is light years ahead of anything else available for a Unix user, not just in GUIs like Motif and Open Windows, but even with the additional capabilities of Looking Glass, X.desktop, or others.

At the same time, though, for a machine that offers a high-resolution color display, the NeXTstation has minimal use of color, with the NeXT icon the only nongray on the screen. My understanding is that NeXT designed it that way because its engineers believe that color is overused in interfaces today, a philosophy I share, but being unable to add *any* color to the screen is annoying. Not even a color clock.

NeXTstep also suffers from some surprising ergonomic design failures, most notably a lack of understanding of what cognitive scientists refer to as *user focus*. The idea is that when we're involved in a task on the screen, our intention is either at the cursor point, or the center of the screen. On the NeXT, however, things happen at the periphery of the screen without any feedback. The NeXT has a vertical menu bar that by default appears in the top left of the screen. While on first glance it always seems like it's the same menu items available, in fact its changes for each application launched. The problem is, it isn't obvious

that it has changed, and so, since the differences are so subtle, users quickly ignore that area of the screen. So what's the problem? Some applications don't have windows and just pop up their own menu bar, resulting in them being essentially invisible.

For example, WriteNow is a slick desktop publishing tool, originally from T/Maker, that is included with the NeXT. It offers multiple fonts, graphics, tables, and many other sophisticated features. As with many DTP-style applications, it launches with a blank slate, a new "untitled" document (a la the Mac). If you close that, and then have your attention drawn to something else (perhaps mail coming in, for example) you're doomed. The WriteNow menu bar is replaced by the Mail menu bar, and there is no way to know if the app is running or not. If you try to relaunch it, nothing happens (the computer knows WriteNow is already running and simply brings it to the foreground (changing the menu bar, but remember, the user has already learned to ignore that spot on the screen, so it's invisible). There are also icons on the bottom of the screen for each application, but windows rapidly grow to cover that space on the screen. In real use, many times I found myself puzzling over where my application had gone, how to bring it back, and whether it was already in the foreground. Very confusing.

How it compares

My background is in Unix. I've been using Unix systems for over a decade now, and have learned to endure the inferior X Window System, and the two mediocre GUI's on top of Motif and Open Windows. While each offers strengths, as interfaces, I find both, and the entire X environment, quite lacking. For the last few years I have also worked in the Macintosh environment, and have found the differences between the interfaces dramatic. On a Mac, you can accomplish and navigate without touching a keyboard, and indeed, the lack of a command-line interface has never been a problem for me.

It has been difficult, as you might expect, to endure the slings and arrows of Open Windows, even the latest version with its improvements and better utilities. The best analogy I can think of is that Unix remains a bunch of bricks without any mortar at all. It's a nice wall, but it sure doesn't make a good building to live within.

NeXTstep offers the mortar that's missing in the X/Open Windows and X/Motif environments. Using the NeXT computer offers a computing experience (a seamless computer experience) that shames other advanced systems. Indeed, I had to almost wrestle with the NeXT to get a terminal window, and when it launched, I quickly realized I didn't want it, and more importantly, didn't need it. Whatever the task, from writing this review (in WriteNow) to saving it to disk (floppies are automatically mounted) to adding new users, to shutting the system down (press the power button on the keyboard (the same way you boot it), could be done easily, painlessly, and intuitively from within the NeXT graphical environment.

The NeXT approach to documentation is also a new standard for the rest of the Unix industry. In addition to four well-written, appropriately illustrated, printed documents (*User's Reference*, *Network and System Administration*, *Applications and Setup*, and *Tutorials*), all documentation is also available on line, accessed through Digital Librarian, a PostScript document browser. All the Unix *man* pages are included in the dataset for Digital Librarian, and all information is displayed in an attractive, multifont manner, allowing for not only easy perusal of documents on line, but easy search and reading too. At one point I found a ".dot file" that was unfamiliar in my *home* directory, and simply giving its name to Digital Librarian resulted in an almost instantaneous match with the application that created it. And a simple click of the mouse gave me the point in the documentation that mentions the file and explains its purpose. There are similarities with Sun's *AnswerBook*, but instead of a separate program that must be run off CD-ROM (a device notoriously difficult to share across a network), Digital Librarian is always there and local to each machine. Further, DL is easily user-extendable, with the ability to add new documents at whim. Finally, as with the rest of the NeXT interface, DL is dramatically better in appearance and functionality than *AnswerBook*. A tricycle and a racing bike are the same idea, and offer similar technologies, but I know which one I'd rather have.

System performance is slower than a SPARCstation 2, and the system is based on the lackluster Motorola 68000 CISC architecture, but somehow the slower performance didn't seem to matter when I could accomplish so much more on the system due to the overall excellent design.

Don't be fooled by the numbers, though. Ultimately, the most important indicator of performance is how fast you can accomplish your tasks, and with a sophisticated, easy-to-learn and easy-to-use interface, the NeXT system goes far beyond just compensating for not having comparable raw performance to a SPARC system. Indeed, one thing that the NeXT system clearly points out is that Sun has been chasing after the wrong rainbow: Instead of having the fastest machine (which it doesn't have anyway, now that HP has launched the 700 series), Sun should have been chasing after the best, easiest-to-use interface.

In the real world

The nagging headache of the NeXT system, however, is that it just isn't a team player in today's world of heterogeneous computer systems, floating-license servers, distributed applications, and so on. NeXTOS is not like any other Unix operating system, and NeXTstep is incompatible with any X application, and cannot interact with any X server either. Using a NeXT is taking a major step away from interoperability, unfortunately, and dooming one to live within a NeXT-only world.

NeXTOS offers a variety of standard network features, including TCP/IP networking, Berkeley Sockets, NFS, and even *routed* to allow it to be a good network member. But in our environment, a prototypical Unix workstation

environment, includes servers that not only serve files, but serve applications, too.

What exacerbates this is that the NeXT has a small number of applications available. At the same time, the ones that are available are top-notch, and typically better versions than their non-NeXT peers. For example, the version of Adobe Illustrator for the NeXT is more powerful than that on the Macintosh. FrameMaker is similarly easier to use and understand, being able to utilize the NeXTstep interface to maximum advantage. A further advantage of NeXTstep is that the different applications can easily interact, sharing graphics, text, and other elements via the simple and pervasive drag-and-drop feature. Quite a bit more sophisticated than Open Windows, for example.

And yet, what matters in the end isn't whether it's the cleanest interface, the most attractive icons, or the best-thought-out interface, but whether it will work within existing user environments. With the non-standard Objective-C, NeXTstep, Motorola, few thirdparty applications, and the requirement that we relearn how to use a computer, NeXT has painted itself into a corner. A beautiful, enjoyable corner, but a corner nonetheless. And like any corner, when you're done playing you step back into the room and get on with your work.

I'll keep a SPARCstation on my desk, and dream about being able to have a future NeXT system available, one that can interoperate with the rest of my computing environment. After all, different might be better, but it's still different, and in the world of Unix workstations, the cost is just too high for many people.

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