What's new

- An attempt to merge the multiuser and workstation sections into a single paper

- Information on the new SPARCcenter 2000 and SPARC Classic announced on November 10, 1992.

- Overall product strategy (including workstations and servers)

- New sections describing Sun's processor development efforts

- New sections describing software subsystems

- Updated sales tactics relative to HP's strengths and weaknesses

- New quotes from industry press and consultants

Corporate overview

Sun Microsystems, Inc. was founded in February 1982. For the fiscal year ending June 30, 1992, Sun had $3.6 billion in worldwide revenues and 12,812 employees worldwide. The net income decreased from $190.3M in FY91 to $173.3M; first year-to-year drop in 4 years. For the first quarter of FY93 Sun's worldwide revenues came in at $855.9M versus $754.9M for the same period the previous year. Net income for the first quarter was $4.8M; an 82 percent drop from the same quarter of last year.

Sun has traditionally been very good at leveraging their internal resources as much as possible. Based on a measure of revenue per employee, Sun had $280,100 per employee compared to $146,000 per employee at HP (for fiscal years ending June 30, 1992 and October 31, 1991 respectively).

At the end of FY92, Sun had three manufacturing sites in Milpitas, California; Westford, Massachusetts; and Linlithgow, Scotland.

Effective July 1, 1991, Sun began to conduct its business activities through operating companies. The Sun Microsystems, Inc., family now includes:
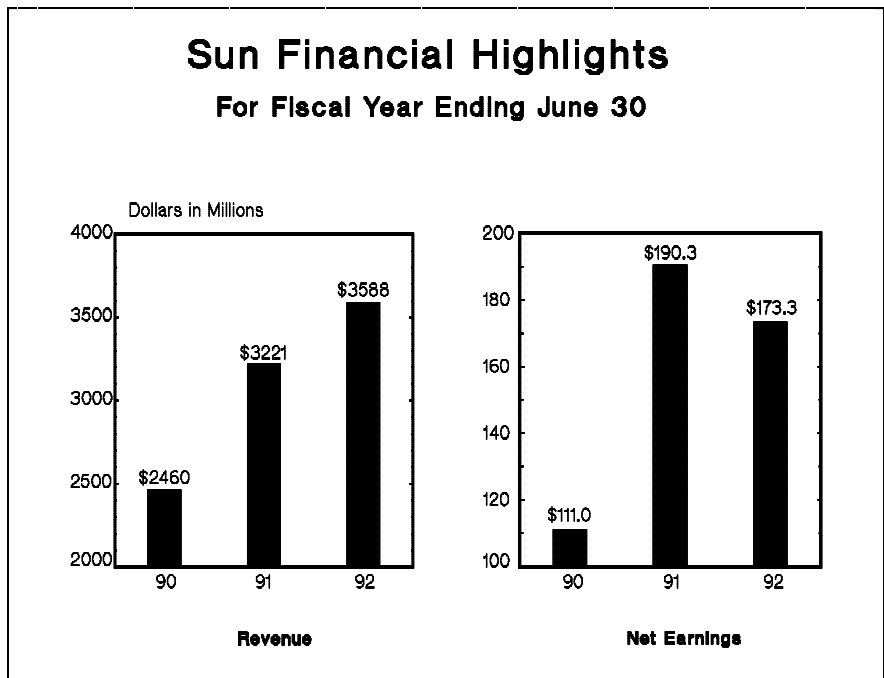
- Sun Microsystems Computer Corporation (SMCC), to supply network-based distributed computing systems, including professional workstations and servers.
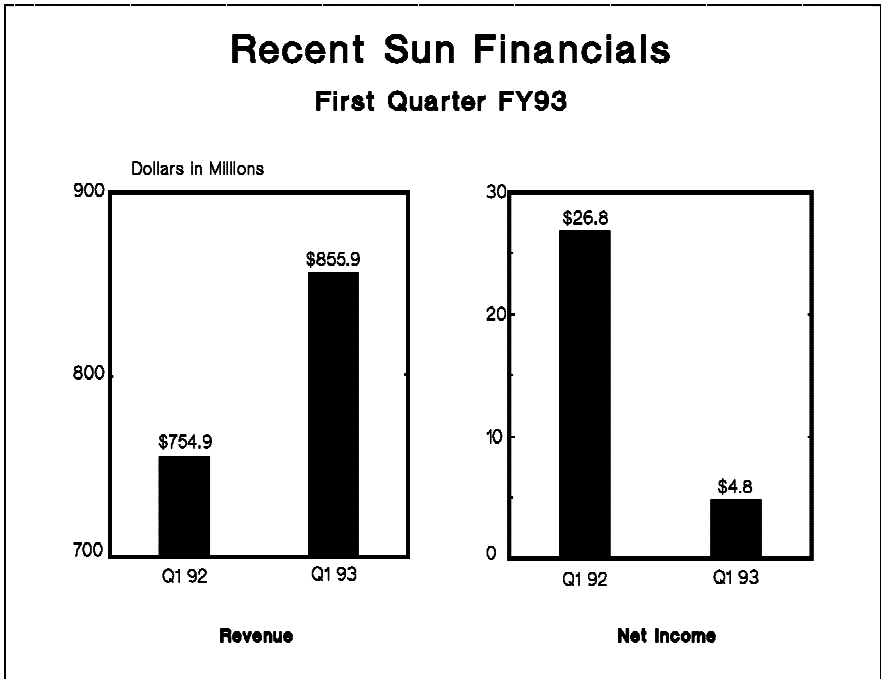
- SunSoft, to supply open client/server UNIX® system software environments for SPARC and other volume platforms; this business unit is expected to be a major contributor to corporate profits as hardware margins increasingly diminish. They own the charter for Solaris and related products.

- SunExpress, to provide quick delivery of nonsystem SPARC products such as memory, cables, and peripherals.

- Sun Microsystems Laboratories, to investigate and develop new technologies and to provide long-range vision for Sun's client/server solutions.

- Sun Technology Enterprises, to develop and market value-added software and hardware for the SPARC Compliance Definition and other UNIX system interface standards. This is comprised of SunPro, SunConnect, SunPics, SunSelect, and SunSolutions.

  - SunPro, to develop and market tools for the professional programmer, and individual and team productivity tools.

  - SunConnect, to develop and market products for integration into UNIX and non-UNIX environments.

  - SunPics, to develop and market printing and imaging products.

  - SunSelect, a new subsidiary formed to focus on PC-UNIX integration products.

  - SunSolutions, to develop and market collaborative software products.

Key Executives

Scott G. McNealy	Chairman, President, and CEO, Sun Microsystems, Inc. President, Sun Microsystems Computer Corporation
Joe Roebuck	VP Worldwide Field Operations, SMCC
Lawrence W. Hambly	VP Marketing, SMCC
Kevin C. Melia	VP and CFO, Sun Microsystems, Inc. VP (Acting), Worldwide Operations, SMCC
Dorothy A. Terell	President, Sun Express
Wayne E. Rosing	President, Sun Microsystems Laboratories
Edward J. Zander	President, SunSoft
Eric E. Schmidt	President, Sun Technology Enterprises
John Kannegaard	President, SunPro
Carl Ledbetter Jr.	President, SunSelect

Financial highlights

Sun Financial Highlights
For Fiscal Year Ending June 30

Dollars in Millions

Revenue
- 90: $2460
- 91: $3221
- 92: $3588

Net Earnings
- 90: $111.0
- 91: $190.3
- 92: $173.3

Recent Sun Financials
First Quarter FY93

Dollars In Millions

	Revenue		Net Income	
900			30	$26.8
		$855.9		
800			20	
			10	
	$754.9			$4.8
700	Q1 92	Q1 93	0 — Q1 92	Q1 93

Revenue   **Net Income**
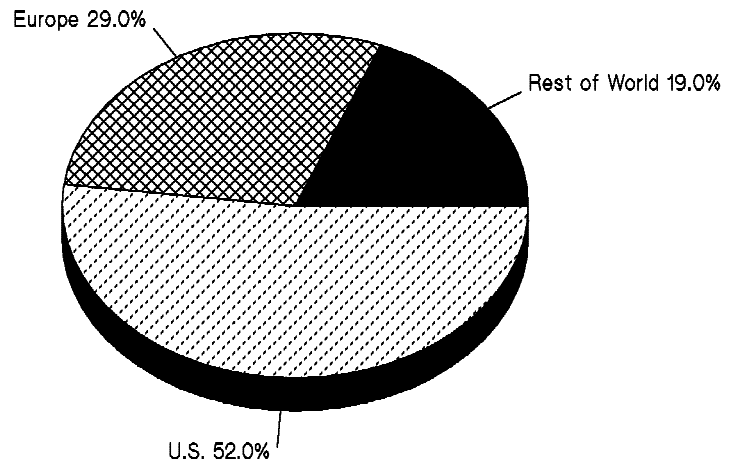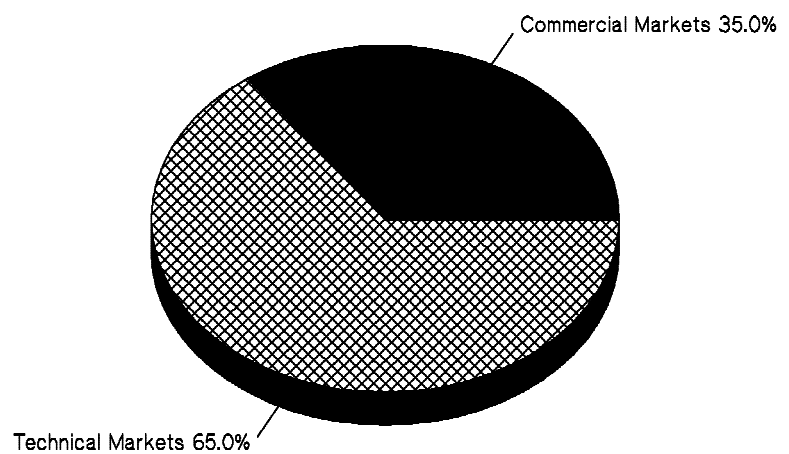
Unit shipments

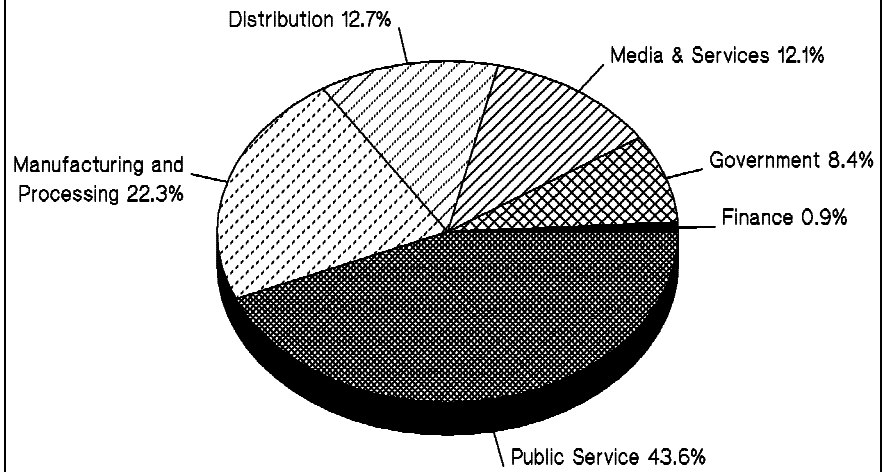|	
Fiscal year ended June 30, 1992:	200,000
Three months ended September 25, 1992:	50,000
Total installed units (approximately):	774,468

Sun Revenues by Region
For Fiscal Year Ending June 30, 1992

Europe 29.0%

Rest of World 19.0%

U.S. 52.0%

Sun Revenues by Market Segment

FY92

Commercial Markets 35.0%

Technical Markets 65.0%

Sun Revenues by Industry
FY92

Distribution 12.7%

Media & Services 12.1%

Government 8.4%

Finance 0.9%

Manufacturing and Processing 22.3%

Public Service 43.6%

Sun Revenues by Sales Channel
FY92

VARs & Distributors 34.0%

OEM 20.0%

Direct 46.0%
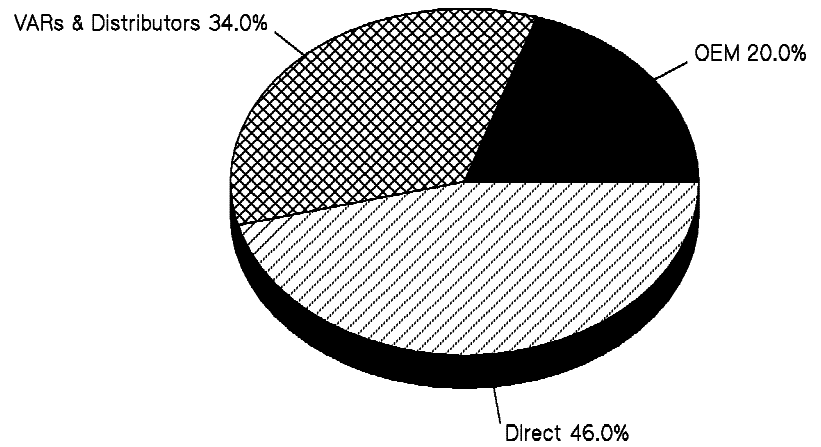
Sales organization

At the end of fiscal 1992, Sun had 86 locations in the U.S. for direct sales, service, and support. Additionally, Sun has direct presence in 27 countries and distributorship in 58 countries; some countries like Japan have both.

Sun sales reps are very comfortable making joint sales call with VARs and ISVs. One key reason is the instituted compensation program that makes the Sun SR channel neutral. The current program gives 100 percent credit for direct sales based on actual dollar and 75 percent credit for indirect sales based on list price. To reach the 10-10 goal ($10B annual revenue with 10,000 employees) by year 2000, Sun's 1000 strong direct sale force in the U.S. is mandated to focus only on Fortune 1000 accounts. They are responsible for breaking into new accounts and new industries and then let VAR to further develop and broaden the new accounts and the new industries. The average Sun SR's quota load is expected to go up to the $4M level in 1994 from the current $2M level.

Sun has increased to 450 the number of software engineers who staff the call-in centers. Problem resolution while the caller is still on the line is currently at 35 percent but is targeted for improvement to 85 percent. While Sun in 1990 had 200 field-support representatives and 55 technical experts, the addition of service partners has provided Sun access to 16,000 field-support representatives and 500 technical experts worldwide. Sun now claims that on average it resolves critical problems within 5 hours.

Sun has two levels of service partners: SunService Agents and SunService Partners. The former simply sell Sun service contracts to their customers. The higher tier SunService Partners are resellers who want to maintain direct control over their service accounts. Strategic service partnership agreements - for both hardware and software consulting - include Bell Atlantic Business Systems Services, Eastman Kodak's Customer Equipment Service Division, Andersen Consulting, Cincinnati Bell Information Systems, and Cabletron Systems. Internationally Sun has more than 90 strategic partners including Fujitsu, Toshiba, ICL, Siemens-Nixdorf, and Phillips. These relationships are more extensive than resale and service partnerships and include technology sharing, product development, etc.

Xerox has an agreement to resell SPARC computers to its installed base. Sun has Master Resellers that deal with smaller VARs that sell less than $1 million annually. The Master Resellers include Access Graphics, Arrow Electronics, Intelligent Electronics, and Computerland as MicroAge was recently disqualified. In all, Sun has about 1000 VARs and the company is considering a plan to increase

the participation of these VARs in repairs, training, and system configuration as Sun looks to expand its service base. To meet the demand of major accounts, Sun is establishing regional parts centers to help major VARs to provide speedier service. However, Sun has made it clear that Sun is not interested in doing direct support and services.

Sun has also initiated a resale program for its VARs that will include SPARC machines that have been superseded or are nearing the end of their life as Sun products. The machines will come with Sun's 90-day warranty and the resellers will be able to sell Sun maintenance contracts.

Sun was ranked 10th for VARs under $2M and 7th for VARs above $2M in the VARBUSINESS 1992 Annual Report Card. By contrast, HP ranked 3rd and 1st respectively. Overall, VARs were reportedly dissatisfied with the flexibility of contract, cross channel conflict, and commitment to the VAR program. They were also unhappy with Sun's strategy of prohibiting them from selling SPARC clone systems.

Target markets

- financial services
- telecommunications
- manufacturing
- retail/wholesale
- publishing
- health services

Strategic goals

- Lead the industry in creating new computing trends (develop leading technologies and push to make them de facto standards).

- Make SPARC the dominant architecture with a wide range of price and performance points.

- Capture the "sweet-spot" of the market and leave niche markets for clone makers.

- Make Sun O/S the primary software development platform for ISVs. Make it a competitive advantage for Sun by providing a common environment across a range of systems for users and software developers.

- Encourage third-party support of SPARC - reselling, software development, system integration, or providing support and maintenance services.

- Maintain lead in technical market while moving aggressively into commercial market.

- Build an object-oriented environment founded on the Distributed Object Management Facility (DOMF); DOMF is being developed in partnership with HP.

- Bring the large installed base of users and developers to a world of distributed objects by adding object-technology based on standards to Solaris, the current software environment. SunSoft calls this vision Project DOE: Distributed Objects Everywhere.

Major claims

- Open systems leader
- Leading price/performance
- Leading client/server solution
- Commercial server products
- Best database performance
- Easy upgradability with symmetric MP technology
- Comprehensive VAB solutions

Overall product strategy

Sun has made and continues to make aggressive efforts to create de facto standards by licensing its internally developed hardware and software products. In doing so, it hopes to drive standards as well as gain additional profits and market share through the broadening of its image as an "industry leader". Examples of this strategy include the licensing of the RISC-based SPARC chip set, SunOS operating system, NFS networking software, and NeWS windows software. Sun also sought to drive standards through its involvement in UNIX International and UNIX Systems Laboratories (USL), X/Open® and IEEE. In the past AT&T's acquisition of NCR has caused AT&T to back off of its close relationship with Sun which included selling the stock equity that AT&T had in Sun. In addition, Sun and USL are not as closely aligned as before.

This strategy was a remarkable tour de force when Sun launched it in 1987 and initially enhanced the company's image of openness and technological cache. In terms of actual market acceptance, Sun's networking products, specifically NFS, have been universally

embraced and can be considered an unqualified success. The NeWS windowing software has been just as universally rejected in favor of X-windows, the clear standard; and SunOS is available only from Sun.

Finally, the push to make SPARC a de facto industry standard and the attempt to build a secondary market for Sun SPARCs have underwhelmed most peoples' expectations. When it announced SPARC, Sun aggressively licensed the processor to a number of third-party fabrication facilities, expecting others to pick it up and clone it, as was done in the PC market. However, in order to let multiple silicon vendors implement the part, Sun had to "freeze" the instruction set. Meanwhile, competitors with systems and semiconductor products mobilized to offer alternative RISCs and standards strategies. Most recently, Sun has come out with Version 9 of their SPARC definition in response to HP 7100 and DEC Alpha architecture. The 64-bit architecture specified by Version 9 demonstrates that Sun is certainly willing to innovate with architecture, but their attempt to proliferate it in the past slowed them down and caused SPARC to fall behind relative to their architectures.

Although Sun claims over 30 clone vendors, it is the only volume SPARC supplier. It is apparent that Sun has consistently used product lead time as an advantage to drive out any clone maker who vies for the general purpose computer market. Sun promised a change of behavior at the outcry of SPARC international partners but only time will tell if Sun truly wants to share the market. IDC estimates that even by 1995 over 85 percent of the demand for SPARC will still come from Sun. Today with many more "publicized and licensable specifications" (Sun's definition of a standard) to choose from, it will be very difficult for Sun to drive standards as it once hoped to do.

Product portfolio and positioning

SPARCstation product family

	SPARC Classic	SPARC stationLX	SPARC station-2	SPARC station-10
Models				30, 41, 52, 54
# Processors	1	1	1	1, 2, 4
Packaging	desktop	desktop	desktop	desktop
Competition	486 PC applications	ALL: HP, DEC, IBM; SGI in case of technical applications		
Purchase rationale (Primary markets)	PC/MS Window, PC-CAD, AEC, DBMS, financial publishing services, document imaging		EDA, MCAD, CASE, financial analysis, electronic,	
	High-end PC, Small workgroup server	Entry-level CAD	File, network DB & NFS servers for medium size workgroup	DBMS, GIS, oil & gas telecom
Base price	$4,295	$7,995	$14,295	$18,495
Base config	16 MB 15" color 207 MB disk	16 MB 16" color 424 MB disk	32 MB 19" mono 424 MB disk	32 MB ECC 19" grayscale 424 MB disk

Note: The base price and configuration for the SPARCstation 10 is listed for the entry-level model. See the Appendix for information on the various models for the SPARCstation 10 product.

SPARCserver product family

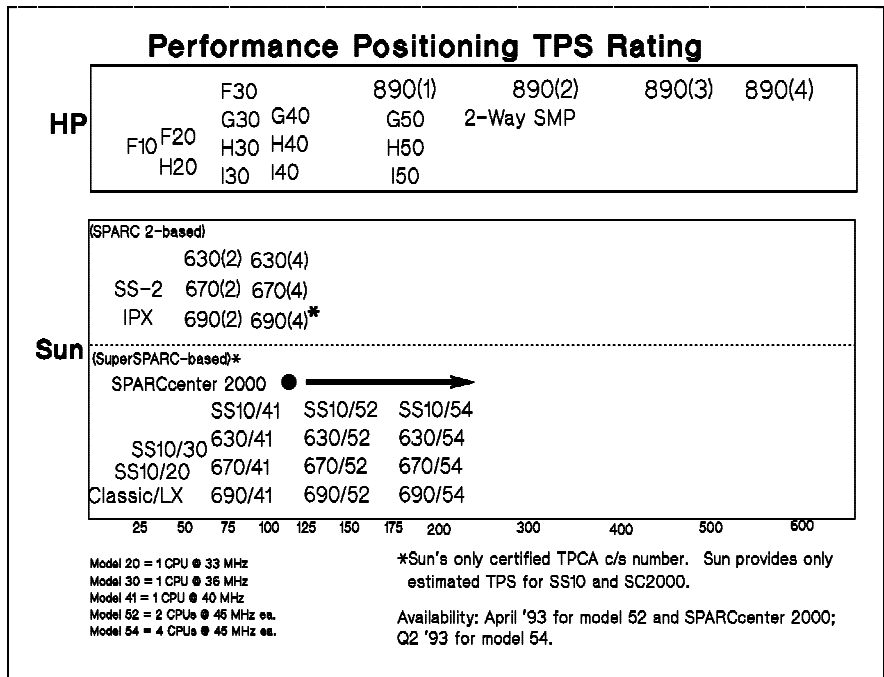|	SPARC-classic Server	SPARC server-10	SPARC server 630MP	SPARC server 670MP	SPARC server 690MP
Models		20, 30, 41, 52, 54	41, 52, 54	41, 52, 54	41, 52, 54
# Processors	1	1, 2, 4	1, 2, 4	1, 2, 4	1, 2, 4
Packaging	desktop	desktop	deskside	deskside	data center
Competition	All: HP, IBM, DEC, high-end PC				
Purchase rationale (Primary markets)	File/database server for small workgroups and PC-NFS server, front-end for terminals	NFS file server, database server for workgroups and PC-LANS, workgroup compute server	Midrange database server, branch or office	Demanding database and NFS file server applications, departmental multiuser system, high-end compute	
Base price	$5,295	$16,995	$47,000	$56,000	$76,000
Base config	1 CPU 16 MB 424 MB dsik	1 CPU 32 MB 424 MB disk	1 CPU 64 MB 1.3 GB disk CD-ROM	1 CPU 64 MB 2.6 GB disk CD-ROM	1 CPU 64 MB 4.2 GB disk CD-ROM

Note: The base price and configuration for the SPARCservers 10, 630, 670, and 690 are listed for the entry-level models only. See Appendix for information on the various models for the SPARCserver products.

SPARCserver product family

	SPARC-Center 2000
# Processors	2-20
Packaging	Data center
Competition	HP, Sequent, Pyramid, DEC 7000/10000, and IBM mainframes
Purchase rationale (Primary markets)	Database server, enterprise file server applications, and compute-intensive applications
Base price Base config	$95,000 2 CPUs 64 MB 4.2 GB disk

Note: The base price and configuration for the SPARCCenter 2000 are listed for the entry-level models only. See Appendix for information on the various models for the SPARCCenter products.

Competitive product positioning

Performance Positioning TPS Rating

HP

		F30		890(1)	890(2)	890(3)	890(4)
		G30	G40	G50	2-Way SMP		
F10	F20	H30	H40	H50			
	H20	I30	I40	I50			

Sun

(SPARC 2-based)

630(2) 630(4)

SS-2 670(2) 670(4)

IPX 690(2) 690(4)*

(SuperSPARC-based)*

SPARCcenter 2000 ●———————▶

SS10/41 SS10/52 SS10/54

SS10/30 630/41 630/52 630/54

SS10/20 670/41 670/52 670/54

Classic/LX 690/41 690/52 690/54

| 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 300 | 400 | 500 | 600 |

Model 20 = 1 CPU @ 33 MHz
Model 30 = 1 CPU @ 36 MHz
Model 41 = 1 CPU @ 40 MHz
Model 52 = 2 CPUs @ 45 MHz ea.
Model 54 = 4 CPUs @ 45 MHz ea.

*Sun's only certified TPCA c/s number. Sun provides only estimated TPS for SS10 and SC2000.

Availability: April '93 for model 52 and SPARCcenter 2000; Q2 '93 for model 54.

Hardware summary

Sun first introduced its SPARC architecture in 1987; this was replaced with the second generation of SPARC that was released in 1989. In its efforts to make SPARC widely accepted, Sun organized SPARC International, a group of SPARC-based vendors (in excess of 100 members). The SPARC Compatibility Definition was introduced to ensure compatibility between the various SPARC clones.

Sun's systems strategy is chartered to the subsidiary called Sun Microsystems Computer Corp. (SMCC). Their strategy is to make SPARC products available ranging from very low-end desktop systems to high-end minicomputers, delivered in conjunction with a variety of partners. In pursuing this goal, SMCC has recruited a number of semiconductor partners to provide a range of price and performance points. These partners currently include Texas Instruments, Cypress Semiconductor, Fujitsu Limited (the largest SPARC clone vendor), Toshiba, LSI Logic Corporation, and N. V. Phillips.

SPARC-2: This processor was implemented by Cypress Semiconductor for Sun. It is used in some of the current workstation and server products. Operating at a 40 MHz clock speed, it is rated at 25 SPECmarks. This compares to the HP 720 processor which delivers 59.5 SPECmarks at 50 MHz. It is expected SPARC-2 will be phased out in favor of SuperSPARC and MicroSPARC.

SuperSPARC (Viking): This is a superscalar processor implemented by Texas Instruments and is used in the new (SPARC-10) products that Sun announced on May 19, 1992. TI has had significant delays in delivering this processor due to difficulties in design and fabrication. Viking is a single chip processor set; it integrates integer, floating point, and memory management functions along with on-chip cache and superscalar capabilities on a single 3.1 million transistor chip. This design comes in varying clock speeds. Processors running at 36 MHz and 40 MHz will be used in uniprocessor systems and are shipping in limited quantity currently, while multiprocessor systems using a 45 MHz processor are expected to be available in second quarter of 1993. Due to the complexity of the design, industry analysts believe it would be difficult to drive the clock speed of SuperSPARC higher than 50 MHz.

The 45 MHz processors are estimated at 60 - 70 SPECmarks which is just barely on par with HP's processors that have been shipping since early 1991. HP's new PA-7100 processor delivers 150.8 SPECfp92 and 184 TPS (TPCA c/s). It seems that Sun is now behind by more than a full product cycle.

The unimpressiveness of Viking, and the SPARC-10 systems based on Viking, are discussed in papers published by D. H. Brown Associates--"Sun Leaps Forward (Soon)", and by Aberdeen Group--"Sun Microsystems Profile", both published in late May, 1992.

HyperSPARC (Pinnacle): This is also a superscalar processor and is implemented by Cypress and was announced in May 1992 shortly after TI announced the Viking chips. Sun has no plan to use it but several clone makers have product plans based on HyperSPARC.

MicroSPARC (Tsunami): This is a project with Fujitsu and TI to develop a low cost but highly integrated chip and target it for low-end desktop systems. SPARCstation LC and LX are based on this chip. The performance is around 24 SPECint92.

Software summary

SunOS is the operating system that runs on all of Sun's computer products. This is the foundation of the software environment called Solaris that SunSoft is now marketing. The foundation also includes Open Network Computing (ONC). Layered on top of this is the OpenLook programming and user interface environment. At the user level is the DeskSet layer that provides productivity tools.

SunSoft's goal is to use Solaris in providing a single environment for users as well as software developers, making this available on as many architectures as possible. In an effort to make Solaris available on Intel-based systems, Sun purchased the UNIX business from Interactive Systems Corporation. Starting with Solaris 2.0, SunSoft hopes to make a single API available for both the Intel and SPARC architectures.

As part of their push into the commercial market, Sun introduced products that provide disk mirroring, online backup, and system security. They have also recruited commercial VABs so as to offer commercial applications on SPARC systems. These efforts have improved Sun's commercial systems portfolio compared to previous years but it is still not as extensive as what HP can offer.

A recently formed subsidiary SunSelect will focus on PC-UNIX integration products, specifically with a focus on the PC-NFS family of products, SunPC family of PC emulation products, and NetWare SunLink to connect Novell NetWare LANs to SPARC systems.

Software subsystems

Solaris: SunSoft is porting Sun's operating system to the Intel platform with the promise of enabling ISVs to write one application that will run on either Intel or SPARC-based systems. Both versions of Solaris will be shrink-wrapped on CD-ROM and sold through OEMs, VARs, and Novell's dealer network. The initial version of Solaris corresponds to SunOS 4.1. The newest version, Solaris 2.0 and its future releases are based on UNIX System V.4 and multiprocessing, and feature source-code compatibility for both Intel and SPARC. Solaris 2.0 has been made available only to developers since August 1992. The end-user version is called Solaris 2.1 and is being shipped in limited quantity at this writing.

Open Network Computing: ONC is a suite of products that enable distributed computing across multivendor networks. It includes Network File System (NFS), PC-NFS, Remote Procedure Call (RPC), Remote Execution, and SunNet Manager among other products. It was Sun's answer to NCS which was accepted by OSF as the basis of DCE, the Distributed Computing Environment. Sun continued to push for ONC. The newest release is renamed ONC+ with better NFS performance, security measure, transport service, and the addition of federated service. However, as DCE develops an increasingly large base of support in the industry, Sun is being forced to recognize it as the standard. Sun announced support of DCE in June 1992 through third parties.

NeWS: Sun developed this windowing specification and tried to make it a de facto standard similar to NFS, in late 1988. However, sensitive to Sun's attempts to dominate standards in the workstation business, competitors unanimously rallied around the MIT X-windows effort sponsored in part by DEC.

OpenWindows: This product set supports development of windowed applications that can be ported across a range of systems. It includes OpenLook GUI, DeskSet, and X11/NeWS.

OpenLook: This graphical user interface (GUI) was developed by Sun in conjunction with AT&T and Xerox before Motif really took off. Sun reacted violently to OSF's decision to standardize on Motif and refused to comply. Under the pressure of customers and ISVs, starting from Solaris 2.0, Sun makes Motif a GUI choice on Sun O/S.

DeskSet: This is an integrated set of personal productivity products.

Backup Copilot: This is a member of the Solaris Commercial Extensions Products that enhances system backup and data management capabilities. It provides online backup and restore operations (without interruption to users), tape librarian facilities (tracking tape usage and availability for up to 100,000 tapes), remote backup and restore along with remote monitoring and control capabilities, online database directory for file recovery, and tape sequencing to enable unattended backup for large operations.

On-line DiskSuite: This is another member of the Solaris Commercial Extensions Products. It provides three main capabilities: disk mirroring, large file system support, and disk striping. The disk mirroring capability enables automatic use of the "mirror" copy in case of disk failure; even system-disk failures will not interrupt users. Data recovery and reconfiguration are done online. The support for large file systems is offered by allowing system administrators to add a new partition to the file system and issue an on-line "grow file system" command. This capability allows a file system to grow to the full size of the storage subsystem - up to a terabyte (1000 gigabytes). Large file systems can be mirrored. Disk striping spreads the I/O load over several disks, increasing the throughput available to a single process; striped disks can be mirrored.

Solaris SHIELD: a product that brings C2-level security to the Solaris 2.1 environment.

Software positioning

Standards

Even though Sun's latest OS will be based on System V.4, Sun has been disjointed from AT&T's UNIX Systems Laboratories (USL) for quite a while now. Sun is still committed to OpenLook which they developed; most of the industry has accepted Motif, and USL has shown no allegiance to OpenLook. USL is much more flexible and may implement these functionalities or use some of the technologies for compatibility. Sun increasingly appears to be on its own due to its reluctance in adopting standards that include non-Sun technology. Although they continued to push for ONC and OpenLook, Sun now makes DCE and Motif available as options through third parties for users who require it.

However, since 75 percent of Sun users have standardized on Motif, especially those in commercial environments, many find the third-party approach not acceptable.

Performance

As described in the Hardware Summary Section, the processor performance that Sun has been able to deliver is quite unimpressive, even taking into account the SPARCcenter 2000 announcements of November 1992. Their weakness in delivering higher performance systems for compute-intensive applications is especially evident from the themes of the SPARCcenter 2000 introduction, which de-emphasized floating-point and graphics performance.

For multiuser environments, there are significant weaknesses in the 600MP and SPARC-10 architecture that are described in an evaluation of the 630MP published in the June 1992 issue of UNIX Review Magazine and a similar evaluation of SS10 in the November 1992 issue of UNIXWorld. Although Sun claimed Solaris 2.0 with its multiprocessing and multi-threading capabilities could fix the scalability problem, Sun has not disclosed any TPC number to demonstrate that. Note that Sun does not have the scalability of performance in their SPARCserver family of products that HP can provide. The "range of laptop to super computer products based on SPARC" is only available if you consider numerous different vendors that develop SPARC-based products.

Sun has published only a single multiuser performance result, that of 107.28 tps-A on the 690MP using four SPARC-2 processors, along with two SPARCstation clients. Note that multiuser performance on the 630MP and the 670MP would be identical to that on the 690MP since the new fast and differential SCSI-2 interface performs better than the proprietary IPI interface and are available on all three 600MP models. Thus Sun only has one performance point, with very limited scalability of performance in the SPARCserver family of products - either between the different models or using various quantities of processors. Also note that the TPC-A was run in a client/server implementation with two SPARCstations as front end.

Sun's new SPARCcenter 2000 introduced in November 1992 uses a new system/memory bus that allows a flexible way of swapping CPU board and I/O card. As Sun's high-end offering, SPARCcenter's performance merely matches what HP can offer today on the 887/897 and 890 family. By the time Sun makes its first customer shipment, HP will leapfrog again with the PA-7100 chip and additional SMP offerings. Also, the availability of application software is questionable since many software applications need to be tuned and recompiled to take advantage of the multiple processors.

Enterprise-wide connectivity

Sun has delivered numerous connectivity products through its SunConnect subsidiary. They provide support for industry-standard conventions such as OSI, TCP/IP, IPX, NFS, and X.25. They also provide support for proprietary protocols such as SNA, Token Ring, BiSync, Novell NetWare, and DECnet.

With their focus on the commercial market, Sun's goal is to allow the interaction of their systems within a mainframe applications environment and conversely, for mainframes running TPC/IP to access Solaris environments. They recently made available Token Ring and FDDI cards. Additionally they offer SNA client and gateway services over Token Ring; an HLLAPI programmer's interface for 3270 users programming in the Sun environment; and an IBM NetView interface for the SNA peer-to-peer product, which enables the development of distributed applications for the Solaris/IBM environment. Sun also reworked its PC-NFS environment to run over Token Ring with an NDIS driver.

In summary, HP has an equally strong story to tell in the area of IBM/DEC connectivity and a much stronger story in the areas of PC integration and network management. For more details, please refer to the October issue of "A Guide to Winning Against Sun in Commercial Accounts".

HP 9000 versus Sun

Parity	HP's Strengths (Sun's Weaknesses)	Sun's Strengths (HP's Perceived Weaknesses)
-Leadership in open standards -Leading UNIX systems vendor -RISC server family -Client/server solutions -Industry-standard networking -Large number of VAB applications	-Support services -Growth path -Commercial UNIX systems -Range of high-availability products -Symmetric multi-processing expertise -Fault tolerance, CPU failover and disk arrays -Industry recognized system reliability -Mainframe class applications -Absolute uniprocessor performance	-Low cost (price/performance) -Focused solely on UNIX -Open architecture -Aggressive prices on memory and disk storage -Perception of easy upgrades

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The issues listed under parity reflect areas that may be important in a sales situation but both vendors offer equivalent products or services.

The HP strengths or Sun weaknesses reflect areas that HP should discuss and sell as being critical to the prospect's success. Being in the account first and discussing the importance of these items may set the criteria for an HP win.

Sun's strengths reflect areas that Sun will discuss. These may be HP's perceived weaknesses and HP can expect to be challenged on these issues. The handling objections section discusses tactics to discount or turn these issues into an HP 9000 strength.

**HP strengths against
Sun/criteria for HP win**

Corporate strength

HP advantage:
HP was ranked Fortune 26 in 1992 and has annual revenues in excess
of $16 billion.

Customer benefits:
HP's financial strength assures long-term stability as a business
partner. The diversity of our business and product segments enables
HP to be more financially stable than strictly computer-oriented
companies such as Sun and DEC. This stability has enabled HP to
invest strongly in R&D and be a technology innovator and contribute
in the development of industry standards. As a result, HP has a strong
reputation for quality and leading-edge technology in its products. HP
is also known worldwide for leading support services.

Support services

HP advantage:
HP offers a complete range of support, maintenance, and consulting
services on a worldwide basis.

Customer benefits:
HP's services have been consistently rated highly by industry analysts
as well as customers on a worldwide basis. This is a weak area for
Sun. Their new "open service" strategy is aimed at improving the
quality of their services and breadth of coverage by recruiting third
parties to provide these services. Having multiple third parties
delivering support will provide customers with a range of choices at
the best prices. However, this also means that the support will be
inconsistent across geographical regions and may have an impact on
Sun's account control. Although Sun is investing a lot of financial and
staff resources into improving their service capabilities, they still have
to improve further before being acceptable for the "glass-house"
environment.

Superior RISC

HP advantage:
HP's PA-RISC architecture has proven to be consistently superior to
SPARC in performance growth. Products that use this architecture,
are proof of the superiority of PA-RISC. This is even more clear in the
light of Sun's new product announcements in May and November
1992.

Customer benefits:
Customers can expect to have the broadest choice of products for the best price/performance. HP's strategy is to work with specifically selected partners in mutually beneficial programs to address specific market needs. This had led to continued innovation on the architecture as well as in the fabrication process. Sun promotes SPARC indiscriminately and uses a number of semiconductor partners. The result has been that there is a low degree of innovation on the architecture and each new generation of SPARC was fabricated by a new semiconductor partner that lacked implementation expertise from fabricating previous generations of the architecture.

Superior price/performance

HP advantage:
Leadership in system performance and the price/performance of the overall solution.

Customer benefits:
HP delivers leading RISC architecture in the broadest range of products that provide solutions with leading price/performance. Sun priced their new products aggressively but compromised expandability and upgradability.

Growth path

HP advantage:
The breadth of UNIX systems available from HP ranges from PC performance to mainframe class systems.

Customer benefits:
The wide range of performance points in a fully object-code compatible family means substantial protection of investment for customers in addition to the greatest flexibility to choose a system that fits their immediate needs. Easy upgrades allow customers to continue using existing applications. Even with the new servers introduced in November 1992 which will not ship until mid 1993, the SPARC products merely matched what HP offers today and HP will soon leapfrog them.

HP always aims to protect the customer's investment by providing an upgrade path to current products in the most effective manner possible. HP's range of performance points also offers the customers the widest range of solutions for their needs. Even for the Apollo Domain and Motorola installed accounts, HP has trade-in and upgrade programs to help customers move to PA-RISC. HP is the only vendor to offer board upgrade from CISC to RISC.

Commercial UNIX

HP advantage:
HP is the premier choice of commercial UNIX system VABs.

Customer benefits:
All the leading ISVs from the mainframe environment such as Computer Associates, Dun and Bradstreet, Cincom, Ross Systems, Lawson Associates, and Software AG have chosen HP to be the primary platform for their UNIX-based products. The leading database vendors including Oracle, Informix, Ingress, and Sybase are strong partners of HP as HP is now the largest UNIX server platform for all these database products. HP's own products have been licensed by a variety of companies worldwide. Customers can be assured that HP will be able to provide a full range of applications for all their business needs.

Fault tolerance

HP advantage:
HP offers fully fault-tolerant systems for critical applications, as well as a range in terms of high-availability capabilities.

Customer benefits:
Industry-leading fault-tolerant systems (the Series 1200) are available from HP which are source-code compatible with the HP 9000 Series 800. HP offers products with high mean time between failure, disk mirroring, disk arrays, and SPU failover along with fault-tolerant systems in order to provide customers with the best range of reliability and high-availability solutions depending on the needs of various functions. Sun views the fault-tolerant market as a niche market that is better served by one of its SPARC International partners. As a result, Sun provides a very limited set of high-availability functions.

OLTP Performance

HP advantage:
HP offers the widest range of multiuser performance points. In addition to leading OLTP performance, the HP 9000 Series 800 provides leading batch performance also.

Customer benefits:
Not only does HP provide a wide range of systems, but all these systems deliver leading database performance in their class. HP has published industry-standard benchmarks to support this claim. Sun has only published a single TPC-A result on their midrange system. While Sun has been able to achieve a competitive price/performance for this result, they have still not demonstrated a range of multiuser performance points. Customers that need systems with higher performance than the SPARCserver 690MP will have to wait 6 months for SPARCcenter 2000 if everything works out.

See the Appendix for specific TPC-A results that have been published by HP and Sun.

Superior graphics

HP advantage:
Higher resolution, better performance as follows:
– over 2.5x the X11 windows performance
– over 2x the 2D vector performance
– over 3x the 3D vector performance
– better 3D wireframe MCAE graphics performance: HP CRX graphics is 2.4x faster than the SPARCstation-LX GX+
– One Sun third party, E&S, recently introduced a high-end graphics system with good 2D/3D performance but the price is also high

Customer benefits:
Substantially better graphics solutions than Sun can offer.

Superior X-terminals

HP advantage:
Industry-leading X-terminals products.

Customer benefits:
HP can offer a significantly better solution when low cost is a major issue. Customers get not only a low-cost solution but also one that includes industry-leading products. 700/RX continues to lead the X-terminal market in price/performance even after its first inception 18 months ago.

It is interesting to note that Sun, in spite of their apparent lack of belief in X-terminal technology, uses these products in-house. Sun has a forked tongue and uses it often when dealing with customers. In fact, one of the biggest complaints from the user community is that many of the Sun's system management utilities and reference tools are not X-based.

Note that HP's product is designed to ensured that users perceive no loss of performance. To keep it that way, avoid bidding X-terminals in CAD or other environments where performance can deteriorate as X-terminals are added.

Sun's perceived strengths versus HP

- Largest UNIX system vendor dedicated to UNIX system solutions.

  Counter with:
  HP edges over Sun in terms of UNIX system revenues; 1992 UNIX vendors' market share of the $31.9B initial value reported by InfoCorp (September 1992) was 18.2 percent for HP versus 16.8 percent for Sun. HP also is ranked number one in terms of UNIX revenue by "UNIXWorld" in the December 1992 issue. Although Sun is 100 percent focused on UNIX systems, HP's experience with UNIX systems as well as commercial systems exceeds the total number of years that Sun has been in business. HP has combined these areas of expertise to deliver commercial UNIX systems rated by industry analysts to be the best in the industry. HP also has the largest share of the commercial multiuser RISC/UNIX market.

  As for HP's commitment to UNIX there should be no doubt whatsoever. HP's UNIX system revenues constitute about 40 percent of total computer systems revenues; compare this to other top vendors like IBM and DEC whose UNIX system revenues constitute only about 11 percent and 9 percent of computer systems revenues respectively. This should convince any prospect that HP's UNIX system business is a mainstream activity and not just "lip service."

- Leader in open systems, in fact Sun created open systems.

  Counter with:
  Sun is good at delivering slogans and may have created the "open systems" slogan. However, Sun only adopts standards when they are based on technologies developed at Sun. They seem to have a severe case of "not invented here" syndrome. HP not only adopts industry standards but also actively participates in standards organizations. HP has also developed a number of technologies that have become key components of today's industry standards such as DCE, DME, NCS, and Motif. Other products from HP, such as OpenView network manager and SoftBench have been licensed by other major companies such as IBM.

  Sun is still insistent on its proprietary products such as Open Network Computing (ONC), OpenLook, and NeWS.

- Low-cost leader; superior price/performance.

  Counter with:
  Sun has demonstrated price/performance for multiuser environments at ONE performance point only, the TPS rating of 107.28 is no comparison to what HP can offer across our entire 800 line. Sun quotes estimated transaction/second on its new SPARCstation/server 10 and SPARCcenter 2000 without qualifying what these numbers mean. Therefore, until Sun can validate their price/performance "leadership" with certified TPS rating, Sun has nothing creditable to show their OLTP performance.

  On its workstation products, Sun did disclose all the relevant performance numbers only to embarrass themselves. HP offers better price/performance in just about every aspect not only with regard to $/SPECmark but also with regard to graphics-oriented solutions ($/khornerstones) and likes.

  Due to manufacturing efficiency, Sun currently has the absolute lowest priced workstation and server in the market place. HP will address those segments in 1993.

- Sun has high-performance multiprocessing (MP) servers which are ideally suited to database applications.

  Counter with:
  Both symmetric multiprocessing and high-performance uniprocessor are capable of growing the system performance. SMP is technically more complex to design and optimized and; therefore, the resulting performance gain can vary significantly. By contrast, uniprocessor provides linear incremental performance gain and is inherently better suited for batch and single-thread jobs. Currently, Sun has neither a high-performance uniprocessor or scalable SMP. Compare their 107 TPS on the 690MP with our 185 TPS on the H50. One is a full 4-way implementation and the other is single processor. New products like SPARC 10 and SPARCcenter 2000 will need a very well-tuned Solaris 2.1 to deliver the performance Sun has promised for a long time. On top of that, Sun needs a faster SuperSPARC chip (better than 40 MHz) from its silicon foundry TI, to boost uniprocessor performance. However, TI continues to experience difficulty in perfecting the production process at this writing. The fact that Sun announced the SPARCcenter 2000 with the 40 MHz chip shows that the production yield problem is not a short-term one.

  It is interesting to note how Sun continues to make performance comparisons with HP using MIPS, SPECrate and similar measurement units. They either don't realize that these units do not fit well in making comparisons for multiuser OLTP performance or

they are trying to divert attention from poor multiuser performance. In either case, Sun is proving that they are still a workstation company and still have a significant amount of work to do before becoming a credible commercial systems vendor.

As a workstation company, Sun is falling even further behind in terms of delivering high-performance systems, as is evident in light of their November announcement of low-end systems.

- Open and industry-standard computer architecture compared to HP's proprietary PA-RISC architecture.

  Counter with:
  HP has licensed PA-RISC to other companies such as Convex Computer, Hitachi, Hughes Aircraft, Mitsubishi Electric, Oki Electric Industry Company, Prime Computer, Sequoia Systems, Stratus Systems, and Yokagawa Electric, some of whom already have commercially available products based on PA-RISC. These companies, in conjunction with HP, have formed the Precision RISC Organization which is focusing on licensing the PA-RISC architecture to vendors so as to deliver products to fill market needs in a mutually beneficial manner to the companies involved. If these activities are considered "proprietary," Sun needs to relearn the English language.

- Wide range of applications.

  Counter with:
  Sun has respectable solutions in the technical market, but do not have leading software solutions for the commercial market. The premier software companies in the commercial market, when porting their applications to UNIX systems, choose HP as their first UNIX system-based platform. Examples include: Computer Associates, Dun and Bradstreet, Cincom, Software AG, CGI, TI, ASK, and Lawson Associates. HP has close to 4,000 commercial applications available from leading software suppliers.

  In the technical market, HP is winning a significant share with the Series 700 products. Although Sun has been dominant in this market segment, HP is quickly adding to its portfolio of third-party applications support.

Quotes

Regarding SPARC

"Sun used to lead the market by every barometer, including number of units shipped, revenue and price/performance. But Sun has stumbled in all three areas, Allison said, because of the delay in getting the Viking-based SPARCstation 10 to market."

> Philip J. Gill
> "Has SPARC Gone About As Far
> As It Can Go?"
> Sun Focus Insert
> Open System Today
> September 21, 1992

Regarding open systems

"Sun Microsystems Inc. has been secretly backing a tiny software firm's lawsuit against a group of Sun's industry rivals, an arrangement that one legal expert said could be unethical."

> Lee Gomes,
> Mercury News Staff Writer
> "Sun Covertly Backed Suit
> Against Rival Group"
> San Jose Mercury News
> Business Section
> September 24, 1992

Regarding SPARC-10

"The SPARCstation10 competes in performance, but not in price."

> Alan Sotherton and
> Edwin Perkins
> "Sun Tries to Play Catch-up"
> UNIXWorld Magazine
> November 1992

"Overall, Sun has announced excellent new products [with the SPARC-10 announcement]. The only catch: none of these products can be delivered today.... Sun has now all but proven the upward scalability of the SPARC design and instruction set.... The relatively low MHz speed of current versions represents a major disappointment."

> "Sun Leaps Forward (Soon)"
> Technology Trends Paper by D. H.
> Brown Associates Inc.
> May 22, 1992

"...it is also clear that the failure of SuperSPARC to achieve significantly higher uniprocessor performance ratings will allow HP and IBM to continue to challenge and beat Sun at the high-end of the workstation market--unless efforts to turn up the clock on the next superscalar SPARC microprocessors proves successful or unless Sun can produce an efficient, easy-to-use multiprocessing break-through machine, or both."

> "SuperSPARC and New Product
> Update"
> Sun Profile by Aberdeen Group
> May 25, 1992

"Sun is trying to start a new wave with desktop multiprocessing [with the SPARC-10 systems], but they are also desperate to get performance that they can't get from a uniprocessor system. If they don't get a faster SPARC processor, they'll fall further behind HP and IBM."

> Vicki Brown, VP of Systems
> Research
> International Data Corp.
> "Sun Introduces First Workstation
> with Multiprocessing"
> Digital News
> May 25, 1992

"It is disappointing in that the speed [on SuperSPARC] didn't get there. It was rumored for so long, and then to come in at 33 and 40 MHz which are pretty low."

> Nancy Battey, Workstation
> Analyst
> International Data Corp.
> "SuperSPARC Makes the Long
> Awaited Debut"
> Digital News
> May 25, 1992

Regarding system performance

"As the clients' load went up, the Sun went down - way down. With the capacity to hold four SPARC processors and all this disk and RAM storage, the SPARCserver looks tantalizingly like a system that should be able to serve a lot of clients. In our tests, however, it didn't deliver on that promise."

"Client/Server Computing:
SPARCserver 690MP"
ZD Lab column
Corporate Computing
July 1992

"Multiprocessing systems that are not truly symmetrical, like this one [the Sun 630MP], will exhibit degraded performance with multiple CPUs once a certain number of tasks are active. This degradation is attributable to the increased overhead of dividing the processing across the CPUs. However, on the 630MP, the performance drops so sharply with only ten tasks running, that even the CPU housekeeping overhead cannot explain the results. Poor architectural design is a likely contributing factor."

"The Sun 630MP Multiprocessor"
Tested Mettle column
UNIX Review
June 1992

"Sun is still going to be behind the performance curve [after intro of the Viking chip]. They still aren't going to be able to compete with IBM and HP and Alpha [DEC's forthcoming chip] on the high-end."

Michael Slater, Editor of The
Microprocessor Report
"Texas Instruments and Sun
Present Workstation Chip"
Wall Street Journal
May 8, 1992

Regarding investment protection with SPARC-10

"It is important for customers to be aware that even transition to a simple uniprocessor version of SuperSPARC hardware running will necessitate release 1.1a of Solaris and recompilation of existing applications."

"SuperSPARC and New Product Update"
Sun Profile by Aberdeen Group
May 25, 1992

"The new chip design [SPARC-10] remains compatible [with the previous SPARC-2 design], but one must realize that Sun's forthcoming Solaris 2.0 operating system will break this compatibility....because the names, options, and semantics of many system calls, utilities, and system configuration files change in the SVR4-based Solaris 2.0, 'just recompile' will not work for many applications."

"Sun Leaps Forward (Soon)"
Technology Trends Paper by D. H. Brown Associates Inc.
May 22, 1992

Regarding Solaris 2.0

"Unfortunately for McNealy, early reports about Solaris indicate the strategy is not working. For one thing, users are hesitant to upgrade to an unfamiliar operating system. More over, Sun lacks the necessary distribution channels to sell Solaris for the Intel platform. And its Fortune 500 customers have been dissuaded by Sun's reluctance to adopt the Open Software Foundation's Distributed Management Environment (DME) standard. As for the object-oriented technology, a primary competitor-NeXT Computer, Inc. - has already released its own object technology well ahead of Sun."

Gary Andrew Poole
"Sun's Soft Spot"
UNIXWorld
November, 1992

Regarding Sun's lack of X-terminal

"Without an X-terminal in its line, Sun is letting vendors like HP get inside to attack SPARCstations on price. It's not hard to imagine Sun getting sacked at the bottom line of quote against HP X-terminals. HP's several thousand dollars-per-client advantage can add up quickly."

> Ron Seybold
> "The Last Word"
> Sun Observer
> December 1992

"Sources who have tested the software said Version 2.0 runs as much as 10 percent to 15 percent slower than version 1.0 because of all the features SunSoft had to include such as symmetrical multiprocessing."

> Ed Sperling and Darryl K. Taft
> "UNIX Developers Confront
> Solaris Speed Questions"
> Systems & Network Integration
> June 29, 1992

Regarding commercial solutions

"Much of its [Sun's] 'commercial' base consists of professional workstations such as trader/analyst workstations, decision-support applications, and document preparation, rather than the central database, accounting, and other mission-critical applications traditionally referred to as 'commercial applications.' Sun's products are not yet available enough or manageable enough for most commercial customers. Only a fraction of the required applications have been ported."

> "Sun Leaps Forward (Soon)"
> Technology Trends Paper by D. H.
> Brown Associates Inc.
> May 22, 1992

Regarding SPARCCenter 2000

"One of the problems facing Sun is the first phase (support of 8 CPUs) is not available until April of 1993. This certainly allows the competition to catch-up or leapfrog in that time frame."

> Steve Widen, Analyst
> WorkGroup Technologies
> Competitive Analysis Service
> November 10, 1992

"... but full delivery won't be until 1H'94 giving competitors ample response time. We believe Sun will use this time to organize its marketing, sales and service efforts to better match the requirements of the commercial system market. In the end, effective execution will be the determining factor if Sun is to become a much stronger competitor in 1994."

> John Morrel, Analyst
> IDC
> IDC Fax Flash
> November 10, 1992

"Sun's strategy is to surround servers with clients and its low cost structure helps Sun to gain volume leadership in the past.... The risks are weak graphics offering at the low-end, limited availability of faster Viking chip, dwindling SPARC development and very late SMP O/S."

> Terry Bennet, Technical Systems
> Service
> InfoCorp
> "November 10 Impact Analysis,
> 1993 Workstation and Server
> Markets"
> November 10, 1992

Regarding the SPARC compatible market

"Sun is the only real customer out there [for SPARC]. As a result, there's been no real pressure on anyone to produce higher performance implementations, and, in fact, the company that tries to produce one without Sun as a customer is in real trouble."

> Michael Slater, editor and
> publisher of The Microprocessor
> Report
> "State of the SPARC 1992"
> SunExpert Magazine
> April 1992

"...they [Sun] said that all SPARC-compatible vendors would get it [new SPARC designs] at the same time, but that isn't true yet."

> Nancy Battey, workstation analyst
> at International Data Corp.
> "SuperSPARC Makes the Long
> Awaited Debut"
> Digital News
> May 25, 1992

Regarding Sun's support strategy

"Sun may be moving out of the hardware maintenance business,... Rivals like DEC, HP and IBM are among the many service organizations that have plenty of experience in multivendor environments and are willing to provide it at sites that use Sun equipment."

> Marilyn McMaster
> "Service in the Solar System"
> Sun World
> November 1992

Regarding SBus

"Some SBus vendors believe that if an SBus product succeeds, Sun will take notice and soon offer a competing product. It also seems that Sun is using third-parties to test the market, and then steps on them when a direction (read=potential profit) becomes apparent."

James D. Lyle
Troubador Technology
"Readers Response"
Sun World
October 1992

Regarding GX graphics

"In any case, for the SPARCstation 10 to be a true competitor in the graphics market, we believe performance must be made at least double the current GX speed."

Dave Taylor
"SPARCstation 10 = the Future?"
Sun World
December 1992