

What's NeXT for Business Users?

Comparing Two Spreadsheets Designed For The NeXT Platform: Lotus Improv and Ashton-Tate PowerStep

BY SIMSON L. GARFINKEL

Without applications, even the most advanced computer system is just another pretty black box. And for most of the business world, the words "pretty black box" aptly describe what the NeXT cube has been for the past three years.

Then in September '90, NeXT president and founder Steve Jobs announced what he hoped would be the salvation of his company: three new computers (all of which use Motorola 68040 CPUs) and a powerful new family of applications that would fulfill the promise of making NeXT *the* business computer of the '90s. But despite the media extravaganza, by the end of last year NeXT had only just started to deliver the goods.

When Jobs introduced the NeXT Computer System in '88, he said the computer was intended solely for the educational market. Today NeXT has changed its goal and is trying to crack the corporate market: the company's vision is to develop a computer that's as easy to set up and use as the Macintosh, yet is as powerful as a Unix workstation — a computer that is home to a new generation of productivity tools so powerful that businesses will buy NeXT computers in order to run them.

Instead of safely following established standards, NeXT decided to break new ground. Indeed, many of the delays that beset the company were the result of NeXT's engineers taking the time to do something "right" instead of pushing products out the door in order to meet marketing deadlines. Realizing that

its developers couldn't write all the applications it needed or wanted, the company aggressively pursued major software publishers such as Lotus, Ashton-Tate, and WordPerfect to develop mainstream applications that would take advantage of all the computer had to offer.

With all this history in mind, in January I eagerly unpacked my beta copies of Lotus's Improv and Ashton-Tate's PowerStep. Improv started shipping on February 4th. The future of PowerStep, on the other hand, is less clear. As the first third-party mainstream financial tools designed expressly for NeXT hardware, I had high hopes, as well as high expectations, for both of these programs.

INTRODUCING IMPROV

Lotus's Improv was an integral part of NeXT's new product announcement last fall. The advertising copy read, "Lotus reinvents the spreadsheet." To spur NeXT's penetration into the business market, NeXT and Lotus are giving Improv to anybody who purchases the new NeXTstation before March 31, 1991. The package is also being given to existing NeXT customers who upgrade their 68030 NeXT cubes to more capable 68040-based systems.

After using Improv for less than ten minutes, it became clear that Lotus has made good on its claims for the new spreadsheet. The first thing that Lotus did with Improv was throw away



FREDERICK H. CARLSON

the standard spreadsheet view of the world. Conventional spreadsheets represent data on a rectangular grid of cells; any cell can contain a label, a number, or a formula. The data in the spreadsheet itself has no structure.

Improv organizes data into meaningful categories and items defined by the user. For example, on one axis you might have a category called Quarters, with four items in it: Winter, Spring, Summer, and Fall. On another axis you might have a category called Details, with items named Sales, Expenses, Pretax income, Income tax, and Income. Such a "worksheet" (Improv's name for a spreadsheet) would contain 20 different cells, with names like Winter.Sales, Spring.Sales, Winter.Expenses, and so on.

Like traditional spreadsheets, Improv lets you type numbers directly into cells. The power of Improv is that it lets you specify rules, which it calls "formulas," for computing the values of some cells from others.

For example, to the worksheet described above you might

want to add a simple rule:

$$1. \text{ Pretax income} = \text{Sales} - \text{Expenses}$$

This rule specifies the calculation for all of the pretax income cells. If a particular cell should be calculated differently, you can add a second formula for that cell alone:

$$2. \text{ Pretax income: Winter} = \text{Sales} - \text{Expenses} + 1000$$

When you type this second formula, Improv alerts you that there is a "formula overlap." That is, one cell can be calculated with two different formulas. Improv then lets you specify which formula it should use to calculate each overlapped cell; if you select the second formula, Improv modifies the first rule to read:

1. Pretax income = Sales - Expenses SKIP Winter

"Improv doesn't confuse input with output," reports Eric Spahr, a vice president at Lehman Brothers (New York, NY), who has been beta testing the product. "If a cell is calculated by a formula, the user can't enter a new value into the cell by typing on top of it. A calculated cell is a calculated cell."

Spahr likes the way Improv displays formulas at the bottom of the worksheet rather than hiding them inside the cells, like conventional spreadsheets. "The distinction of pulling the algorithms out of the spreadsheet is probably Improv's most important feature, from a design point of view. It allows you to maintain them more easily and check them more consistently, and it doesn't trap you into mistakes where you make assumptions about what is happening with your data."

By having formulas that specify rules, says Spahr, it is easy to

curve. "I think my background was a handicap," says Windflower Gilbert, an Improv beta tester at Pencom Software (Austin, TX). Like other Improv users, Gilbert says that her first reaction to Improv was to try bending it to behave like 1-2-3. "I immediately tried to translate it instead of thinking of it as a different creature — and it is different."

The easiest way for new users to get over Improv's learning curve is to watch the application solve problems, says Gilbert. Beyond that, all that's needed is a good tutorial; Lotus has one planned for the final release of the product.

POWERSTEP

Ashton-Tate's PowerStep doesn't share Improv's learning curve problems. If you've ever used SuperCalc, Quattro PRO, Excel, or other conventional spreadsheets, you'll feel right at home in PowerStep.

Whether this is an advantage or not remains to be seen; in January Ashton-Tate announced that it had no plans to turn PowerStep into a commercial product before the end of the first quarter. In fact, company executives say it's unlikely that the company will release commercial versions of PowerStep before 1992.

When PowerStep starts up it creates an empty 256-column x 2048-row spreadsheet. (The maximum spreadsheet size is 16,383 columns x 16,383 rows, or 268,402,689 cells). PowerStep also creates two other windows: the Controller and the Icon Bar.

The Controller window is PowerStep's primary status display. Its main feature is the Edit Box, which displays the contents of the currently selected cell and lets the user make changes. To the left of the Edit Box are two entry buttons: the one with a check mark on it accepts the entry, and the one with an X on it reverts the contents of the Edit Box to whatever was there before you started editing. You can also press Return to accept an entry.

The Controller window also has a Selection Box, which shows the number of the cell or the range of cells that is currently selected; and three more buttons, which bring up other panels: the Icon Bar, the Chart Inspector, and the Graphics Inspector.

To enter information into a cell, simply click on the cell and type its new data. Clicking on the Icon Bar lets you insert or delete rows and columns, move data, change formats, or save the spreadsheet. There is also a format panel for making detailed changes to the format of worksheets.

The big problem with PowerStep is that each spreadsheet can appear in only one window at a time, and that the window cannot be split. Consequentially, if you're working with a large spreadsheet, you can't view one region while making changes to another.

Furthermore, PowerStep is painfully slow scrolling from one region to another. "[Ashton-Tate should] either do something to speed up the scrolling, or allow the user to split the screen," suggests beta tester Dan Herchenroether, manager of analytical systems for capital markets at Mellon Bank (Pitts-

Upon startup, PowerStep creates an empty 256-column by 2048-row spreadsheet. To enter information onto a cell, the user simply clicks on the cell and types its data.

	A	B	C	D
1				
2	year	1980	1988	1980
3		1980 exports	1988 imports	1980 exp
4	Western Hemisphere	\$74,114.00	\$76,489.00	\$76,271.00
5	Western Europe	\$71,872.00	\$47,849.00	\$58,783.00
6	Eastern Europe	\$3,868.00	\$1,433.00	\$3,216.00
7	Asia	\$60,168.00	\$78,848.00	\$60,748.00
8	Oceania	\$4,878.00	\$3,392.00	\$8,398.00
9	Africa	\$9,080.00	\$3,251.00	\$7,368.00
10	total	\$229,460.00	\$242,282.00	\$212,781.00
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take a general worksheet and successively refine it by adding detail. "I don't have to rebuild the basic model," he explains.

Another exciting thing about Improv is that it can be used to view and manipulate data — each Improv category is a separate dimension in the data set. By simply clicking on a category tile and dragging it to another corner of the worksheet, you can display the data ordered in one, two, or three dimensions, and sorted according to whatever criteria is appropriate to your application. You can even create different "views," so that the same data set is displayed simultaneously in two different windows in two different presentation styles.

Although Improv has no system for linking worksheets in different files, you can have any number of worksheets within the same file. Formulas can operate on items in any of the worksheets. A special Model Browser window displays a list of all of the worksheets, views, and charts stored within a file; each can be assigned its own set of comments.

Improv's power comes with a heavy price: a steep learning

burgh, PA). Otherwise, PowerStep is all but unusable for large spreadsheets.

SETTING UP A SAMPLE PROBLEM

To put both Improv and PowerStep through their paces, I decided to enter and graph a table from the section on U.S. Foreign Trade with Leading Countries in the *World Almanac* (Pharos Books, 1986).

Building the model with Improv was a snap. I named the first category "Region," and created six items: one for each region with which the U.S. trades. I then made a second category, called "Exchanges," and created two items: Exports and Imports. (See the figure on page 48.)

Improv created a grid that I filled in with the 1990 data. To incorporate the 1985 data into the model, I told Improv to create a new category: "Years." The program collected all of the data that I had entered and put it under a new item called "Years1," which I renamed "1980." I then added a new item, "1985," and filled in all of the values for that year.

Basically, creating a new category adds a new dimension to the data set. It is a powerful idea: by adding a new dimension for parameters such as interest rate or rate of return, Improv simplifies comparisons of financial scenarios.

To make all of the numbers appear in the currency format, I brought up the Format Panel, which has buttons to select the display of dollar signs, commas, parentheses, negative signs, and other options. I clicked the dollar sign, the comma, and then the Set Default button, which set the format for all of the numbers in the worksheet.

To ensure that I had entered the numbers correctly, I grouped the regions together and added a group summary called "Total." (At this point I discovered that the totals published in the *World Almanac* were wrong!) Improv put the total at the bottom of the region list. I wanted it at the top, so I used Cut and Paste to move it to the top. Finally, I played with a few different views and saved the model to the disk.

I then launched PowerStep and tried to build a spreadsheet with the same data. (See the figure on page 46.) On a lark, I tried using Copy and Paste to copy the data from the Improv worksheet to the PowerStep spreadsheet. Much to my amazement, it worked without a hitch — the values of each cell were properly filled in. Apparently, both Improv and PowerStep follow the NeXT Pasteboard specification for a rectangular region of spreadsheet cells. This is how software *should* work!

Unfortunately, there's no way to use the NeXT Pasteboard to transfer a range of item labels from Improv to PowerStep. This isn't terribly surprising, since PowerStep does not support the Improv concept of "items." The only way to avoid retyping the item labels is to triple-click on each item cell, copy the actual text of the item description to the pasteboard, and paste the text into a specific PowerStep cell. You must repeat this process for each label you want to copy.

To make PowerStep calculate the totals for 1980 exports, I selected the cell in which I wanted the total to appear, pressed the plus (+) key to indicate that I was typing a formula, typed SUM, (, selected the range I wanted to sum, and typed). To make sums appear in the other columns, I selected the four cells,

starting with the 1980 exports, and clicked on the menu option Fill Right. The formula was copied and the cell references automatically updated.

To set the format with PowerStep, I selected the region of the spreadsheet in which I was working and clicked on the dollar sign icon in the Icon Browser. This set the entire spreadsheet to the Currency 4 built-in format. Alternatively, clicking on the menu option brings up the PowerStep Format Panel; the format choices available are the same type of named format patterns available with other conventional spreadsheets.



RESOURCE UTILIZATION

With the identical spreadsheet represented in both Improv and PowerStep, I decided to compare the amount of system resources used by each spreadsheet. Here are the results:

	Improv	PowerStep
CPU memory used:	5.42 Mbytes	5.90 Mbytes
Save file size:	5 Kbytes	27 Kbytes

In general, Improv appears to run faster, use less memory, and store the same amount of information in less space than PowerStep. A possible explanation for the difference between the two is that Improv stores rules for classes of data, while PowerStep needs to replicate slightly altered data many times to accomplish the same result.

EDITING

Both Improv and PowerStep let you edit formulas and the contents of cells by selecting them and then editing with the mouse and keyboard. PowerStep has an Undo feature that seems to be able to undo any change to the spreadsheet, small or large. Unfortunately, you can't undo an undo.

Improv has no Undo, but anything you cut can easily be pasted back to its original place.

Although PowerStep's Edit Box seems easy to use, in practice it's a real pain. With Improv, if you want to change the contents of a cell, the name of an item or category, or a formula, simply double-click on the object and edit the text right on the screen. (This is, incidentally, how most NeXT applications work.) With PowerStep, you must click on the cell and then move the cursor up to the Edit Box to make your changes.

Neither Improv nor PowerStep allow the user to split the window and simultaneously display two different parts of the same spreadsheet. However, Improv allows the user to open multiple windows on the same data set; all of the views are updated whenever any change is made.

Improv organizes data into user-defined categories and items, which the user can then manipulate to create different "views," as shown here.

		Item	exports
regions	Total		\$223,450
	Western Hemisphere		\$74,114
	Western Europe		\$71,372
	Eastern Europe		\$3,860
	Asia		\$60,168

		Item	Exports Imports
regions	Total		Exports Imports
	Western Hemisphere		Exports Imports
	Western Europe		Exports Imports

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- Vertical stacked bar
- Horizontal stacked bar
- Pie
- Area
- Line
- Scatter
- High-low
- 3D bar
- 3D wire frame
- 3D area
- 3D line

Most of the graphing is fairly straightforward, but there are some exciting surprises. To explode a slice from a pie chart, simply grab the slice and slide it in or out; the slice is constrained and moves only along the radial line.

"I like the labeling, the representations, and the flexibility for exploding out pie charts," says Mellon Bank's Herchenroether. "But," he adds, "if you look at what you can do with Excel or with graphics part of Improv, [PowerStep lacks] some sophistication."

Ashton-Tate's biggest claim to fame with PowerStep is 3D graphing: the spreadsheet lets you rotate a graph or change its perspective in real time as you drag the mouse. "The visual representations of the graphs are really excellent," says Herchenroether. "It makes

GRAPHING

Both Improv and PowerStep offer powerful — and surprisingly similar — tools for graphing. With both applications, you make a graph by selecting a range of cells and executing a command from the main menu; the application then takes the data and graphs it. With both applications, graphs are "hot" — when you change the data the graph is updated instantly, with rescaling done as necessary.

Once the graph is made, you can double-click on any object within the graph — lines, labels, legends, or bars — and change their width, color, font, or any other property using an inspector. Graphs can be printed, copied, and pasted into other documents, or sent as images to other users with NeXT's Mail application.

The primary difference between Improv and PowerStep is the way they display data. With Improv, graphs are distinct from the spreadsheet: they appear in separate windows, have their own entries in the Model Browser, and print separately. Improv even has a mini-application — Presentation Builder — for manipulating graphs. (Improv and Presentation Builder communicate with the NeXT Speaker/Listener interprocess communication system.) PowerStep, on the other hand, treats graphs as part of the spreadsheet — they appear on, scroll with, and print with the spreadsheet.

GRAPHING WITH POWERSTEP

Of the two programs, PowerStep offers a wider variety of graphs and more graphing options. PowerStep also lets you "lock" a graph so that users can't accidentally modify its format.

PowerStep offers 13 different kinds of graphs:

- Vertical bar
- Horizontal bar

a difference to be able to easily manipulate [a graph] to make it aesthetically pleasing."

But PowerStep's graphing is not without problems. When you select a region of data to graph, PowerStep grabs the titles for each bar or slice of the pie chart from the adjoining cells. This is fine if the data you're graphing has adjoining labels, but if you're trying to graph a subset of cells from a larger table — for example, only one column of data — PowerStep can't find the labels. Worse, it doesn't let you supply them, either. Apparently, the only way to make a graph with labels is to copy the data elsewhere on the spreadsheet, supply the labels there, and graph the copy.

Another problem with PowerStep is that graphs sit on the same spreadsheet as the data. Since you can't split the spreadsheet window, it's impossible to view the graph while simultaneously editing data elsewhere on the spreadsheet.

GRAPHING WITH IMPROV

Improv can graph the data in an entire category, set of items, or group of cells. First, select what you want to graph. Then decide whether the graph will be added to or replace an existing graph, and where the graph should appear — in a new window, or alongside a graph in an existing window.

Improv offers eight different kinds of graphs:

- Pie
- Vertical bar
- Horizontal bar
- Line
- Area
- Stock (similar to PowerStep's High-low)

- Scatter
- 3D bar

The ability to add to an existing data set is handy if you want to make a graph with portions of data in your data set. To do this, simply select the cells in the worksheet one by one and click on the Add Series to Graph menu option. I did this and easily made a bar graph showing just three of the export regions.

Like PowerStep, Improv picks up the labels for the graphs from the original data set. But since Improv has an English name for every item and category, it always gets the labels correct — even when it's only graphing a subset. Most important of all, Improv lets you edit the text of the labels.

According to Lehman Brothers' Spahr, there are two problems with Improv's graphing abilities: First, it's impossible to overlay two different kinds of graphs onto the same axes. Second, if you're graphing a category and add an item, Improv does not automatically add that item to the graph — you must specifically add it with the Add Series to Graph menu option.

According to Spahr, if you leave holes in an Improv spreadsheet, the graph application will automatically pick up the data when the holes are filled. But if you add items to an existing worksheet, those items are not automatically added to the graph. "This is especially a problem with chronological series," Spahr says.

ANNOTATING THE SPREADSHEET

One of PowerStep's novel features is that it lets you directly annotate the spreadsheet with text and graphics. You can draw lines, boxes, or circles around cells, and you can place explanatory paragraphs anywhere on the spreadsheet. You can also cut and paste graphics from other NeXT applications and insert voice-mail messages.

Improv's Presentation Builder lets you make similar annotations on graphs, but the worksheet itself cannot be annotated as a PowerStep spreadsheet can.

HELP!

Improv's Help window is actually an electronic book. At the bottom of the window Improv displays pages from its manual. At the top left is a table of contents and the top right has a three-button control panel. Clicking on an entry in the table of contents makes that page appear at the bottom of the window.

There are two ways to access Improv's help system: Context Help and Point for Help. Clicking the Context Help menu option (or pressing Command-?) opens the Help window and takes you to the section of the manual that describes whatever is selected in your worksheet window; for example, if a cell is selected, you would go to the Selecting Cells page.

Clicking the Point for Help option turns your cursor into a question mark. Click the question mark on anything in any

NeXT's Four Systems

Although NeXT sells four different computers, priced from \$4995 to \$14,115, the average business customer is usually surprised to learn that all these computers run the same software at about the same speed. That's because all four machines feature the same CPU — the Motorola 68040 — with a speed of about 15 MIPS.

Today's basic NeXT computer is the NeXTstation, a \$4955 monochrome screen that sits on top of a "pizza box" case. Each machine comes with two serial ports, a DSP, a stereo amplifier

to play sounds and a micro-phone to record them, twisted-pair and thin-wire Ethernet adaptors, a laser printer interface, and 8 Mbytes of RAM. The basic NeXTstation comes with a 105-Mbyte hard disk and a 2.88-Mbyte 3½-inch floppy that can read 3½-inch MS-DOS disks as well. The screen runs Display PostScript and shows four shades of gray.

The color NeXTstation is similarly configured but includes a color video controller and monitor (each pixel can display 4 bits of red, 4 bits of blue, 4 bits of green, and 4 bits of "alpha" — a special data channel that is used for calculating transparency) and 12 Mbytes of system memory. The basic color configuration costs \$7995.

The NeXT Cube is basically a NeXTstation

in a bigger box. The Cube costs \$7995 and has three bays that can be used to hold CD-ROM, rewritable-optical, or regular SCSI hard disks.

Finally, there's the NeXTdimension board, a high-resolution color graphics adaptor that displays 32-bit color and features the JPEG video compression system, which lets the system record and play back video compressed

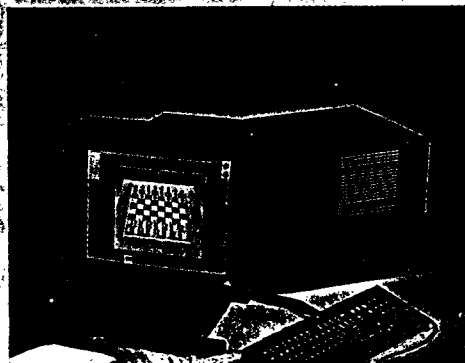
at 50:1 in real time. The NeXTdimension is driven by an on-board Intel 1860 processor. As many as three NeXTdimension boards can plug into the NeXT Cube. Boards come configured with either 8 or 16 Mbytes of RAM and cost \$3995 and \$5497, respectively.

Any one of these computers can drive the NeXT 400-dpi Laser Printer

(\$1795). This 8 page-per-minute laser printer costs less than other PostScript printers because it uses the NeXT's main CPU to do its number crunching.

Although both Improv and PowerStep work acceptably well with 8 Mbytes of RAM, more memory noticeably improves the performance of both packages. This is because all the programs run on the NeXT share the main memory; adding memory reduces the amount of virtual memory "paging" the computer must do.

NeXT's systems can take up to 16 rows of 1- or 4-Mbyte SIMMs memory (the same memory SIMMs used by the Apple Macintosh); the company plans to introduce 9-bit parity-checking versions of all of its computers in '91.



Improv window for an explanation of what it is and how it works.

"A tech writer and a developer went off and came back with [the help system], and we are all very impressed," says Improv product manager Jeff Anderholm.

The beta release version of PowerStep that I reviewed did not have a help system. However, the WILMA window that lists every function includes a field that prints an English description of what each function does and what its arguments are.

MACROS

PowerStep's macro language is a PASCAL-like programming environment. Every PowerStep mathematical function is accessible from the macro language; the syntax for functions used in cells and in macros is the same. Furthermore, PowerStep has functions for performing every PowerStep user command, such as loading a new spreadsheet, inserting or deleting rows, and changing the content of cells.

Macros can be assigned to cells, used as user-defined functions, or built into entire application programs. They can be given any name and added to the Macros menu or assigned to command keys. Macros can have both local and global variables, loops,

and conditional execution. It takes a separate 250-page manual just to describe the behavior of all of the functions.

PowerStep has two kinds of macros: local and global. Local macros are saved on a per-spreadsheet basis. Global macros are stored individually for each user in a special directory called .PowerStep.

"I think the real strength of PowerStep is its macro language, because it allows you to [write] programs without having to build them into a cell," says Herchenroether. "It's almost like a fourth generation language."

Improv doesn't have a macro facility. "A lot of people use 1-2-3 macros to automate the mechanics and housekeeping of getting things done in their spreadsheet. A lot of that is obviated by the fact that Improv is easier to use," says Lotus's Anderholm. Lotus is considering adding macro support to a future release of Improv.

At least one of Improv's users wants macros now. "I would use them for linking files and incorporating updates," says Pencom Software's Gilbert. "For example, if I had somebody write a project tracking [worksheet] and people mailed in their own project reports, I'd like to be able to automatically [incorporate the data]. With 1-2-3, you can do that with the macros."

CONCLUSIONS

Both Lotus and Ashton-Tate have made something of a gamble by developing Improv and PowerStep for the NeXT, since programs that use NextStep are not easily ported to other platforms. (See the sidebar on page 51.)

According to Anderholm, one reason that Lotus chose NeXT

hardware as a launching pad for Improv was that Lotus didn't want Improv competing against its bread-and-butter product 1-2-3. "We didn't want to get into the position at the onset [of telling users to] use 1-2-3 for this, use Improv for that," he says. "We wanted to see how far we could take Improv in the marketplace on a new kind of computer with no installed base. We can aggressively market Improv as it is; it's a great first-entry platform for us."

If Improv is successful, says Anderholm, the company will look into making it available to the broadest range of its users, which probably means porting it to the MS-DOS platform. That's not terribly surprising, since Improv's engine was originally developed on the PC for an internal Lotus project, code-named Back Bay. Of course, the user interface would have to be completely rewritten.

As for PowerStep, Ashton-Tate officials emphasize that it may be some time before the product sees the light of day. While such a decision by a major software developer could be bad news for NeXT, the absence of a conventional spreadsheet for NeXT hardware isn't a death blow for NeXT's systems, especially now that Insignia Solutions' Soft PC will soon let any existing MS-DOS application run on NeXT hardware.

Conventional business productivity applications are vital to the survival of NeXT. "A lot of business people won't even look at NeXT systems without a viable spreadsheet," says Herchenroether. Truly stunning applications — like Improv — are needed for NeXT to thrive. Improv is so good, says Spahr, that many people are considering purchasing NeXT's sleek black machines just to run the program. "[NeXT] applications are better than what is [offered] for other PCs at this point."

Perhaps one of the most important aspects of Improv is its price: At \$695, Improv is priced comparable to high-end PC applications. Compare that with the price of mainstream MS-DOS programs when they are ported to Unix platforms. For example, a five-user network version of Ashton-Tate's dBASE costs \$1790; the same product under Sun Unix costs \$3990.

At Ashton-Tate's unveiling of PowerStep last fall, Steve Jobs said the availability of inexpensive popular applications would spur the growth of Unix workstations such as NeXT's systems. He went on to say that the unavailability of such applications thus far has hindered the acceptance of Unix workstations.

Software analysts also believe that Improv and PowerStep represent an important new class of software for Unix workstations. "I spent less time with PowerStep than I did with Improv. But Improv is the first product I've seen in a long time that breaks new ground, bringing new functionality to the desktop spreadsheet marketplace," says Brian Mutert, founder and president of Stratagem, a software consulting firm based in San Francisco, CA. "In comparison to other Unix applications the pricing [of these products] is very attractive."

Clearly, in order for Unix workstations to gain a foothold in an already crowded business market, they need to offer more powerful applications that are both easier to use and priced competitively with DOS applications. Improv on the NeXT just might be the first of a new wave of applications.

Simson L. Garfinkel is a doctoral candidate at MIT and works at the MIT Media Laboratory.



Not Quite Unix, And More

"If a user ever has to type commands at a Unix command line, we're not doing our jobs," a programmer at NeXT once told me. Although the features list that is shipped standard with NeXT systems is supposed to make a developer's mouth water, NeXT's computer is considered approachable to veteran Unix programmers and computer neophytes alike.

The standard NeXT computer comes with a 68040 microprocessor, 8 Mbytes of RAM, a high-resolution graphics screen running Display PostScript, and a hard disk with a minimum capacity of 105 Mbytes. At the heart of the computer is the Mach operating system, developed at Carnegie-Mellon University. On top of the Mach "micro-kernel" rests a modified version of Berkeley 4.3 Unix, which is very similar to both Sun's SunOS and Digital Equipment Corp.'s Ultrix.

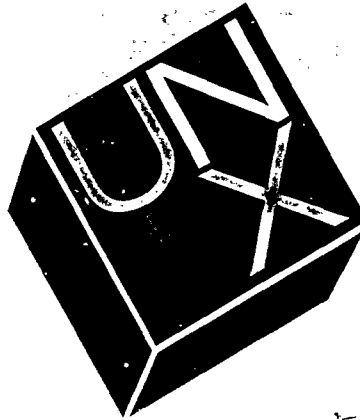
What separates NeXT from most other Unix boxes is its windowing system. Instead of running X Windows, the NeXT runs NextStep, an integrated run-time and development system that makes it a snap to assemble complicated graphics-oriented applications. All the tools — buttons, scrollers, font panels, and window managers — are included in the NeXT Application Kit and are accessible from the NeXT Interface Builder. Since NeXT uses the same Display PostScript interpreter to display information on the screen as it does to drive printers, the screen display routines also generate output for the printer.

"If you don't have to worry about writing a lot of printer drivers, you can spend your development cycles developing some new features," says Lotus's Jeff Anderholm.

NextStep provides a single unified system to cut and paste data within a single application and between different applications, for inter-process communication, and to integrate third-party application programs into the user's environment. For example, Pencom's Windflower Gilbert often uses the NeXT Mail application to send

Improv models to other users. To send a document, she simply drags the icon for the model into the Mailer's Send window; an icon for the spreadsheet appears in body of the message. "I can ship a model to somebody else in my company via e-mail, and they can look at it right on-line."

Because both the screen and the printer use the same fonts, says Gilbert, Improv reports look exactly the same on her screen as they do on paper. This



means that she prints less often, since she doesn't have to go back to the original document and reformat it for printer fonts, as she might have to do using other systems.

Another difference between the NeXT system and other Unix machines is the NextStep defaults system. Instead of using storing configuration information and user preferences in environment variables, .Login, .Cshrc, and .X11Resources files, NextStep allows each application to store configuration information in a special database that is kept in the user's .NeXT directory and managed by the Workspace Manager. The system supports both global defaults and application-specific defaults. Although defaults can be read and changed with Unix commands from the shell prompt, they can also be changed with each application's Prefs panel. Again, the whole goal of NextStep is to hide the Unix operating system from the user.

From a user's point of view, it is

irrelevant that the NeXT runs Mach instead of vanilla Unix. Software developers, however, can use the hooks into the NeXT's Mach kernel to get better performance from their applications. For example, the NextStep memory allocator lets programmers specify from which Mach memory zone to allocate new blocks of memory. If different parts of a large application allocate their memory from different zones, an application program reduces the amount of dynamic memory paging that it does. According to programmers at NeXT, much of the reason for the performance improvement between version 1 and version 2 of the operating system was a result of judicious use of zone memory allocation.

"I find that NeXT's is unquestionably the easiest programming environment," says Lehman Brothers' Eric Spahr. He estimates that it takes between half and a quarter the time to develop an application on the NeXT as on a Macintosh or Sun.

NeXT's advantages are for programmers and users alike, says Mellon Bank's Dan Herchenroether. "Right out of the box, you can sit down and be productive on this thing in 10 or 15 minutes, and that is not an exaggeration. Try doing that with any other Unix workstation."

NeXT's short suit is portability. An application developed under NextStep can't be ported to a Sun or a DEC workstation without a lot of work. Likewise, moving applications from X Windows to NextStep isn't an easy task, if you want to take advantage of all that the NeXT has to offer.

NeXT hopes that this disadvantage will be rendered inconsequential by a collection of easy-to-use mainstream applications that, taken together, make the NeXT computer more valuable to businesses than any other platform, including Unix, DOS, Microsoft Windows, and the Macintosh. Undoubtedly, the success of NeXT, Inc. in the next few years depends on the outcome of this situation.