companies have for the longest time underestimated IBM. Until now the engineering/scientific field has held up the workstation makers, but UNIX is no longer a niche product -- it is now entering the business mainstream.

I predict the Big Three in Workstations, by the end of 1991, will be Sun, IBM, and HP/Apollo (in that order). The highest growth area for the Workstation Market will be business applications, many brought on by IBM's entrance into UNIX. DEC will be right behind HP/Apollo. NeXT will spend the next year building its sales force and consolidating its early footholds. The academia will remain NeXT's best and biggest market, while IBM and DEC will enjoy a majority of business customers, with Sun and HP/Apollo each boast an even mixture of academia, business, and scientific.

8M RAM, 120M hard disk, you have to add: keyboard, mouse, monitor, video board, SCSI controller, ethernet card, and even software. There is no bundled deal. Even more insidious, the 8M upgrade and the 320M SCSI upgrade (replacing the 120M hard disk) are priced at a premium. There are other extras too: manuals, monthly maintenance plan, a tape backup system (also premium priced), a CD ROM reader.

By refusing all but the most spartan necessities, and by applying a 40% discount that IBM Canada grants to developers, I was able to whittle the price down to C$11K (about $10K US) for a basic Model 320.

Then came another surprise. NextStep wouldn't run unless the machine has 16M of memory. And in fact, since it comes on tapes, I'd have to have a tape reader to load it onto the system. 8 extra megs would cost a retail of C$6K from IBM, so I had to turn that down too. Eventually I ordered the machine without NextStep.

My US friends tell me the US IBM developer program grants a 50% discount, and the components are priced lower than the Canadian counterpart. That's one disadvantage for living here in the Great White North. We always get ripped off for computers, cars, etc.

Compared with the $6K that a SparcStation IPC would cost to a developer, I wonder if the extra speed of an RS/6000 is worth the extra $4K I'd have to pay. If I take into account Sun's much larger installed base, as a developer it'd simply make more sense to support the Sun camp.

IBM definitely has the means to play whatever price game Sun wants. But not only will it tarnish IBM's Big Bucks Computing image, it will also squeeze the AS/400 department even more. IBM is hesitant to slaughter their big cash cow, so RS/6000's will always be priced higher than Sparcs.

Despite the discrepancy, IBM will likely become Sun's strongest rival. For more money, one does get both more power and the IBM name, which in the minds of the MIS directors is a big plus. IBM expects to sell 10,000 units a month average next year, for a total of 120,000 machines in 1991. I think this is achievable, provided manufacturing gears up fast enough.

IBM has what it takes to be successful. The RS/6000 is technologically strong, and its backed by IBM's excellent distribution channels, as well as the world's most aggressive sale force, which spans not only US but Europe and Asia and just about everywhere else. These are the credentials that businesses need to justify a purchase. NeXT has to adequately address all of them to be as competitive.

Apple has mocked IBM for years as the clumsy giant. The time has come though when Apple's scion, NeXT, must fight against IBM on their own turf: the Real World of business. Apple met and matched IBM by having a better GUI and no 640K memory limitations; for NeXT the playing field is levelled by the common UNIX OS, and IBM is no longer bound by backward compatibility requirements. The cocky young UNIX

fast 68040 pizza box gets too busy.

Meanwhile, one must wonder if there are any margins left for NeXT anymore. Quite likely more than half of its installed base are either academic sites or developers. NeXT is looking at either a very lean year, or if they decide not to compete with Sun on the basis of price, then face even greater attrition of user loyalty.

Meanwhile, NeXT is daily losing prestige and mystique. Its "mainframe on your desktop" propaganda no longer credible, its ailing sales widely publicized, its deteriorating relationship with BusinessLand, and more importantly, losing momentum of the initial excitement.

The new announcement must have the force of high drama to recapture that momentum. Unfortunately, its competitors may have already stolen the wind out of NeXT's sail. High drama includes things like ultra-fast CPU and unheard-of low prices. The CPU, we all know, is the mild manner 68040. While no slow poke, it certainly won't set anyone's imagination aflame, especially in an industry jaded by RISC power boxes like the RS/6000 and DECstation 5100.

The saving grace would be the price tag. If NeXT can reach the $5,000/$3,000 price point, they would have outgunned Sun's SparcStation SLC for matching its price, yet giving a somewhat faster CPU, and bundling a small hard disk. While these features won't necessarily lure away faithful Sun customers, it would give new buyers a choice.

Corporate customers of Sun have habitually enjoyed up to 40% discount on large purchases, something that NeXT has steadfast refused all its corporate clients. NeXT may be forced by current trends to discount machines, if they want to remain price competitive.

It is clear that Sun is the one to beat in the Workstation War. They have the biggest installed base, the most binary compatible CPU units out there, and the most aggressive marketing force. NeXT is weak in both marketing and in installed base. NeXT cannot expect a clean sweep in a short time; to win this war, it'll take patience and tenacity and bloody fists and broken bones.

IBM RS/6000 Update

Another contender in the Workstation War is IBM and its new RS/6000 machines. Projected sales to year end of 1990 is 15,000 units, though IBM has problems filling its existing orders now, due to troubles in the manufacturing plants. Some say the AS/400 department is slugging things out with their rival, the RS/6000 group; I think it's more likely typical IBM juggernaut slowness.

I recently met with IBM Canada to discuss pricing for a developer's machine. My eyes bulged at the **exorbitant** retail pricing. Everything's extra. From a basic Model 320 with

product.

Don't confuse the IM14400 with the proprietary high speed standards like USR's HST (14,400 bps), or Telebit's PEP (18,000 bps). Both USR and Telebit cheat by having the large bandwidth in one direction, a small bandwidth in the reverse direction, and switching directions as the modem traffic requires. This switching, or ping-pong, quickly degrades performance for applications like network bridging, which uses both channels equally.

Both USR and Telebit know the days of proprietary, semi-half duplex protocols are numbered; they've both incorporated the V.32 full duplex standards into their top-end modems.

- Virtual Reality from your NeXT? One hot gossip indicates AutoCAD is working on a VR package, complete with a data glove and visor, driven by a NeXT, that gives you a "Cyber Space" where your hand actually manipulates objects in 3D.

The Workstation War

Sun recently introduced a new line-up of Sparc machines: the SparcStation SLC, a diskless networkstation, for $4,995; the SparcStation IPC, a color stand-alone machine with 200M hard disk and a less than $10K price tag; and the SparcStation 1+, an upgraded version of the original (but with faster chip), at a base price of $10,495.

It may come as no surprise that Sun is riding high on very strong sales. People suspect that there are a total of 15,000 to 20,000 NeXT machines out there in total; Sun sells that many boxes in **a month.**

The combination of fast hardware and low pricing is irresistible. When NeXT introduce their new lineup, you can expect a very conscious effort at matching and perhaps even one better these price ranges. If we accept as a premise that a 68040 is roughly equal to a Sparc chip in terms of performance, we can basically see how NeXT might want to position themselves.

To avoid costly humiliation, NeXT must sell a diskless system for less than $5,000, complete with a 17" monochrome screen and, if rumors are to be trusted, a floppy drive, a pizza box enclosure, and a small internal hard disk. That's retail pricing; developer pricing must also be competitive with Sun's 40% off policy for developers (under its Catalyst program). So you might expect an academic/developer system to cost $3,000 a piece.

Seen in this light, one starts to wonder why one should upgrade one's system for $1,000 to the 68040 board. Why not just pay $2,000 more, and add a second NeXT to the network? It'll almost be like paying PC clone price for workstation power. Dedicate the old 68030 to file serving and printer sharing, and maybe one or two odd jobs when the

has, after all, something in common with a mainframe...

- One interesting rumor points to the Intel i860 as the graphics coprocessor used for NeXT's new color board. This beast can do 25 million floating point operations per second, and is generally recognized as an excellent choice for high-end graphics handling. Even more interesting: the i860 opens up possibilities that Renderman and Display Postscript are implemented in the i860, offloading the two most computationally and memory-resource expensive tasks from the CPU.

- In Byte July 1990, there was an article on the Mattel PowerGlove, and how it could be interfaced to an IBM PC. It occurred to me that someone might hack together an interface through the DSP, and implement a new user interface paradigm: **grab and squeeze**.

- I discovered NeXT's TIFF library routine only supports the most rudimentary TIFF format, the uncompressed bitmap format. Most TIFF files generated by Mac and PC programs are in the PackBit compression format, which NeXT can't read.

  NeXT promises more versatile TIFF reader in version 2.0; meanwhile, a set of public domain utilities from Sam Leffler called tifflib will convert the Mac and PC format to NeXT's simple-minded format.

  For a machine that claims excellence in the Desktop Publishing area, I am shocked the TIFF support is so weak. Many people were rudely surprised when porting TIFF files from PageMaker to FrameMaker.

- Rude T-Shirt Department: A Sun engineer was seen wearing the NeXT T-Shirt, except the X and T were replaced with V and R, to read "NeVR".

- In Unix World (Sept. 1990), Dennis Ritchie was quoted as having said at Usenix: "Steve Jobs said two years ago that X is brain-damaged and it will be gone in two years. He was half right."; Rob Pike on X: "I have never seen anything fill up a vacuum so fast and still suck."

  It is clear that by now, X is here to stay. It may not be as elegant as Display Postscript, but it is out there in large numbers and it is needed. DEC has chosen to integrate Display Postscript into its X windows servers. This may be the best approach yet, provided that Display Postscript X extensions become widely adopted. Hell hasn't frozen over yet, but it still may be possible that NeXT swallows its pride and support a Display Postscript extended X.

- The first of the 14,400 bps full duplex modem is here. Forval introduces the IM14400 in September 1990 issue of Byte, page 345. The IM14400 uses an extension of the V.32 protocol, based on the V.32bis specs undergoing approval at CCITT. Foreval is confident enough of its approval that it has jumped the gun with a real

an advance workstation like NeXT can lay claim to sophistication, with a big hole in its serial pants.

How much more can it cost to put in a better serial controller chip? I'd happily pay $5, $10, or even $20 extra for a decent serial controller. How much does it cost NeXT not to have hardware flow control? At least three sales. People on the Internet have written to me and told me that they simply will not buy the NeXT because of the serial hardware. And any excuse you hear from your NeXT rep is just that... an excuse.

I hope someone high up at NeXT reads this and kicks some butts, and before the new motherboard goes into volume production, get this problem fixed for good.

Bits & Pieces

- SLIP for NeXT lives: I've gotten a copy of DialUpIP, written by NeXT engineers, which is SLIP for NeXT. Its existence is very little known outside of NeXT. Even within NeXT many people do not know much about it. It exists as unsupported software for those truly in need, for now.

  I've reported in Tao #3 that there isn't any SLIP for NeXT. Apparently I was misinformed by the Developer Support staff. The word is by version 2.0 DialUpIP may be bundled, or at least be publicly acknowledged to exist.

- Mutant Ninja 68040 seen! After Tao #4 went out the door, wherein I said the "there is no 50 Mhz 68040", I received a tip. "Hello, I am <Mr. X> from <Company N>. I'd appreciate it if you do not reveal my name. I have seen a 50 Mhz 68040, and yes, NeXT has one." I was amazed. "How can that be?" asked I. "It's a mutant that survived the 50 Mhz benchmark, it's one of only two I know of that got the high end of the chip yield." So naturally I asked, "who's got the other chip?" Mr. X replies, "I am pretty sure it's HP."

- It looks like the "Warp 9" rumor may be correct after all. The word is NeXT has a 68040 "pizza box" networkstation, with a 2.88 Meg floppy, which reads IBM style 1.44 Meg 3.5" disks. This little drive along will hurt at least three NeXT third party manufacturers, who make SCSI based floppy drives. The slotless machine will also host a 100 Meg hard disk -- big enough to put essential UNIX and do local swapping, though still reliant on a server for other files. The grey scale monitor version will cost less than $5,000, and the color version will cost less than $10,000.

- NextStep spotted on mainframe! By mainframe, I don't mean the NeXT "desktop mainframe" marketing jargon, but an IBM 3090, running AIX 370. It was also seen running a special version of NextStep, squirting output onto an RS/6000. This is unlikely to be a product, but only a curiosity. The word is, the speed was actually **slower** than an RS/6000's NextStep. Which would mean the NeXT

Tao #5
August 24, 1990

You know, I have a pet peeve with those editorials that basically summarize the contents of the magazine. It goes something like this: *<irrelevant rambling>.... oh yes, in this issue we have <article1> and its about <content1>, and we have <author2> writing about <article2>, and .... finally, we have a very enjoyable article from <author-n> about <content-n>. I hope you enjoy this issue as much as I do!*

When you guys see me writing those kinds of editorials, you'll know I'm desperate for filler material. So, all you'll get from me is the <irrelevant rambling> part, stretched to fill the prerequisite space for editorial.

And speaking of pet peeves, how about the **brain-dead** serial port on the NeXT. It's been a sore spot ever since NeXT first came out. Here's the problem: it hasn't got hardware flow control. You may not think that's such a big deal, until you examine the consequences.

Suppose you want to connect two NeXTs together in an Wide Area Network using SLIP (refer to issue #3 on discussion about SLIP). SLIP lets you use a high speed modem to emulate an ethernet cable, so that for all practical purposes, your computer thinks the other machine is on the same network.

Obviously, whenever you tele-communicate, the higher the throughput the better. So you go out and buy the latest in modem technology: a V.32, 9600, full duplex modem, with V.42bis data compression, which achieves a typical thoroughput of 38.4Kbps. So far so good. You configure your NeXT serial port to run at 38.4Kbps and you run SLIP. But it doesn't work! All the packets get royally screwed up!

A couple of problems. First, at 38.4Kbps, the NeXT serial device driver starts to lose characters. "But that's ridiculous! I have an 80286 AT running Xenix, and its serial port never loses characters at 38400bps!" I can hear the indignant cries. NeXT engineers explains to me that the problem is because there is no DMA support for the serial ports. So much for the "mainframe architecture" slogan.

If not having DMA is a problem, then they should bloody well put DMA into the new NeXT machines. But according to the engineers I talked to, there will **not** be any DMA support in the new motherboard.

Obviously software flow control won't work in this scenario, since all the ^Q and ^S characters used to signal XON/XOFF are being mixed up with real data. In fact, I've simply come to the conclusion that high speed data compressing modems and the NeXT just doesn't mix.

DMA has nothing to do with availability of hardware flow control. Look at your typical dumb PC. Every PC I've ever used can support hardware flow control. It baffles me how