Changing the rules on market leaders: Strategies for survival in the high-performance workstation industry

by

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Abstract

The high-performance workstation (workstation) market is a relatively young segment within the information technology product industry. The workstation segment has been marked by many significant innovations over its brief 15 year history. During this period the industry has witnessed the entry and exit of many firms desiring to capture a major share of what is anticipated to be a $48.7B market growing at 24% (CAGR) by the year 1999.

Despite the large number of firms that have been unable to sustain a foothold in the workstation industry, there are a handful of companies that continue to churn out successful new products and hold a dominant share of the industry. These successful companies have developed strategies that appear to constantly "shift the rules" on existing industry participants, thus directing attention to the features and benefits of their innovative product offerings. Constant evolution of this strategy is of significance due to the fact that the "value" clients have placed on specific workstation attributes has constantly shifted over the past 15 years.

The purpose of this thesis is to provide the reader with significant insight to the evolution of the workstation industry from its inception to its current critical juncture and competitive battle with emerging high-performance intel-based personal computers, Microsoft Windows, and Internet enabled solutions. The paper will provide the reader with a comprehensive overview of the types of companies and products offered at each stage of the industry's evolution. The analysis is based upon a database of over 400 companies and a large sampling of their products offered over the period 1980-1996. The primary objective is to analyze the industry from the perspective of Utterback & Abernathy's (1978) Theory of Dominant Design. The chapters of this thesis analyze the companies and products utilizing several tools to derive the strategies that have led to these companies success. The analysis performed would suggest that long-term success in the workstation industry has been dependent upon the participant firm's ability to continually refine both its market strategy and product offering to align with constant shifts in technology and customer needs. The strategies highlighted are a sampling of those tools contributing to success.

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A great deal of the data gathering for this thesis relied upon the wealth of experience, memories, and libraries of my previous co-workers, friends, and new contacts in the workstation industry. Without the input of these individuals, much of the information presented would have been prone to inaccuracy or superficial analysis. I would like to offer my thanks to Bill Poduska and other members of the early Apollo team for their friendship and guidance in re-creating the early history of the workstation. Lacking their input, I would still be trying to understand how a "Perq" fit into the overall picture. I would also like to thank the employees of Digital Equipment, Hewlett-Packard, and Sun Microsystems for the countless hours they spent answering my constant stream of questions and for allowing me to dig through their old library resources. I would specifically like to thank my friends Mark Christe, Bob Fendrich, Jack Gartlan, Derrick Knight, Greg Nicastro, and Larry Peckham, for the littany of faxes, copies, and other forms of technical assistance. Most importantly, I would like to thank Bob Humble for his efforts in arranging my executive contacts at Sun Microsystems and helping me to sift through my thoughts on what has contributed to long-term industry success. I would also like to thank Ed Zander at Sun, for his openness and unfiltered perspective on the past 15 years of the workstation industry.

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- Chapter 1 -
Introduction

The computer industry circa 1980 was experiencing exciting growth based on the emergence of minicomputers, microcomputers, and networking technologies. Organizations such as IBM, Digital Equipment Corporation (Digital), Data General, and other providers of traditional information technology (IT) products were enjoying tremendous growth and dominant marketshare. Few analysts would have predicted that the creation of high-performance workstations (workstations) based on "commercial off the shelf" (COTS) hardware components and emergence of client/server computing would pose such a significant hurdle and disruptive current for these industry giants. Even fewer would predict that upstarts like Apollo Computer (via Hewlett-Packard) and Sun Microsystems would become the industry locus of power in the late 80s and early 90s.

The high-performance computer workstation market is quite possibly the most exciting and fastest moving of all segments within the world of information technology (IT) products. The industry has experienced dramatic shifts in the number, type, and differentiation between providers of workstation products. Since its inception in the early 80's the market leadership has remained elusive to traditional computing giants such as Digital and IBM, and unattainable for powerhouses like Xerox and Sony. Despite developing significant advances in technology, the industry's most wealthy and powerful innovators (e.g. Xerox, IBM, AT&T) found it difficult to harness their advances into a sustainable a product position. Evidence of this difficulty is highlighted in Figure 1.1 which outlines major industry innovations, the developer, and the significance to their current marketshare. Also interesting is the fact that the industry's pioneers in computer graphics (e.g. Tektronix, Megatek), an essential component of workstations, have all departed the workstation industry, being relegated to the position of supplying "add-on" or peripheral graphics products.

	Innovator	*Current position*
Raster Graphics	Tektronix	Exited industry
Dual-function Graphics	Megatek	Liquidating
Graphical User Interface	Xerox	Exited industry
High-performance Wkst	Apollo	Acquired by H/P
Unix operating system	AT&T	Not major player
RISC processors	IBM	#5 in marketshare
Distributed computing	Apollo	Domain loses to NFS
Windowing system	DEC/IBM	X11 dominates
Earliest Workstation	3 Rivers	Exited industry

Figure 1.1 - Major Workstation Industry Innovations

Despite the fact that many firms have failed to attain a lasting position in the turbulent workstation market, there are examples of organizations that have had significant periods of success. In most cases, the success of these firms has been dependent on their ability to leverage their technological innovations into new market segments or diverse product offerings. While it is true that these firms may no longer be major players, may have been acquired, or exited the industry altogether, the fact remains that at a point in time, their strategies were sound and the success profound.

The purpose of this thesis is to provide a brief history of the high-performance workstation industry, its participants, and their innovations. Based upon initial review of limited data, it would appear that the industry landscape is consistent with the findings in Abernathy & Utterback's Theory of Dominant Design. Part II of this document provides a more in-depth view into the types of strategies and impact on marketshare that have led to the continued growth of industry participants. A brief insight into these strategies, previous research, and their applicability to the workstation industry forms the remainder of this chapter.

Changing the Rules in a land of Giants

Christensen[1] introduces the concept of disruptive technologies where companies "introduce a very different package of (product) attributes from the one mainstream customers historically value, and often perform far worse along one or two dimensions that are particularly important to those customers." The workstation industry is a perfect example of this phenomenon. Early industry pioneers like Apollo Computer and Sun Microsystems used the advent of high-performance, low-cost computer systems to steal away marketshare from the industry's leading vendors, despite the fact that these early products may have lacked the robust features of minicomputer systems.

Early workstation products were inferior to mainframe or minicomputers in many different aspects, but they appealed to customers at a time when they needed low-cost, local, price/performance. Based on the information presented, it is the author's belief that this strategy of using disruptive technological shifts to change or "tip the industry playing field" to your company's advantage, is a strategy that companies in this industry have used, and may apply to other high-technology industries. The fact that organizations that have failed to develop major innovations, yet have combined commercially available technologies, into effective, yet inelegant, product combinations is exemplary of this strategy. More importantly, recognition of this trend dictates the strategy and investments for a corporation entering similar high-technology industries.

Defining the High-Performance Workstation Product

In order to gain a proper understanding of the market dynamics surrounding the workstation industry, it is important to possess a solid product definition, which is difficult to do in the midst of continued encroachment by low-cost personal computers. Despite much confusion within the industry, high-performance workstations (also known as technical, graphic, CAD/CAM, or multipurpose) occupy a relatively well defined niche, positioned between large network or

departmental servers (or minicomputers) and personal computer products. Workstations offer the user a graphical user interface (GUI) based access to a system capable of executing multiple applications, concurrently, on local high-performance computing resource (processor, memory, and storage peripherals). This system offers extended access to network resources via LAN attachments and resource sharing software. This complex description can be more simplistically stated as a graphically-based computer system that allows the user to run multiple applications on the desktop that were previously confined to large expensive mainframe (also known as "host-based) computing resources.

The late 70's and early 80's marked a period when American management was focused on methods for increasing worker productivity. Xerox's developers at the Palo Alto Research Center (PARC) hoped to capitalize on this need by creating the "Office of the Future.[2]" The Xerox Star (also known as 8010) was one of the industry's earliest workstation products, and carried many elements of the purported dominant design that would emerge 5-7 years beyond its introduction. Many other products such as early graphics workstations, had similar design goals to that of the Star. Products from companies like Tektronix, Megatek, Auto-trol, and Applicon were purported to increase engineering productivity by an estimated 300-500%[3]. Many of the workstations sold by today's vendors are targeted at reducing multiple desktop PC or mainframe terminals, improving network connectivity, offering significant price/performance on the desktop, and providing professionals with more simplified access to information. Upon comparison, the complexity of problems and the underlying technology available in these new products may have changed in the past 15 years, but the underlying computing requirements remain the same.

> ***"Computing has ceased to be divided between the world of the personal computer and the traditional 'glass house,' where white-coated technicians tended to a bank of mainframes. The growth of networked computing is bringing forth computing***

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[1] J. Bower & C. Christensen, "Disruptive technologies: Catching the wave," HBR, Jan-Feb 1995
[2] "The Office of the Future and Xerox," Xerox internal document (1980), held by author
[3] "Surveying interactive graphics systems," Mini-Micro Systems, 12/80, p. 72

> ***environments, where entire processes, rather than selected tasks, can be automated. The workstation is the door through which the worker enters, experiences and exploits that environment."*** - Fortune Magazine, 1985

Fortune Magazine's simplistic description of workstation-based computing offers an excellent framework for discussing the evolution of this industry. Much of the technical literature on workstation architectures and products is focused on the technology-enabled solutions they offer. Workstations are described as enabling organizations and their "knowledge workers" to "have a computer(s) that can multitask along with them[4]," "[workstations] designed so that users don't even realize they are operating computers," and the 1985 prediction by the CEO of one computer company that "the great power of the new workstations is such that in some cases we have seen a complete change in the way departments are organized to do their work." As we have seen, workstations have turned many of these predictions into reality.

THE EVER CHANGING LANDSCAPE OF THE WORKSTATION INDUSTRY

Over the past 15 years, users have demanded, and industry has responded, with a vast array workstation products. In the late 70's and early 80's the focus was on high-performance, high resolution graphics capabilities that leveraged the existing processing resources found in traditional mini and mainframe systems. The early 80's showcased new standalone workstation products that offered significant increases in price/performance while breaking the trend in proprietary designs by utilizing standard technology components. During the late 80's and early 90's vendors continually refined workstation architectures with upgrades to processor, graphics, connectivity, and multimedia features. Over this entire period there were similar advances to the system software as well.

Preceding Early Workstation Architecture (1978-80) - Prior to the emergence of the industry's early workstation products from vendors like Apollo Computer, computer graphics solutions were complex configurations of minicomputers, and graphic workstation hardware, and assorted

software interfaces and input/output devices. In many ways these early workstation solutions provided the base upon which future systems would be built. Technological innovations like the Tektronix raster-graphics terminal, and the Megatek "Whizzard[5]" dual function display provided catalysts for future products, and offered customers dramatic improvements over the "strokewriter" technology that dominated the industry. The primary point of interest relating to today's workstation industry is the fact that of the 46 vendors[6] offering solutions in 1980, many of which went on to offer standalone workstation products, only 2 of these vendors (IBM and H/P) participate in the workstation industry today.

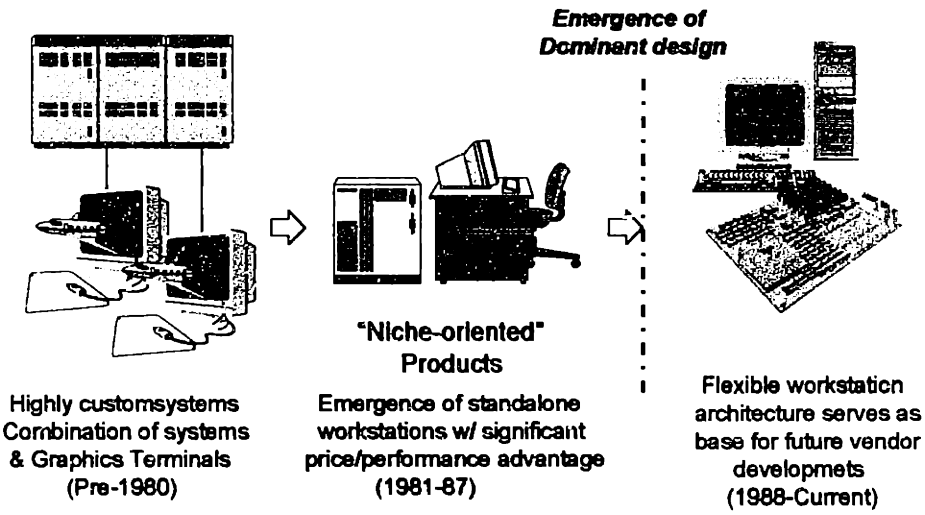

Figure 1.2 - Illustrated Shifts in Workstation Technology

Early Workstation Entrants (1981-1983) - The industry landscape changed forever in the early 80's as vendors like Apollo and Sun entered the market with standalone workstation solutions that dramatically reduced the price of workstation computing. It is interesting to note that these workstations were not based on any novel or terribly complex technology, but they utilized low-cost off-the-shelf components. The combined features and style of computing offered clients a

[4] "Workstations & networks enhancing personal and group productivity," Fortune (1985)
[5] "Architecture for combined vector/raster graphics," Mini-Micro Systems, 12/80, p. 105-112

valuable alternative to the previous highly customized and difficult to support graphical computer solutions. The new products also introduced a different style of computing which focused on "openness," software portability, and distributed processing capabilities (e.g. Apollo Domain[7]) that offered customers a new dimension in flexibility.

During this period the industry also witnessed vastly superior designs, such as the Xerox Star, which despite its innovative features, met with less than enthusiastic market support. Although the Star, and many other innovative products made significant market contributions, they will always be marked as failures that stand as an example of "too much functionality for (the) user[8]," a fault repeated many times over the span of this industry.

Software Compatibility, Resource Sharing, & Standards (1984-86) - Despite the introduction of many new and innovative workstation offerings from other vendors, many customers continued to buy workstations from Sun and Apollo based on the availability of key applications or networking functions. Digital, H/P, and many of the early providers of graphics workstations tried diligently to gain marketshare with creative combinations of products. While quite elaborate, many of these features were simply not valued by potential workstation purchasers. Vendors focused on flexible networking, higher resolution screens, additional software tools, integral printing capabilities, and higher speed buses, all to no avail. The primary reason was that at this point the majority of these vendors lacked the applications and software tools that were essential to running the client's business (or engineering departments). It is also hypothesized that in the late 80's the dominant design emerged based on a package of hardware features and integral software capabilities.

As highlighted earlier, Bill Joy the "spiritual leader" of Sun Microsystems engineering efforts, had been one of the more outspoken contributors on the topic of workstation architecture[9].

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[6] Assembled by author based on data found in multiple sources already cited.
[7] "New architecture spotlight," J. Rochester, Computerworld, 11/17/82, p. 35
[8] "The user interface," T. Biladeau, Computerworld, 3/31/82
[9] M. Hall & J. Barry, "Sunburst: The ascent of Sun Microsystems," (1990)

In the 1986-87 timeframe numerous other authors (Joy 1986, Farber 1987) discussed and hypothesized on the topic of future workstation architectures. The resulting architecture, highlighted in Figure 1.3, is similar in many ways to those products offered today. While it is true that current workstations offer higher performance buses, processors, and vastly superior expansion capabilities, these features represent incremental improvements to those highlighted in Figure 1.3.

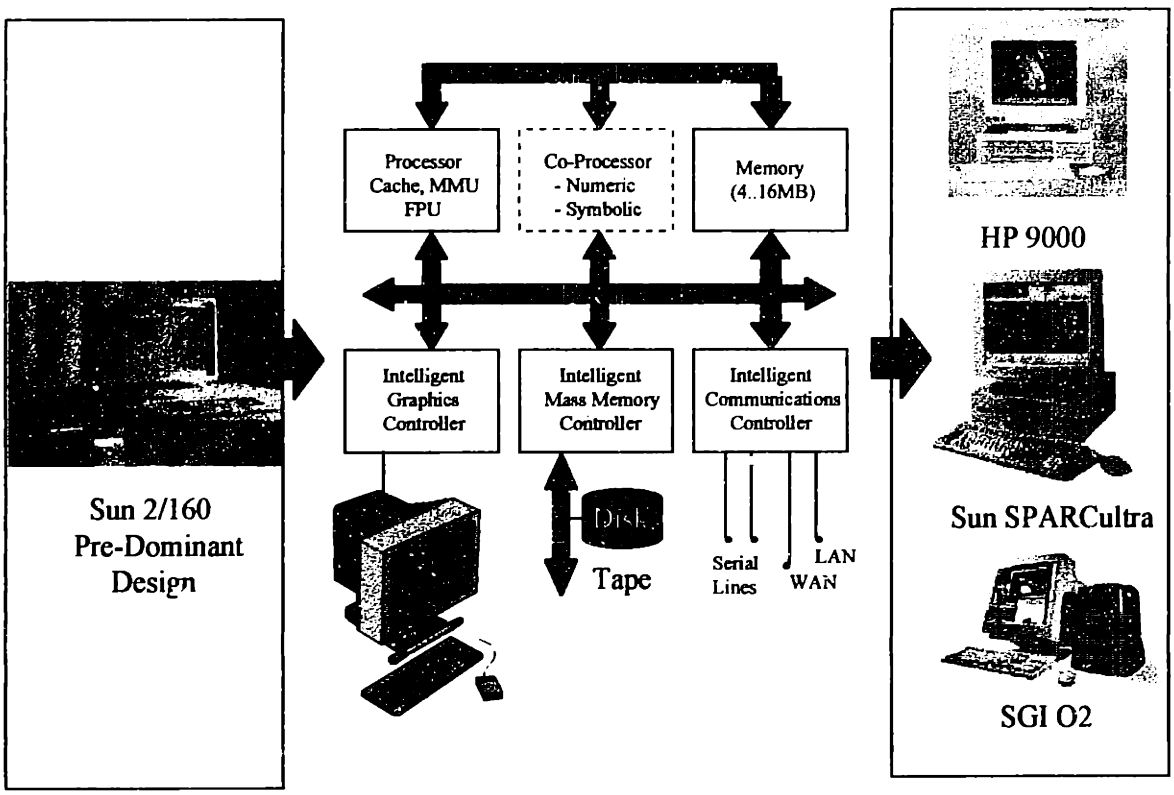

Figure 1.3 - 1986 Workstation Architecture & Pre/Post Product Examples

Processing Performance (1987-90) - Based on the tremendous performance offerings from H/P and Digital, many customers focused their purchasing decisions on the power these systems offered for complex computing tasks. During this period H/P and their powerful Precision Architecture (PA-RISC) "Snake" family of workstations experienced tremendous success, attracted top applications developers, and briefly eclipsed Sun as the industry's leading provider. During this period vendors also developed technologically elaborate solutions (e.g. Stardent Titan, NeXT

Cube, Apollo DN10000, DEC VAXstation 8000, Sun VX/MVX) that unfortunately met with the same fate as the Xerox Star, lots of features, not enough customers.

Balance Performance, Graphics, Low-cost, & Multimedia (1991+) - In the period following the introduction of H/P, Digital, MIPs, and Intergraph's high powered workstations, the market shifted to a focus on balanced performance. During this period customers realized that workstations needed more than just fast processors, but also high-speed buses, connectivity options, and graphics accelerators. The industry once again responded with innovative products that leveraged off the dominant design yet provided more advanced features in the product bundle. Some of the more recent features being the addition of 3-D graphics as standard in most system offerings[10]. Many customers also demanded very low-cost workstations during this period that would enable wide spread corporate use, vendors responded with workstation products in the <$5K price range[11].

These examples and timeframes while general, demonstrate the evolution the workstation industry has undergone. The key factor to be considered is the impact this has had on industry composition. In the first period described there were 46 different systems providers. In 1984 there were approximately 120 vendors, yet in 1996 Data Sources highlights only 30 organizations offering products which qualify as traditional Unix workstations (with the top 3 vendors holding >70% marketshare). Recent industry developments suggest the exit or transition of many of these firms to the Windows NT/Intel platform, with the most significant defections coming from large players like IBM, Intergraph, and a number of SPARC clone vendors. The remainder of this chapter is focused in researching tools that may provide greater insight into this industry.

THEORY OF DOMINANT DESIGN AND THE WORKSTATION INDUSTRY

The industry's professional journals include many discussions on the evolution of technological developments and products that have contributed to today's workstation offerings.

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[10] "Graphic content," Information Week, 8/28/95 pp. 43-44

[11] "Sun boosts low-end," "Silicon Graphics adds low-cost models," Information Week, 7/22/91 p. 45

These papers range from Harslem's[12] review of the development and technical aspects of the infamous Xerox Star 8010 Professional Workstation, Bell, Miranker, & Rubinstein's[13] eloquent discussion on the merits of supercomputing workstations, to Joy's[14] often quoted and frequently over-hyped description of future workstation architectures and creation of "Joy's Law of Computing." All of these articles provide a comprehensive overview of the industry's major technological turning points, but do little to helping us understand the issues leading to the emergence of a dominant design. Despite the fact that the evolution of the workstation industry shows many interesting traits found in industries impacted by a dominant design, little academic work appears to have been focused in this space.

Utterback[15] describes a dominant design within a given product class as "the one that wins the allegiance of the marketplace, the one that competitors and innovators must adhere to if they hope to command significant market following." The theory of dominant design purports that the emergence of a dominant design will be preceded by a "flurry" of product innovations, by an increasing number of firms, which will lead to a synthesis of these various innovations into the winning product combination. Tushman (1990) refers to these innovations as "technological discontinuities," that are disruptive to existing, or well established products or technologies, and lead to the "unseating" of these products and their vendors. The period following the emergence of the dominant design is characterized by a decline in the number of firms and product offerings as the vendors shift from a strategy focused on technological differentiation, a strategy of process innovation. The period following the solidification of this design also marks a point where consumers will place less value (or no value) on product functions extraneous to those found in the

[12] E. Harslem, "The Star user interface, a review," Proceedings 1982 National Computer Conference, & A retrospective on the development of Star, Proceedings 6th International Conference on Software Eng.
[13] G. Bell, "Supercomputing for one," IEEE Spectrum, 4/88 pp. 46-50
[14] B. Joy, "Computer workstation architecture: 1982-1992," Proceedings of the IFIP '86, (1986)
[15] J. Utterback, "Mastering the Dynamics of Innovation," Harvard Business Press (1994)

dominant design. This is of tremendous importance because the state of market evolution dictates when and where radical versus incremental innovation will be valued.

There are many rich examples of well established industries and the impact of the dominant design's emergence. Utterback highlights much of his own, as well as other academic work surrounding dominant design theory in both the discrete and process manufacturing environment. Specific examples are given in the typewriter, automotive, television, transistor, calculator, winchester disk drive, semiconductor, massively parallel computer, glass, wood pulping, and Rayon industries, including summary data on the number of competing firms and the products offered at varying stages in the industry. Tushman[16] further applies many of these concepts to the cement, container glass, flat glass, and minicomputer industries.

While there has been little to no work on the theory of dominant design as it applies to the workstation industry, there have been many studies which have applied this concept to other segments of the IT products industry. Although these studies may focus on an industry segment that has experienced dissimilar technological developments, they share many traits with the evolution of the workstation industry and in some cases the research actually focused on technologies that are incorporated into the dominant workstation architecture (e.g. winchester disk drive and RISC processors). These studies also explore industries that have been dramatically impacted (minicomputers) or pose a threat to the workstation industry (personal computers). The other point worthy of noting is that the maturity and level of detail in some of these studies vary greatly. Some of the authors have gone to tremendous length in detailing the industry and its participants (Christensen, Affuah, Khazam & Mowery), and others provide a cursory (Tushman) overview of industry evolution. At the same time some of the literature was based on industries where technology was still evolving and recent or upcoming events may impact the findings (Kai).

[16] M. Tushman, "Technological discontinuities and dominant designs: A cyclical model of technological change," Administrative Science Quarterly (1990)

The following paragraphs outline some of these studies and their pertinence to the study of the workstation industry.

Winchester Disk Drives (Christensen 1992)

Christensen's research on the evolution of the winchester (or rigid) disk industry provides an excellent model for researching, documenting, and applying the dominant design theory. The product of this research, highlighted in many papers, focuses on the various participants and their product offerings over the history of the winchester disk industry from its inception in 1981 to products offering through 1989. The work is based on product data as recorded in *Disk/Trend Report* and *Data Sources,* which combined provide an excellent framework for ensuring accuracy of product and vendor specifications. The database assembled encompasses all known companies offering winchester products and over 700 product entries. Christensen's research reveals an industry which has changed dramatically over its 15 year span. The work also showcases the various introductions of technological advances such as thin-film heads, and the impact these have had on the competitive landscape. In addition Christensen's work encompasses the use of tools such as *hedonic regression analysis* to assist in correlating various product features to overall market acceptance and perceived value. Christensen (1995) also provides further extrapolation of the data set into strategy development and decisions on vertical disintegration.

The application of *hedonic regression* analysis (or a similar technique) could provide significant insight into the workstation industry. As outlined in our discussion of the workstation industry's evolution, we see the customer's perceived value in workstation solutions has changed dramatically. Over the past 15 years, customers have placed value on features ranging from graphics resolution and flexibility, to pure processor performance, to today's workstations which emphasize "balanced" system performance. *Hedonic regression* analysis, which was introduced at General Motors to measure the proportion of increase in automobile price attributable to specific product features, provides a quantitative approach to assigning value to a given element within the

product feature/benefit "bundle." Christensen used this technique very effectively to assess how the introduction or changes in various disk drive attributes (e.g. capacity, speed, and size) changed over the 8 year period reviewed in the disk industry. This approach assigns "shadow price" values to each product attribute.

Given the number and type of changes in the workstation industry, it could be valuable to apply a tool similar to *hedonic regression* to the workstation vendor dataset, in an effort to determine the value various attributes contribute to an individual vendor or products success. As previously noted, many workstation offerings have fallen victim to offering features that were not (or were not capable) of being valued by the consumer, *hedonic regression* offers an approach to measuring the efficacy of these features.

The concept of vertical disintegration is of great interest based on recent developments in the supply chain of various processor and ASIC components and the resulting reduced cycle time of developing computer workstations. Following suit behind Intel[17], vendors like Sun Microsystems and Digital are placing greater emphasis on developing system components business units which cater to bringing new (and sometimes competitive) product offerings more quickly to market. Christensen contends that "changes in component technology will exert pressures toward greater integration to the extent that they create uncertainty about the interaction amongst components,[18]" this is especially true in the development of new workstation products where defining the interactions between various system elements is one of the primary delays in the introduction of the product. Vendor expansion into the sale of core components/modules is focused in reducing this uncertainty.

[17] "Intel Unbound," Business Week, 10/9/95, pp 148-154
[18] C. Christensen, "The Drivers of Vertical Disintegration," (1995)

Reduced Instruction Set Computers (RISC)

Khazam and Mowery's[19] research into the area of RISC computing while somewhat lacking in detail, also provides an excellent framework for our study of the workstation industry. The study does an excellent job of capturing early history of RISC technology development at MIPS Computer, Sun Microsystems, and IBM. The authors highlight the various strategies employed by these firms, and how they translate into a firm's market position. They describe the early developments at IBM's Watson Research Center where RISC computing was pioneered, but also highlight IBM's difficulty harnessing this technology into a substantive product set. The study also highlight's Sun's strategy of "giving technology away," and attributes this manner of handling proprietary developments as essential to defining standards (in this case a "de facto" standard) and the emerging dominant design in RISC.

While Khazam and Mowery's work provides some interesting details on strategies surrounding RISC microprocessors, it lacks substantive details on the overall impact to the industry landscape (vendor composition and total marketshare). The other consideration, primarily due to timing, is that the study does not incorporate recent industry developments (e.g. Alpha, SGI acquisition of MIPS, and HP/Intel Merced) around new participants and ever increasing encroachment from Intel product offerings. While these industry additions do not change the fact that SPARC still dominates the RISC processor (and workstation) market, the paper could benefit from these enhancements. Our discussion of the workstation industry will leverage Khazam & Mowery as well as Affuah's[20] work in reviewing the various strategies workstation firms have employed in protecting versus promoting their technological innovations. As expressed in Affuah's

[19] J. Khazam & D. Mowery, "The commercialization of RISC: Strategies for the creation of dominant designs," Research Policy, 1994

[20] A. Affuah, "Strategies for profiting from an innovation – a dynamic perspective," University of Michigan (1996)

work, Sun's combination of "giving away technology" in combination with "run" and "blocking" strategies have been major contributors to their increasing marketshare.

Personal Computer Industry (Kai 1992)

Kai's research[21] into the personal computer (PC) industry in many ways parallels the proposed research into the workstation industry. PC systems share a lot of the same characteristics of high-performance workstations, and have very similar system architectures. As a matter of fact, with Compaq Computer's recent introduction of workstation models[22], one might contend that there are no differences. In Kai's work, various PC manufacturers and products are reviewed in the period from 1974 through 1989 (utilizing Data Sources for vendor information and product specifications). Kai's research revealed that the dominant design in the PC industry was comprised of a set of technologies including an Intel 80x86 microprocessor, the PC-AT bus, and the MS-DOS operating system, the so called "IBM-compatible" design which at the time of publishing held 80% marketshare.

Kai's findings are of interest for many reasons. First, in the case of the PC industry, Kai found that the market landscape did not follow the theory of dominant design, and that the number of vendors actually increased based on the emergence of the "IBM compatible" configuration. Secondly, it is of interest due the fact that a similar comparison might be drawn for a workstation design which incorporated elements such as a commercial microprocessor (perhaps Motorola 680x0, the VME bus, the Unix Operating System, and a Windowing environment [similar to early Sun or Apollo systems]). The drawback to this conclusion would be that we know both the workstation and PC vendor's product offerings have progressed significantly from the point in time these elements were solidified. Additional developments in the area of motherboard design, I/O buses, software environments, product packaging, and upgradability, have had significant impact

[21] H. Kai, "Competitive strategy under standardization in the personal computer industry and its influences on new entrants," Sloan School of Management, MIT (1992)

on product offerings as well as the type and number of companies competing in industry. Intel's recent offensive moves into board-level products (e.g. peripheral adapters [Ethernet cards])[23] are exemplary of the impact on PC dominant design and industry participants at both the product and peripheral level.

The discussion in Kai's work around standards and complementary versus specific assets is directly applicable to the workstation industry and will be explored in greater detail.

Product Families & Applicability to the Workstation Industry

In addition to the "IT specific" studies highlighted on the preceding pages, much work has also been done in the value of leveraging product families (or platforms). As Utterback & Abernathy[24] point out, once the dominant design has emerged, firms will transition to a phase where tremendous importance is placed on efficiencies in designing and manufacturing of specific product offerings. Sanderson & Uzumeri's[25] research into Sony's management of the Walkman product family provides a tremendous example of the power in this technique. Although some might contend, and it is quite true, that Walkman technology is very different from that incorporated in workstations, Sony effectively used this strategy to "milk" the maximum life possible out of its design with models lasting nearly twice as long as competing products. This strategy allowed Sony to command a price premium and contributed to dominant (50%) marketshare. Recent trends in the workstation industry have shown that many vendors such as Sun, Digital, H/P, and IBM are all leveraging workstation families to both decrease cycle time, and reduce the cost of introducing new products.

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[22] "PC giants challenge Unix workstations," Information Week, 10/28/96, p 26
[23] "3COM," WSJ, 2/10/97
[24] W. Abernathy & J. Utterback, "Patterns of industrial innovation," Technology Review (1978)
[25] S. Sanderson & M. Uzumeri, "Managing product families: The case of the Sony Walkman," Research Policy (1995)

Based on the information collected in the survey of workstation products, it is proposed to leverage tools similar to those used by Sanderson[26] in her comparison of Digital and Sun workstations, or perhaps those suggested in Meyer, Tertzakian, & Utterback[27] to measure the relative efficacy in each vendor's approach to new product development. Sanderson's work demonstrated how Sun's use of product families and transitions were more effective than those of rival Digital Equipment. It is my opinion that vendors have made dramatic improvements over the days where each new system introduction was based on a new design, and secondly, that some vendors do a better job than others in leveraging (or "milking") additional life out of product families.

Proposed Area of Research

While there has been little work done specifically on the workstation industry and the applicability of Utterback & Abernathy's (1978) Theory of Dominant Design, I believe the industry demonstrates characteristics congruent with this approach. My objective is to leverage the information gathered which encapsulates the history of the industry to gain a better understanding of the technological innovations and architectural developments which led to the emergence of a dominant design. Based on this understanding of the elements forming this design, I proposed to utilize some of the tools highlighted to derive insight to the successful strategies providers of workstation products have used change the rules on some of the industries leading and most powerful providers of information technology products.

[26] S. Sanderson & M. Uzumeri, "Managing product families, " (1996) pp. 99-109
[27] M. Meyer, P. Tertzakian, & J. Utterback, "Metrics for Managing Research & Development, " Sloan School of Management, MIT, Working Paper #3817 (4/95)

- Chapter 2 -
Catalysts for Emergence of High-Performance Workstations

In the late 50's a team of engineers, led by MIT's Dr. Jay Forrester, diligently worked to complete the development and integration of the SAGE air-defense system. SAGE represented the most advanced computer system ever developed, and incorporated the industry's first attempts at interactive computer graphics.[1] While it may be true that SAGE exhibited tremendous breakthroughs in many aspects of computer science (e.g. graphics, real-time data acquisition, resource sharing, and networking), the world of interactive graphics and high-performance workstations was destined to become, one of the fastest moving and turbulent segments of the computer market. These developments would lead one to question Dr. Forrester's claim that "everything interesting in the computer industry had already been discovered,[2] more importantly, it would lead one to question the strategies of the industry's dominant players and their failure to understand the critical shifts in technology and customer computing needs that would lead to the emergence of the workstation industry, and numerous new competitors in the early 80's.

Catalysts for Change

The early 80's represented a time of tremendous change for the computer industry. The industry's dominant suppliers of systems, IBM, NCR, Burroughs, as well as industry youngsters like Digital, Data General, and Prime Computer were experiencing tremendous growth. Customers were clamoring to obtain the latest in minicomputer technology, while also striving to take advantage of emerging wide-area and local-area networking technologies. At the same time these vendors were enjoying the profits of a booming market their were a number of shifts, or "step functions" in technology, and a business environment seeking increases in productivity that would foster the emergence of the high-performance workstation industry.

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[1] "Surveying interactive graphic systems," Mini-Micro Systems, 12/80 p. 77
[2] Lecture: Dr. Jay Forrester, MIT Management of Technology Program, 7/30/96

On the technological front the prices and availability of component level technologies were offering the opportunity for new combinations of computer systems. The radical decrease in price of random access memory (RAM) prices fueled the advent of raster computer graphics devices from vendors like Tektronix, Megatek, and a host of other technological followers. Newly available commercial microprocessors offered performance on par with that available from proprietary offerings such as Digital's VAX and PDP-11 or Data General's MV/Eclipse were becoming available from vendors such as Motorola (68xxx), National Semiconductor (NS160xx), and Zilog (Z80). The most significant of the technological shifts was occurring in the west coast laboratories of Xerox's Palo Alto Research Facility (PARC), specifically in the areas of networking and graphical user interfaces.

Despite their inability to translate tremendous technological breakthroughs into a sustainable market position for Xerox, the engineers at PARC can claim credit to 3 major technological contributions in the workstation industry, namely the development of the Ethernet LAN, graphical user interface, and concept of network resource sharing (although Apollo's Domain distributed computing environment can claim similar credit). While the ill-fated Xerox "Star" 8010 leveraged all of these elements into an early workstation offering, the product was not well accepted in the market due to its excessive price and compatibility with existing personal computer applications, and level of hardware and software complexity. In this case the Star may have been yet another example of a high-tech product that was well in front of its target market.

Ethernet Local Area Network - Xerox's introduction of the Ethernet local area network technology offered a new way for computers to share information via a "standards-based" 10MB/second hardware solution. The Star incorporated this technology into its base system, more important however was Xerox's licensing of this technology to a number of hardware manufacturers leading to its availability for a wide range of buses (e.g. VME & Multibus) and operating environments (e.g. Unix).

Bit-Mapped, Graphical User Interface(GUI) - The second major influence of the Star workstation was the availability of its early "windowing environment" which for the first time allowed users a flexible way and intuitive way to communicate with the system. The bit-mapped interface allowed the Star to display "what you see is what you get" (WYSIWYG) documents and graphics which increased productivity and reduced user frustration in the generation of documents and charts. The Star's windowing environment also allowed users to work on the computer in a manner similar to the way the work at their desk, having multiple documents or projects open at the same time, and allowing the user to quickly switch back and forth between various resources. Xerox leveraged the Star's enabling technologies into CAD and Text Publishing Systems which at their time of introduction were considered far superior to competing minicomputer-based solutions.

Network-based Resource Sharing - The Star's concept of network-based resource sharing while tremendously innovative, would also stand as one of the primary reasons for the systems failure (due to cost for file server resources). The Star product set was based on the concept that user workstations would be serviced, and have access to a central file server which would house resources for the entire network. This concept of shared services and "public" documents which could be accessed by users would form the basis for future solutions available from 3 Rivers, Apollo Computer (Domain), and Sun Microsystems (NFS). Unfortunately, the cost of the file server was cost prohibitive for early potential Star customers that balked at the price tag of workstation and file server for a single workstation user.

On the business front, the workstation market was spurred on by market demand for tools that offered the potential to increase worker productivity. The ever increasing "white collar" workforce sought tools that could squeeze more hours from existing personnel. The use of computer graphics and specifically enhanced user interfaces on computer applications presented the opportunity for increased worker productivity. Early targets included the Computer Aided Design/Computer Assisted Manufacturing (CAD/CAM), mapping, and animation segments of the

computer market, where users were hampered by clumsy computer interfaces and complex programming tools. Graphical-based interfaces offered the potential for 300-500% increase in user productivity. On the same front (although at different scale), Xerox, A.B. Dick, and Exxon Business Systems were purporting to offer similar productivity increases in the area of office automation, text processing, and publishing software applications.

A secondary driver to the emergence of workstation powerhouses like Apollo Computer (acquired by Hewlett-Packard), Sun Microsystems, and Silicon Graphics (SGI), was the demand for improved price/performance. The emergence of desktop personal computers increased user awareness of alternatives to expensive minicomputer systems. The early graphics workstations leveraged the combination of Digital VAX or Data General MV/Eclipse minicomputers with high-resolution graphics terminals from Tektronix, Megatek, or any one of a number of other suppliers. Major drawbacks to these configurations was both the excessive investment in hardware (in excess of $300K for a four user system, not including any applications!) and the lack of commercial-off-the-shelf (COTS) software or management tools necessary to operate the systems. One purchaser of an early Perq workstation cited the fact that they could by an entire standalone graphics workstation for the same "price [they] were paying for a Tektronix 4014 storage tube[3]." These issues coupled with the availability of new technologies positioned the market opportunity for the birth of the workstation industry.

While some of the claims for productivity increase may be suspect, it is true that the advent of computer graphics posed a significant shift in course for the computer industry. It established a new way for users to interact with their computers and led to the emergence of both hardware and application software vendors looking to cater to a new class of computer users.

[3] "The Perq," http://www.cis.rl.ac.uk/publication/ECN.final.perq.html

Industry's Pioneers and Interactive Graphics Workstations

The industry's early providers of computer graphics workstations can be grouped into the categories of either CAD/CAM systems providers, OEM graphics providers, or OEM systems providers (examples highlighted in Table 2.1). This period in the workstation industry was marked by tremendous technological creativity as well as great disparity amongst the workstation products and components offered.

In a period that lacked any dominant architecture or standards, suppliers of early CAD solutions were rewarded for their unique, complex, custom solutions that incorporated both proprietary system and applications technology into a "turnkey" solution. Suppliers of graphics and systems components (e.g. Tektronix and Digital) offered systems to both end-users, developers of turnkey graphics systems (OEM market), or systems integrators for embedding into their solutions. The reliance upon these resellers for market entry is one element destined to hamper vendors like Tektronix, Digital, and even Apollo Computer, in the future.

Participant	Category	Primary Product	Host Technology	Primary Distrib.
Adage	Graphics	Graphics Terminals	Proprietary	Direct
AED	Graphics	Graphics Terminals	Proprietary	Direct
Applicon	CAD	CAD Applications	DEC PDP-11/34	Direct
Auto-Trol Tech.	CAD	CAD Applications	VAX/Sperry	Direct
Calcomp	Graphics	Graphics Peripheral	Proprietary	OEM
Chromatics	Graphics	Graphics Terminals	MC68000	OEM
Digital Equipment	Systems	Minicomputers	Proprietary	OEM
Evans & Sutherland	Graphics	Graphics Hardware	DEC PDP11	Direct
Genisco Computers	Graphics	Graphics Terminals	Z800	OEM
Gerber Systems	CAD	CAD Applications	H/P 1000p	Direct
Hewlett-Packard	Systems	Minicomputers	Proprietary	OEM
Lundy Electronics	Graphics	Graphics Terminals	DEC PDP/Cyber	Direct
Megatek	Graphics	Graphics Terminals	Proprietary	OEM
Sanders Associates	Graphics	CAD Applications	Proprietary	OEM
Summagraphics	CAD	Graphics Hardware	Proprietary	Direct
Tektronix	Graphics	Graphics Terminals	Minicomputer	OEM
Vectron Graphic Sys	Graphics	CAD Applications	Proprietary	Direct

Table 2.1 Representative Graphics Workstation Suppliers[4]

[4] Derived from "Surveying interactive graphics systems," Mini-Micro Systems 12/80 pp. 71-90

The graphics workstation market in the late 70's and early 80's was characterized by a focus on graphics performance. Most systems leveraged computing resources (in most cases minicomputer systems) shared between 4-6 graphics terminals. The representative configuration highlighted in Figure 2.2 exemplifies many of the workstation offerings available in this time period. COTS (or custom) graphics terminals were connected via proprietary interconnects (usually parallel [e.g. DEC DR11]) to a shared minicomputer (in this case a DEC PDP11), running a modified version of the vendor's operating system. The configuration was based on numerous proprietary drivers at both the workstation as well as system level to facilitate rapid graphics response and file transfers. These systems (or hosts) were usually modified with the addition of specialized hardware accelerators on the systems bus facilitate graphics and file serving performance[5].

The important characteristic of the industry in the early 80's was the recognition that vendors differentiated themselves based on innovations in proprietary graphics hardware and software technologies, a radically different approach in today's industry which emphasizes standards and adherence to COTS hardware and software configurations. At this stage in the industry, few standards existed around hardware and software which afforded vendors a great deal of flexibility in developing new products. One Computervision executive, cited that "in the early 70's, when Computervision started this whole CAD/CAM business, it was easier to manufacture every component of our systems[6]." Computervision maintained a mixed strategy of proprietary and COTS hardware platforms well into the early 90's when it finally transitioned to using COTS workstation hardware from Sun Microsystems (and later Hewlett-Packard and Digital Equipment).

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[5] Example configuration can be seen in Mini-Micro Systems, 12/80 p. 84 (depicts typical configuration for M&S computing IGDS system)

[6] "Computervision unveils new products, new approach to CAD/CAM market," Mini-Micro Systems, 10/83 p. 211

This strategy, common to many suppliers of CAD/CAM solutions suppliers, would lead to the demise of many unfortunate firms.

The drawbacks to the "custom/proprietary" approach was the degree of "finger pointing" when customers sought support, the level vendor dependence for software, and the price associated with these complex systems. When customers required support for their newly acquired systems they would frequently get "bounced around" to various component supplier trying to troubleshoot problems. In the case of workstations assembled by a systems integrator it was often difficult to identify responsibility for a system failure. In the case of turnkey solutions from CAD/CAM vendors the proprietary nature of hardware and software typically locked users into upgrades solely available from this vendors.

All of these factors coupled with the tremendous cost of systems made the market ripe for a new breed of systems suppliers.

Catalysts for the Early Workstation Industry

Based on discussions with industry participants, the workstation industry appears to have been influenced from two important and closely related sources. Despite popular industry belief that Apollo Computer was the industry's first mainstream (defined as volume and based on standardized components) workstation provider, the credit actually is directed towards a small Pittsburgh, PA company known as 3 Rivers Computing[7]. In the late 70's a proposal known as SPICE (Scientific Programming Interactive Computing Environment) was developed at Carnegie-Mellon University, that sought a workstation based on standard computing elements. Despite the fact that this proposal never received a response, it would lay the foundation for the future of many workstation products including vendors such as 3 Rivers Computing which was founded in 1974, but had yet to solidify its workstation product offering.

[7] Interview: J. William Poduska, 3/17/97, Lexington, MA

The SPICE proposal[8] identified that numerous "step functions" in computing technology had occurred making the shift of computing power to the user (or desktop) level now a reality. The proposal focused on the availability of low-cost off-the-shelf compute power offered by commercially available microprocessors, the availability of low-cost 16K DRAMs which enabled dramatically reduced system memories and the production of bit-mapped graphics (previously cost prohibitive), and new storage technologies such as Winchester disk drives as catalysts for a new breed of computer systems. Despite the fact that the SPICE proposal evolved into more of an operating system development initiative (with ACCENT O/S contributing to the early Perq workstation), Brian Rosen (President of 3 Rivers) harnessed the concept to bring the Perq workstation to market[9].

Late in 1976, on the opposite side of the United States, researchers in Xerox's Palo Alto Research Center were working on the development of the STAR 8010 Information Processing System, which is cited by many as the most influential force on the creation of the workstation industry. Where the SPICE proposal was focused on individual hardware and software, the STAR project focused on the most essential elements of workstations such as the concepts of Local Area Networks (Ethernet), Graphical User Interfaces, and file sharing concepts. These elements made the STAR Workstation a radical and elegant solution, but largely unappreciated product in the market.

A sequencing of early workstation developments is highlighted in Figure 2.2. The cross pollination of the Xerox and Carnegie-Mellon concepts occurred when Brian Rosen left 3 Rivers Computing in 1976 for a 2 year period to join the team at Xerox PARC[10]. During this timeframe

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[8] "Proposal for a Joint Effort in Personal Scientific Computing," Carnegie-Mellon University, Department of Computer Science, 8/30/79 (copy held by author)

[9] Based on input from R.L. Hopgood, first customer of both the Perq and Apollo DN200 workstations (F.R.A.Hopgood@rl.ac.uk)

[10] "The Perq," http://www.cis.rl.ac.uk/publication/ECN.final.perq.html

Mr. Rosen was a participant on the design team for the Alto[11]. Based on lessons learned at PARC, Mr. Rosen rejoined 3 Rivers, and many of the elements contained in the STAR workstation were incorporated into the PERQ workstation which 3 Rivers announced late in 1978.

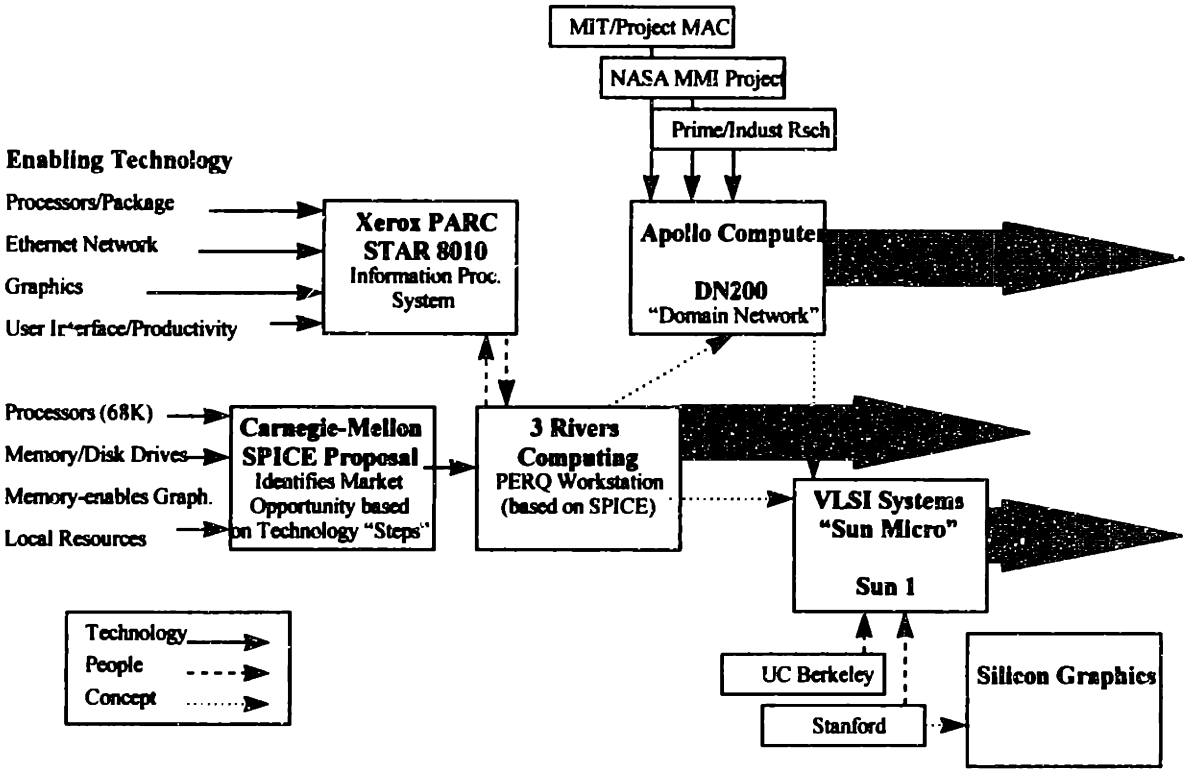

Figure 2.2 - Early Workstation Influences

The early PERQ workstation contained many of the key elements found in the hypothesized dominant design. Despite the fact that the $27,000 system was based on a proprietary 1 MIP microprocessor, it utilized low-cost memory, contained a 12MB 14" disk drive, offered users a bit-mapped 100 pixel-per-inch, 1024x768, gray-scale display, a graphics "touch-pad" for cursor control (similar to those found on today's Macintosh PowerBooks) and utilized the the Accent (Unix-like) operating system. The major shortcomings on the early PERQ workstation were the proprietary processor, lack of Ethernet interface, sophisticated file system, and elegant packaging that would be included in the early Apollo workstations. Industry trade press cites

[11] "Growth through PERQs," Datamation, 12/81, p. 63-65

hundreds of early imitators of the 3 Rivers system approach, but it wasn't until September of 1980, when Apollo Computer added the essential ingredients that took the industry by storm.

Apollo Computer - The Birth of Modern Workstation Technology

Utilizing a unique mix of technology transfer for MIT's Project MAC, NASA's Man-machine Interface Project, and elements of industrial research underway at Prime Computer, J. William Poduska, previously Director of Engineering at Prime Computer, launched Apollo Computer in February of 1980. The organization's first product, the Domain Network 200, shared many of the traits found in the early Perq workstation, but differentiated itself based on four superior elements: its Aegis operating system, the Domain file sharing environment, a windowing-like environment known as the "display manager," and its use of a Motorola 68000 microprocessor. Despite the fact that the DN200's "green 30Hz display was not very impressive[12]," the introduction of the DN200 signaled the availability of the first low-cost workstation product which posed formidable competition to existing suppliers of minicomputer systems.

Workstation Industry Participants

In the years following the introduction of Apollo's first product, the workstation industry would experience the entry and exit of a vast array of firms hoping to capitalize on this new market. Each of these firms leveraged different types of entry strategies (discussed in Chapter 5) and faced a changing suite of customer needs and elements of competition (discussed in Chapter 7).

Early Workstation Suppliers - In the period following Apollo's introduction of the DN200, many other firms followed in the footsteps of 3 Rivers Computing and announced a vast array of products based on the Motorola, National Semiconductor, or Zilog products. Suppliers varied a great deal with their product differentiation strategies. Some vendors focused on offering low-cost systems which lacked any sophisticated graphics or networking capabilities, others focused on their

choice of operating systems (e.g. DOS, CP/M, or proprietary), and others differentiating based on their own custom-developed applications (e.g. CAD/CAM). Some examples of these early product offerings are highlighted in Table 2.2

Organization	Product	Processor	Introduction
Florida Computer Graphics	Beacon Workstation	Z80	9/82
Telesis		PDP11/23	3/82
Applicon	Series 4000	VAX 750	3/82
Cadlinc	GNC11	VAX/68K	6/82
Charles River Data Systems		68K	8/82
Fortune Systems		68K	9/82
Forward Technology	Gateway Wkst	68K	9/82
Sigma Design	Sigma III CAD	68K	3/83
Chromatics	7900		4/83
Calos	Model 6000	68K	3/83
Arrigoni Computer Graphics	Touch & Draw II	68K	6/83
Bausch & Lomb	ProDraft 2D	68K	8/83
Cadmus Computer Systems	9000 Series	68K	8/83
Engineering Automation		68K/7720	8/83
Bruning CAD	Spectra	68K	11/83

Table 2.2 - Early Workstation Suppliers[13]

In addition to the introductions made by the vendors highlighted in Table 2.2, significant announcements were made by the industry's leading suppliers of minicomputer systems. This period marked the entry point for vendors such as Digital Equipment (VAXstation 100[14]), Data General (GW4000[15]), Prime Computer (PW200[16]), and Hewlett-Packard (Series 200[17]), who would each grapple with developing strategies to counter entrants such as Apollo, VLSI Systems (later to become Sun Microsystems), and Silicon Graphics.

The late 80's marked a period when the workstation industry shifted its focus to issues such as software compatibility, resources sharing, and standards. During this timeframe vendors began to focus on issues relating to the interoperability between systems and commonality in

[12] "The Perq," http://www.cis.rl.ac.uk/publication/ECN.final.perq.html
[13] S. Klein Computer Graphics Newsletter, 3/82 through 1/84 (information compiled by author)
[14] S. Klein Newsletter, 6/14/82
[15] S. Klein Newsletter, 3/7/83
[16] S. Klein Newsletter, 1/17/83
[17] S. Klein Newsletter, 1/17/83

software due to the fact that "...software is becoming more of a concern to users... (they) worry that they will lose their software equity when acquiring new systems because graphics software is in a state of flux[18]." These user concerns coupled by vendor strategies focused on raising the awareness of standards led to the purported emergence of a dominant design which would impact the number, roles, and types of firms participating in the workstation industry.

[18] "Workstations standardize," Mini-Micro Systems 10/83, p. 227

- Chapter 3 -
Workstations and Dominant Design

Utterback & Abernathy describe a dominant design as "the one that wins the allegiance of the marketplace, the one that competitors and innovators must adhere to if they hope to command significant market following."

During mid 1980's workstation manufacturers faced just such a situation. Up until this point manufacturers of high performance graphics products, CAD/CAM terminals, and various configurations of computer systems, had enjoyed a tremendous range of flexibility in the innovation and development of new products. While some of these products succeeded and others failed, during this period their were few constraints on the technology elements or standards that governed the introduction of new product offerings. The lack of standards or any industry dominating player is exemplified by the fact that there were in excess of 110 companies offering workstations in 1985 (pre-dominant design), and over 300 different organizations that offered workstation-like products in the period from 1981-1985.

The level of creativity and flexibility in product design is evident in both the diversity of the companies offering products, product configuration, and the technological advances made during this period. Prior to the solidification of the dominant design, these companies were responsible for the introduction of over hundreds of unique product offerings that one could classify as a high-performance workstation. While it is true that many of these products were embodied in "CAD-specific" solutions, or "standalone graphics terminals," they were precursors to the solutions launched by current industry leaders like, Sun HP/Apollo, and Silicon Graphics.

In the period prior to 1985, workstation-like solutions were offered by a very diverse group of companies (examples shown in table 3.1). The industry included the large purveyors of computer systems (large player), suppliers of CAD/CAM applications (CAD/CAM, producers of graphics hardware [Graphics]), and a wide range of small vendors building custom systems (Start-

up). *Computerworld* divided industry participants into 1 of 3 categories[1]such as large systems suppliers, CAD application suppliers, or smaller start-up companies. Prior to the emergence of the dominant design, providers of CAD/CAM applications had few choices for base system technology, so they built their own custom workstations[2]. Providers of graphics terminals (e.g. Tektronix, Adage, Florida Computer Graphics, and Lexidata), recognized the market demand for higher performance products that could off-load graphics functions from minicomputer/ mainframe systems, and began offering products with standalone processing and storage capabilities. Following the introduction of Apollo Computer, these same graphics hardware purveyors, recognized the potential competitive threat from workstation upstarts.

The most significant activity during this period involved the emergence of a new breed of computer systems vendor, which focused on utilizing low-cost, commercially available, systems technologies as the basis of their product offering. It was the emergence of these vendors (e.g. 3 Rivers Computing, Apollo Computer, Masscomp, and VLSI Systems [to later become Sun Microsystems]), that posed the most disruptive threat to existing players and the basis of the dominant design for today's high-performance workstation products. An advertisement for Apollo Computer best summed up the competitive situation proclaiming "Until today, you needed a computer company, a graphics company, and a workstation company. Now all you need is Apollo[3]."

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[1] "Demand for 32-bit workstations outgrowing supply," Computerworld, 9/10/84 p. 16

[2] "Computervision unveils products, new approach to CAD/CAM market," Mini-Micro Systems, 10/83, p. 211

[3] Apollo Computer advertisement, Mini-Micro Systems, 3/86, p. 37

Company	Product Line	Category	CPU/OperSys
Apollo Computer	DN300, 320, 550, 460, 660	Start-up	Proprietary or 68010 CPU & Aegis or Unix
Cadmus Systems Co.	9750/9790	CAD/CAM	68010 & Unix
Cadnetix	CDX-5000, 9000	CAD/CAM	68010 & Proprietary OS
Celerity Computing	C1200	Start-up	Proprietary CPU & OS
Daisy Systems	Chipmaster	CAD/CAM	Intel 8286 & Maestro (Unix)
Data General	DS/4000 & 4200, GW/4000, 8000 & 10000	Large Player	Proprietary & Unix, AOS/VS & AOS/RT32
Digital Equipment	VAXstation 1 & 100	Large Player	Proprietary & VMS or Ultrix,
Florida Computer Graphics	Beacon Workstation	Graphics	Z80 & CP/M
Gould, Inc.	PS/3100 & 5100	Graphics	Proprietary & UTX32 (Unix)
Masscomp Co.	Workstation 500	Start-up	68010 & Unix
Metheus-CV, Inc.	Lambda	Graphics	68010 & Unix
Orcatech, Inc.	Orca 3000 & 3050	Start-up	680x0 & Unix
Perq Systems Corp.	Perq	Start-up	Proprietary & Accent (prop)
Prime Computer, Inc.	PW200	Start-up	Proprietary & Primos (prop)
Ridge Computers, Inc.	Ridge 32S & 32C	Start-up	Prop. & Unix
Sun Microsystems, Inc.	Sun-2/120 & 170	Start-up	68010 & Unix
Syte, Inc.	Series 3000	Start-up	NS 32000 & Unisyte (Unix)
Telesis C[illegible]oration	T-Series	Start-up	11/73, 68000 & NEC7220 - RSX11 O/S
[illegible]ic, Inc.	Scaldstar/system 1, 2, 4	CAD/CAM	68000 & Unix
[illegible] Systems, Inc.	Worknode 50, Systemnode 200 & 250	CAD/CAM	68000 & Unix

Table 3.1 - Sampling of Early Workstation Suppliers[4]

Variance in Early Workstation Designs

Upon review of the early workstation offerings, it is easy to note the wide range of variance in the performance, software, and hardware configurations of the various workstation products. It is also interesting to note that these systems vary a great degree in the number and

[4] Compiled by author, based on Computerworld, 9/10/84 p. 16

type of actual display devices (monitors), input devices (mouse, digitizers, "touch-pads," or multiple keyboards), graphics performance (resolution and support of complex graphics rendering), bundled software applications, and the physical packaging of the systems. The variance can be explained to a certain extent by the intended use (end use) of the systems, and the primary business segment (e.g. CAD/CAM versus artificial intelligence) addressed by each of these suppliers.

Display Devices - Today's workstation products are pretty standard in the number and type of display devices that they utilize. The manufacturer of workstation monitors (e.g. Sony versus Samsung) may vary, but most workstations commonly have a single display, ranging in size from 15-21," and are of the bit-mapped raster variety. Early workstations lacked such uniformity. Large CAD/CAM systems used a wide range of display devices including a mix of raster displays and older vector or "stroker" displays that were typically in excess of 19" and required custom hardware and software interfaces. These same CAD systems typically placed 1-2 large high-resolution displays and 1-2 character-based video terminals on the user's desktop, resulting in a cluttered and cumbersome work environment (albeit better than the non-automated alternative). In contrast to this, systems being used for software development or technical publishing applications may have had only a single display, and in the case of some early workstations, these displays were character based, monochrome, and offered very simplistic (if any) graphics capabilities.

Input Devices - The use of a mouse is pretty common place in today's workstation products. Early systems were quite diverse in their use of graphics tablets, digitizers, light-pens, touch-pads, and other assorted types of hardware for facilitating interaction with the computer systems. One of the early differentiators between Apollo's DN200 and the 3 Rivers "Perq" was the innovative "touch-pad" input device[5], which was similar in design to the touch-pad found in today's Macintosh PowerBook systems. While today's workstations may offer various types of

[5] "The Perq," http://www.cis.rl.ac.uk/publication/ECN.final.perq.html

input devices as an option, the mouse is generally a standard, and bundled component, of virtually all workstation systems.

Graphics Performance - Today's graphics systems may vary somewhat in the type of applications and graphics operations that can be supported, but they still share a great deal of commonality around display resolution, monitor support, and performance expectations. Predecessors to these systems were quite different. Based on the varying types of technology available at the time, workstations could be very different in their ability to draw and display complex objects. Vendors utilized this variation as an opportunity to differentiate their product offerings based on the incremental graphics performance the systems offered. The lack of standards around graphics hardware led many of these vendors to develop their own custom graphics accelerators and system interfaces for their complex systems.

Bundled Applications - A review of early workstation offerings reveals tremendous variance in the price of workstation products offered in the early 80's. The majority of this variance can be explained by the CAD/CAM or other types of software applications that were bundled with some workstation systems. Vendors like Computervision and Applicon sold their workstation products as a turnkey solution, other vendors of 68000-based systems like 3 Rivers, Charles River Data Systems, and eventually Apollo, offered relatively basic system software (limited to an operating system, network/resource sharing, and display management) with their early product offerings.

Physical Packaging - System packaging is an interesting aspect to the early workstation products. Based on the type of system elements included, a workstation could embody numerous rooms filled with hardware (e.g. Computer Room to house minicomputer, Output Room for plotters/printers, and a Display Room with special lighting to support the various monitors supported) to a simple deskside box, monitor, and keyboard, all fitting comfortably on the user's desk. These early workstations also incorporated unique packaging that combined monitor,

keyboard, system, desk, and plotters, all into a single unit. The best example of these elaborate packages were the early Qubix electronic publishing workstations or Intergraph's InterPRO CAD/CAM workstations[6]. Based on the intended end use of the workstation, each vendor would customize the system packaging to meet user needs. As newer systems providers began to emerge, and the distributed style of computing became more commonplace, the uniqueness of these early systems began to fade away. Bill Poduska (founder of Apollo) summed this up best as "size was not necessarily as important [deskside vs. desktop] as long as the product fit comfortably in the users workspace... the key difference was making sure the MIPS were 2 feet versus 200 feet from the users butt[7]."

Processing Power - One of the key differences between the various products offered in the early 80's relates to the type and performance of the microprocessors used by the various systems vendors. Workstation solution providers used a mix of proprietary processors from vendors like Digital and Data General, while others were using commercial microprocessors from Motorola, National Semiconductor, and Zilog, and yet a 3rd group utilized custom developed processor solutions. The outcome of these various approaches led to a great deal of disparity in individual systems and applications performance. Another key factor was the level of software compatibility between these early systems. Due to the fact that they were based on vastly different architectures and software environments led to little software portability between systems.

Networking, Connectivity, and System Interfaces - Prior to the emergence of Ethernet and standards-based I/O buses, early workstations utilized custom hardware and software interfaces to communicate. While some networking standards (e.g. DECnet) may have existed at the system level, workstation solutions relied on high-speed parallel interfaces to communicate between the primary system resource and user display devices. As newer systems began to emerge,

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[6] Example can be found in "The Intergraph CLIPPER family of workstations and servers," 4/89, p. 4-5 (copy held by author).

and organizations like Apollo offered more elegant distributed computing tools, these highly custom solutions waned away. It is also important to note that the early workstations offered from Apollo lacked a standards-based (e.g. Ethernet) LAN adapter, and the 1st Perq workstations lacked any network adapter at all. It was not until the 1983 timeframe that the Perq began to include this in the base configuration, and the emergence of Sun systems promoted Ethernet as a standard element of all of all its workstations.

System Software - As previously highlighted, early systems shared little software compatibility with their industry peers. Systems vendors utilizing proprietary minicomputer systems leveraged the operating systems provided from Digital or DG, and in many cases further complicated matters by customizing the software to support the custom graphics or file sharing requirements of their applications (e.g. Intergraph). On the other end of the spectrum, vendors providing solutions based on commercially available hardware were presented with a plethora of options for operating systems ranging from PC-like environments such as DOS or CP/M (e.g. Florida Computer Graphics), to more robust offerings like Unix (e.g. Masscomp & Ridge). In most cases many of the early start-up vendors developed their own custom operating systems (e.g. Perq, Apollo, Prime, and Syte) and file sharing environments using Unix or other publicly available systems as a base. The vendors that did offer a Unix derivative often customized the operating system to a point that precluded easy software portability, yet another example of vendor attempts to differentiate their solution(s).

The conclusion that can be drawn, is that in a period when no clear dominant design existed and there was a relative abundance of new hardware and software technology, vendors took a great degree of liberty in the development of unique, and highly custom product offerings which enabled vendor software applications which required higher performance than current systems offered. In the 1985 to 1990 timeframe, the industry underwent a major change as these industry

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[7] Interview: J. William Poduska, 3/17/97, Lexington, MA

participants were faced with the emergence of standards in both hardware and software driven by competitor firms such as Sun and Apollo who harnessed these changes into the formation of the dominant design common to the majority of today's workstation products.

Emergence of Workstation Dominant Design

Leader and chief visionary of workstation upstart Apollo Computer, William Poduska, had a vision for low-cost, high-performance, distributed systems, utilizing the emergent technologies as highlighted in the Carnegie-Mellon SPICE proposal[8]. Poduska's vision was contrary to those of industry leaders like Digital, Data General, and IBM in that it focused on using commercial processors (e.g. Motorola MC68000), memories, disks, tapes, and backplanes, when the traditional suppliers based their products on proprietary technologies. As previously mentioned Apollo's vision leveraged the system concept of competitor 3 Rivers Computing (Perq workstation), but was quite unique in that it focused on an entirely different style of distributed computing and leveraged the commercially available microprocessors from Motorola (68000). Apollo coupled the lessons learned from MIT's Project MAC, NASA's Man-Machine Interface Project, and industrial research done at Prime Computer, into the development of Apollo's unique Domain computing environment[9]. Domain in many ways served as the catalyst to propel the workstation industry forward. Early systems offered by 3 Rivers or Xerox included many novel features that would accompany later workstation offerings, but were lacking in either connectivity and graphics functionality (e.g. 3 Rivers) or were cost prohibitive (e.g. Xerox Star 8010). Despite the fact that the Apollo system lacked the sophisticated graphics offered in the Perq[10], or the elegant user interface of the Star, the Apollo solution was the first which embodied many standards-based features in an affordable system package (reference figure 3.1) with a superior, good performing, networked computing environment.

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[8] Ibid
[9] Ibid

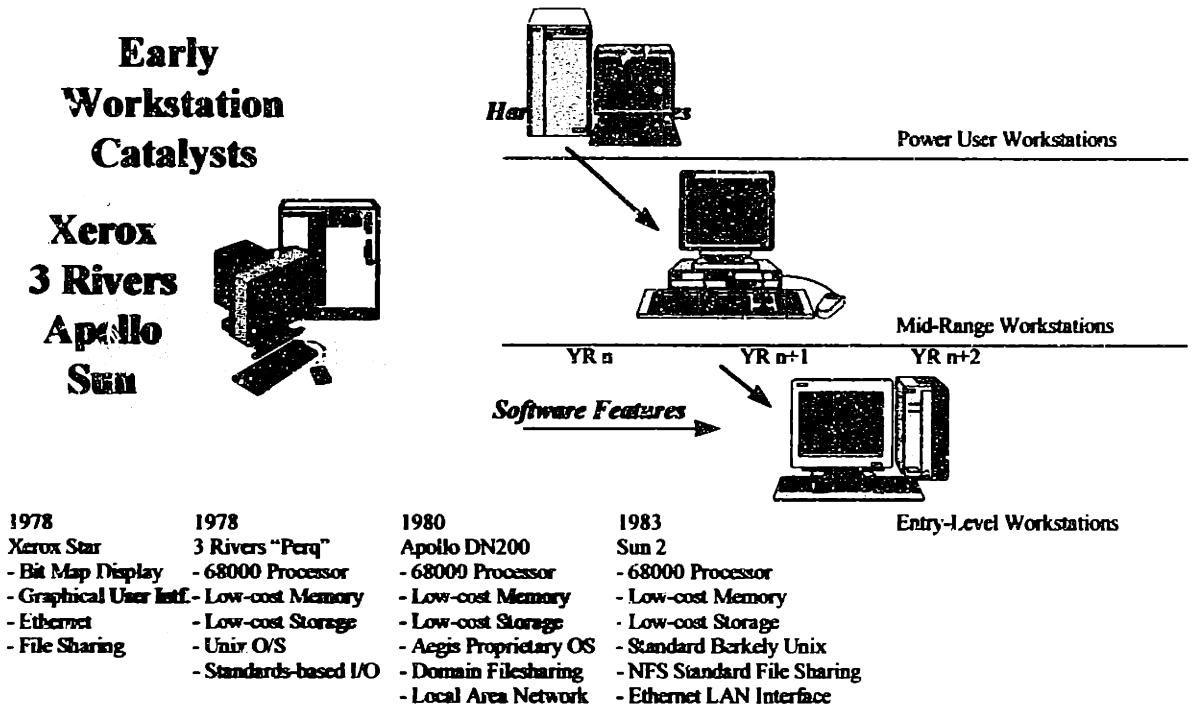

Figure 3.1 - Evolution of Workstation Dominant Design

The price/performance advantage of the Apollo solutions had an immediate impact on systems providers like Digital, Data General, and Prime Computer as it offered the suppliers of CAD/CAM solutions a new alternative to the base technologies available from minicomputer vendors, or the custom systems that were designed and built in-house (most notable, Mentor Graphics, who was one of many CAD vendors to become Apollo's largest customers). The low-cost system technology also had a profound impact on graphics hardware providers that now had a potential competitor and customer in upstart Apollo Computer.

Apollo did share one similarity with proprietary systems suppliers, in that its solutions were based on proprietary systems software technology, such as its operating systems and distributed computing/networking environment (Domain). Apollo's strategy was targeted at offering a price/performance advantage to its clients, but Domain/Aegis's proprietary software and application programming interfaces (API) while ensuring customer loyalty and providing higher

[10] "The Perq," http://www.cis.rl.ac.uk/publication/ECN.final.perq.html

performance, left users and more importantly application developers relatively dependent on Apollo for future generations of hardware and software. Poduska recognized that this strategy had worked quite well for industry leaders like Digital and IBM, and believed it would be the strong pillar in Apollo's as well[11]. Unfortunately for the team at Apollo, while this strategy worked quite well in the early years, it would stand as one of the many technology and business decisions that would lead to the decline of Apollo in later years.

Leveraging Apollo's perceived weakness in both hardware and software standards, Sun Microsystems purported to offer the industry a solution that was entirely "open[12]" utilizing the Unix operating system developed at U.C. Berkeley and its promotion of the internally developed Network File System (NFS). While NFS may have been perceived as an inferior technology to that of Apollo's Domain, it offered software developers a level of comfort around software portability and a wide range of system options citing that "if you cast your lot with Apollo, the chances are great someone else will invent a better box and you're stuck[13]". Sun's "rallying cry" around standards, and a stated corporate policy to adhere to and promote industry standards has been a strategy which allowed Sun to influence the workstation dominant design and enjoy long-term dominance in the industry. Sun's strategy, a then novel, and still controversial approach, was best summed up by CEO Scott McNealy as "[Sun's] proprietary technology is knowing how to build a Ferrari out of spare parts[14]"

The product developments highlighted by Xerox, 3 Rivers, Apollo Computer, and Sun Microsystems (figure 3.1 above) formed the basis for the dominant design in the workstation industry. Each of these vendors had their own unique approach to the workstation industry, but

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[11] Interview: Paul Bemis, ex-Product Manager, Hewlett-Packard, Chelmsford, MA (via telecon) 4/97
[12] Referring to Sun market representation as opposed to literal definition of open computing or adherence to industry standards
[13] "Computerdom's Heavenly Brawl," Fortune, 2/4/85, p. 98
[14] "Computerdom's Heavenly Brawl," Fortune, 2/4/85, p. 93-99

their incremental enhancements on early product offerings formed what would become the industry standard.

In the years following the industry pioneer's innovation, the elements of the dominant design continued to evolve in both performance and the level of incorporation across the various vendor product offerings. The workstation industry offerings can be stratified into three distinct types of products, namely Power User Workstations, Mid-Range Products, and Entry Level Systems (as shown in figure 3.1). Based upon a cursory overview of the various workstation products and their level of adopting the dominant design, it would appear that products in these echelons differed in both level and speed of adoption depending of whether it was a hardware or software feature.

Review of workstations in each of the three echelons shows that software elements were usually uniformly adopted across the vendor product offerings. Examples of this include elements like NFS, TCP/IP, and X-Windows, which once established, eventually became a standard bundled product with the vendor's software distribution. Hardware elements conversely were introduced in the higher priced workstation configurations first and then gradually migrated to the mid-range and entry level products. Some examples of this have included the introduction of accelerated 2D graphics, 1280x1024 screen resolution, 16-bit audio, and color monitors, which were previously limited to higher price workstations, but now adorn the <$5,000 product offerings in most vendors product lines.

Elements of a Dominant Design

In Kai's research of the Personal Computer (PC) industry[15], he identifies a number of elements that comprise the dominant design in a PC workstation configuration. These elements were identified as an Intel 80x86 processor, PC-AT bus, and the Microsoft MS-DOS operating

[15] H. Kai, Competitive strategy under standardization in the personal computer industry and its influences on new entrants, Sloan School of Management, MIT (1992)

system. Kai's research showed that the emergence of this dominant design was followed by an increase in the number and type of providers of PC workstations. If we analyze the early PC designs, we can see that in many ways they were very similar to the early Apollo workstations (in simplistic terms). If we explore the evolution of high-performance workstations architectures to the next level however, we will see that Apollo and Sun drove the standards one step further in the areas of software and hardware standards that would prove to be essential elements in the formation of a dominant design. This would suggest that similar to the evolution of workstation dominant design, perhaps the PC industry has also progressed to a point where the dominant design has become more solidified, and thus had a greater impact on industry composition.

A good example would be the recent developments by Intel in both motherboard and peripheral buses which facilitate the rapid "roll-out" of new products based on Intel microprocessors. Intel's dictation of these interfaces requires system suppliers to adhere to these standards (or potentially "new elements" of PC dominant design) or risk being late to market with new products. Similar to these moves by Intel, providers of high-performance workstations have a number of key features that must reside in any workstation in order to meet industry acceptance[16].

Ed Zander, Apollo Computer's early Vice President of Marketing, described his organization's approach to workstation development as the "triumph of an idea,[17]" put simplistically "design a powerful yet compact virtual computer that could be used by a professional at his desk." Zander threw further "barbs" at the industry's larger suppliers of timesharing systems, referring to this style of computing as "one computer using a lot of people rather than one person using one computer." The Apollo business plan was based on the premise that "timesharing had become obsolete," and the organization possessed the recipe to replace it.

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[16] Based on interviews with industry executives and survey of all workstation products offered in 1996.
[17] "Apollo's right on schedule," Datamation 3/83 p. 80, 82, 88

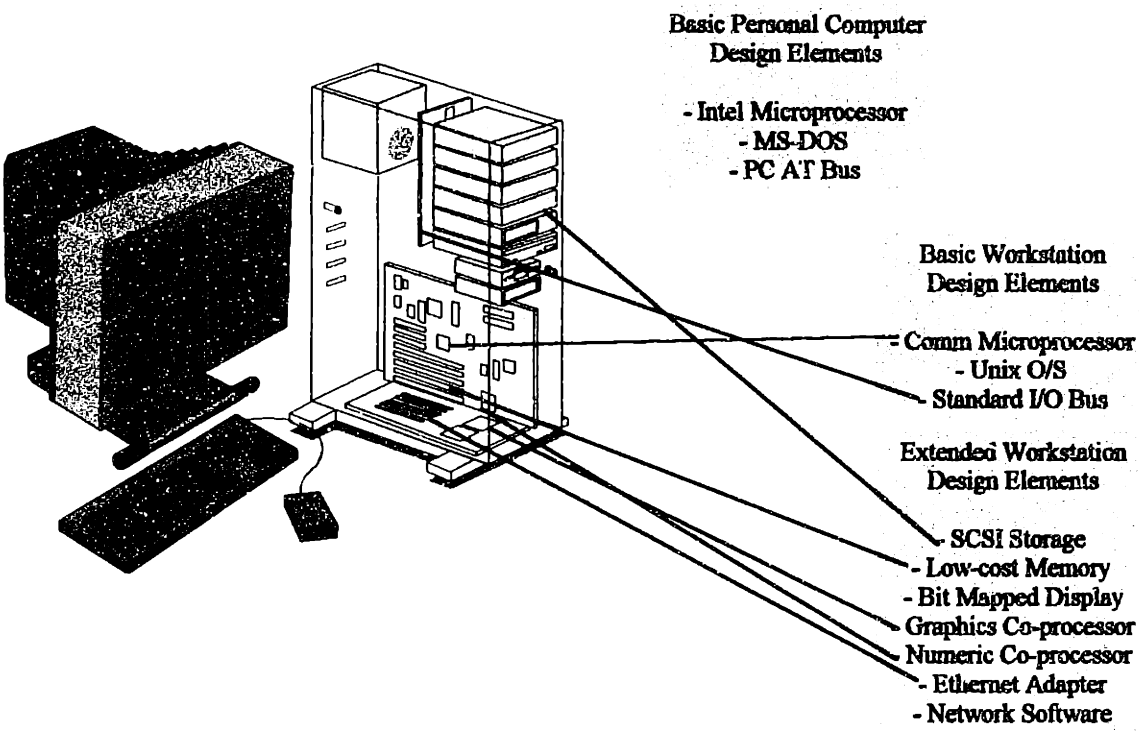

Figure 3.2 - PC versus Workstation Dominant Design

The Apollo "recipe" used many of the ingredients that as Datamation described, "are now becoming familiar to us,[18]" referring to the components that had become a common part of the formula for many start-up providers of workstation solutions. The recipe, as described in Datamation article (highlighted in Table 3.2), consisted of low-cost, commercially available processors, memories, graphics, and storage devices.

Element of Design	Examples
High-density RAM	Low-cost ECC memories (1MB DRAM)
32-bit VLSI Microprocessors	Motorola 680x0, National Semiconductor 320x0
High-resolution Graphics	integrated graphics adapter, which leveraged CPU power
Raster Keyboards	multifunction input devices (e.g. keyboard & mouse)
Bit-map Interfaces	resolution approaching that available from graphics cos.
Winchester Disk Drives	20-80MB 5.25" disks drives
Portable High-level Languages	C, Fortran, and Pascal
Portable Operating System	Unix, and Unix Derivatives (e.g. Apollo/Aux)

Table 3.2 - Base "Recipe" for high-performance workstations

[18] "Apollo's right on schedule," Datamation 3/83 p. 80

The Apollo concept for a "compact virtual computer," also relied quite heavily upon networking and other distributed computing elements. Apollo's approach for accomplishing this task was the development of a proprietary (although they would defend, a "standard-based") software solutions known as Aegis/Domain.

The solidification of the workstation dominant design was based on a number of developments, as highlighted in the academic literature, around distributed processing[19] systems, distributed workstation architectures, and some clarification in the definition of software "standards" and application portability. Vojvodic and Vranes[20] description, albeit focused on Intel/Multibus, provides an excellent high-level description of the architecture that now dominates the workstation industry. The architecture described in this paper suggest using both a "distributed intelligence concept" (processors dedicated to a given function [e.g. graphics co-processor]) in addition to a hierarchy of buses (high speed internal communication paths) to segment internal workstation traffic and reduce bottlenecks. This type of architecture (with enhancements of course) exists in the majority of today's workstation products. This type of workstation configuration was also described in Farber's[21] discussion of future workstation architectures, which coupled with Joy's concept provides a framework for the workstation dominant design (as shown in figure 3.3).

[19] "New architecture spotlight," Computerworld, 11/17/82 p. 35
[20] I. Vojvodic & P. Vranes, "Distributed intelligence and bus hierarchy system implementation for a highly intelligent workstation, Microprocessing & Microprogramming (1988) p. 351-354
[21] Farber, "Future workstation architectures," (1987)

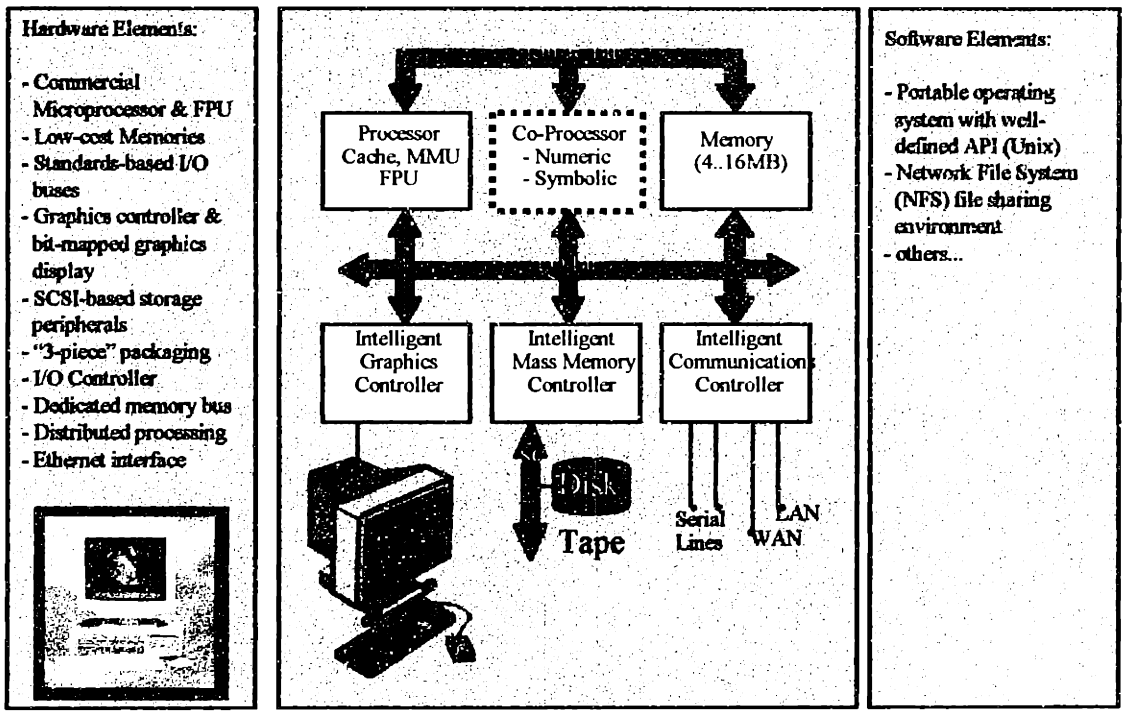

Figure 3.3 - High-performance Workstation Dominant Design

Dr. Bill Joy, an early member of Sun's team, and chief product visionary, outlined a vision for the future of distributed computing that although over 10 years old, stands as a framework to which most workstations are still measured. Over the years, many vendors, have constantly compared their products with reference to "Joy's Law of Computing," and its reference to technological advances in computing performance. While Joy's Law may have been one of the most memorable components of this presentation, a more important aspect relates to the identification of the elements that would, and still do, comprise the dominant design for high-performance workstation solutions. During this period, numerous papers and presentations (Joy & Farber) addressed the topic of future workstation architectures. The elements described in these papers would redefine the basis of competition for most vendors, and lead to what would become the demise of many vendors.

As highlighted in Figure 3.3, the dominant design in workstations relates to a discrete set of hardware and software features, and a "sliding scale" of performance features in the categories

of processor, graphics, and storage capabilities. It is purported that while some workstation offerings may exceed some of these elements, virtually all workstations adhere to this common set of characteristics. Most important is the recognition that all offerings must continually refine their performance capabilities through the introduction of new processor or graphics architecture in order to remain on par with industry offerings. Each element of the dominant design is described in greater detail in the following paragraphs.

Commercial Microprocessors - The emergence of low-cost, commercially available microprocessors served as the basis for most modern workstations. The announcement of the Motorola 68000 product served as the basis for well over 100 different new systems firms in 1984[22]. Other systems were based on competing designs available from National Semiconductor and Zilog. Recent developments in this space include the commercially available and standards-based microprocessors available from Digital (Alpha), Sun (UltraSPARC), and Silicon Graphics (MIPS).

Graphics Co-Processors & Floating Point Accelerators - Congruent with the distributed architecture proposed by Vojvodic and Vranes, nearly all workstation vendors have migrated their products towards an architecture which utilizes separate microprocessors to handle specialized functions. Graphics and Numeric (floating point arithmetic) co-processors are the most common, with 2-dimensional graphics co-processors being one of the most recent features solidified in the workstation dominant design. Some systems, such as the Stardent Titan, took the dedicated co-processor to an extreme, by adding co-processors for nearly every function in the system, which proved to be a cost prohibitive and unnecessary approach.

Low-Cost SIMM Memory - As previously discussed low-cost memories were an essential element of the early workstations (enabling both bit-mapped graphics and distributed processing) and remain a crucial element today. As opposed to early workstation designs which utilized

integrated memories on processor or auxiliary system boards, today's workstations uniformly adhere to the use of low-cost "single in-line memory modules," or "SIMMs" which accommodate the modular and easily upgradable systems offered by most vendors.

3-Piece Design - Unlike many of the early workstation products, most modern product offerings are comprised of three individual systems elements: processor or system unit (housing mother board, storage devices, power supply), monitor, and input devices (keyboard/mouse). The early workstation products offered a number of different configurations, such as composite workstations which integrated all system elements into a single device (e.g. Wicat Systems and Convergent Technologies), or the previously mentioned CAD/CAM solutions (e.g. Intergraph) which housed all workstation elements into a large all encompassing desktop, or systems which included large minicomputers and associated peripherals housed in many different locations (e.g. early DEC-based Auto-trol systems). Systems such as these have given way to the common 3-piece configurations.

Standards-based I/O Bus - Based on user demands for common hardware and software elements, workstations rely on buses that allow vendors to easily interface new peripherals on to workstation systems. Early systems utilized buses like VME and Multibus which allowed a wide array of products to be interfaced to workstation systems. This approach was vastly different to those promoted by organizations like Digital (e.g. VAXBI) which were proprietary and strictly governed which products could be interfaced to their systems.

Hierarchical Bus Architecture - One of the faults of early workstation products was the limited throughput performance of systems when I/O to disks or external peripherals was required. This performance bottleneck was usually attributed to the fact that processors and memories shared the same bus as peripherals. Based this performance issue nearly all workstation vendors have migrated towards a workstation architecture which uses 2 or more separate internal buses to

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[22] "The 32-bit flexible workstation: suppliers answer for users," Computerworld, 6/18/84, p. 35-40

segment traffic within the system (congruent to Farber architecture), or "multiple hierarchies of buses[23]."

Bit-Mapped Raster Display - While it is true that Bit-mapped raster displays have been around for many years, and this type of display was one of the key enabling technologies in the early Star workstation, some early workstations lacked this feature. All workstation products surveyed in 1996 were based on bit-mapped displays.

Standards-based Storage I/O - Early workstations relied on a mix of SMD, IPI, or SCSI disk drive to support their products. Over time workstations have evolved to a point where SCSI (small computer systems interconnect) peripherals form the basis for nearly all workstation products. The majority of these products have integrated the SCSI host adapter on the motherboard of the workstation product. While it remains true that a number of 3rd-party suppliers product non-SCSI solutions which can be interfaced to workstation systems, nearly all products offer SCSI in their base configurations.

NFS & TCP/IP - Sun's Network File System (NFS) is a set of protocols and services that allow users to transparently share files between different vendors Unix systems. At its time of introduction in 1985, NFS became a publicly available standard which could easily be licensed from Sun[24]. The purported "standard" of NFS quickly attracted industry attention and by late 1986 had 28 supporters and over 30 additional firms considering its use. Today, NFS and TCP/IP are standard elements of all Unix workstation offerings.

Ethernet - As previously outlined, Xerox's introduction of Ethernet offered workstation manufacturers a low-cost high-throughput method for sharing resources between systems. The licensing of this technology by Xerox cultivated a wide range of low-cost boards which were vastly superior to the proprietary and highly custom interfaces previously used by vendors.

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[23] Interview: Paul Bemis, Hewlett Packard, (via telecon) 4/97

[24] "Sun's NFS, ATTIS' RFS to compete for recognition," Mini-Micro Systems, 5/86, p. 37

Posix Compliant Unix Operating System - The early workstation offerings used a number of different Unix and Unix-like operating environments. At the same time there were other workstation offerings that used the proprietary operating systems supplied by vendors such as Digital and Data General, or the vendors would custom-develop their own operating systems. In the late 80's users of Unix workstations were starting to become intolerant of the differing Unix offerings and degrees of functionality and portability that vendors offered. These customer needs were addressed by the formation of organizations such as the Open Software Foundation (OSF) which was supported by vendors like Digital, IBM, H/P, and Silicon Graphics, and Unix International which was spearheaded by Sun and AT&T. While it is questionable exactly what these various consortia generated, the outcome was a focus on "standards-based" Unix offerings. Ultimately, the U.S. Governments push for standards such as IEEE Posix 1003[25], led to Posix-compliant operating systems to be a standard in most workstation configurations.

X-Windows - The early windowing or "windows-like" graphic displays of vendor workstations were typically proprietary custom developments. The X-windows system developed at MIT, in conjunction with industry leaders such as Digital Equipment and IBM, offered the industry both a standard windowing-environment and an architectural model for dividing software processing requirements between a network of system resources[26]. While some vendors initially offered products that competed with some aspects of X-Windows (e.g. Sun Microsystems Network Extensible Windowing System [NeWS]), it has evolved to become the dominant environment offered on all systems.

Defined API/Applications Portability - The commonality of systems architectures and ability to port software has become an essential part of workstation systems. The strength of Application Binary Interfaces such as Sun SPARC, DEC Alpha, and SGI MIPS, and their ability

[25] "No rupture in the UNIX community," Mini-Micro Systems, 9/88
[26] "X-Window Enhances Unix Workstations," Mini-Micro Systems, 5/86, p. D1-D10

to share software across common system elements are a large piece of most vendor product offerings.

Auxiliary Communications - A minor, but consistent feature of workstations are the auxiliary communications ports. While the configuration and quantity differs depending on the vendor, nearly all workstations include serial, parallel, and other specialized interfaces (e.g. ISDN and IEEE-488 [lab instrument interface]) in their standard base configurations. These features offer workstation users a great degree of flexibility in the use and configuration of their systems, a degree of flexibility difficult and costly to obtain in most minicomputer systems in the early 80's.

Compliance with Dominant Design

While today's workstations with their high-performance, multiple RISC microprocessors may look vastly different from those of the mid-80s, they share much in common with their predecessors. An analysis of the current workstation offerings from over 30 different workstation vendors demonstrates a very high level (98% based on survey of 189 products) of compliance with the previously defined dominant architecture (reference Table 3.3). The methodology for testing this was to build a data set based on all workstation products highlighted in Data Sources 1996 Hardware Edition (product information was clarified based on vendor supplied data). This data set comprised 189 different product offerings. Each product was ranked as 0 (no compliance) to 3 (maximum compliance) in each attribute of the proposed product design. Certain characteristics which were considered critical factors in the dominant design (open architecture microprocessor [e.g. Alpha, SPARC, etc.], standards-based I/O buses [e.g. VME, S-Bus, FutureBus, etc.], and standards-based operating system [defined as a POSIX compliant Unix offering]) were given a double weight.

In order to compare the impact of dominant design, the products outlined in the 1996 data set were compared against similar products highlighted in the 1985 edition of Data Sources. Each of these products were compared against the identical features (with same weights) used in the

1996 test. The information highlighted in Table 3.3 summarizes the salient differences between the 1985 and 1996 product offerings. The differences shown would indicate that while the overall workstation industry has grown tremendously, the variance in product features and the degree of compliance around standards has increased to a point of nearly 100% conformance.

	1985		1996	
Design Element	Mean	Std. Deviation	Mean	Std. Deviation
Comm. Microprocessor	3.91	2.80	5.94	.62
Numeric Coprocessor	0.78	1.31	3.00	0
SIMM Memory	2.41	1.14	3.00	0
3-piece Design	2.28	1.23	3.00	0
Standard I/O Bus	3.13	2.54	5.94	.62
Hierarchical Buses	0.46	1.08	3.00	0
Bit-mapped Display	2.67	0.85	3.00	0
Display Mpixels	2.11	0.57	2.76	.58
Graphics Co-processor	0.78	1.31	3.00	0
SCSI Storage I/O	2.28	1.23	6.00	0
Base Storage Capacity	1.80	1.30	2.14	.75
Ethernet	2.54	1.01	3.00	0
Posix Compliant O/S	3.72	2.37	6.00	0
NFS, TCP/IP	0.20	0.74	3.00	0
X-Windows	0.00	0.00	3.00	0
Defined & Open API	0.20	0.74	5.83	N/A
Auxiliary Comm.	2.09	1.35	2.94	N/A
Total	29.57	8.56	64.53	1.89

Table 3.3 - Comparative Compliance with Purported Dominant Design[27]

Impact on Industry Composition

The workstation industry has undergone a great deal of change since its inception in the late 70's up until today. As previously highlighted, early workstation providers enjoyed a great deal of freedom in the design of their hardware and software products. As the dominant design emerged however, this level of freedom was tightened to a point that many vendors lost their competitive edge. The impact of this dominant design is demonstrated in Figure 3.4 which highlights the number of industry participants and new entrant firms over the past 15 years. The

information shown is supportive of Utterback & Abernathy's findings that the number of firms increased during the period of high-innovation and then drops off dramatically after the emergence of the dominant design. The drop off in the number of firms in this case can be related to the increased level of industry competition with fewer technological differentiators, and tremendous economies of scale for the industry's leading players.

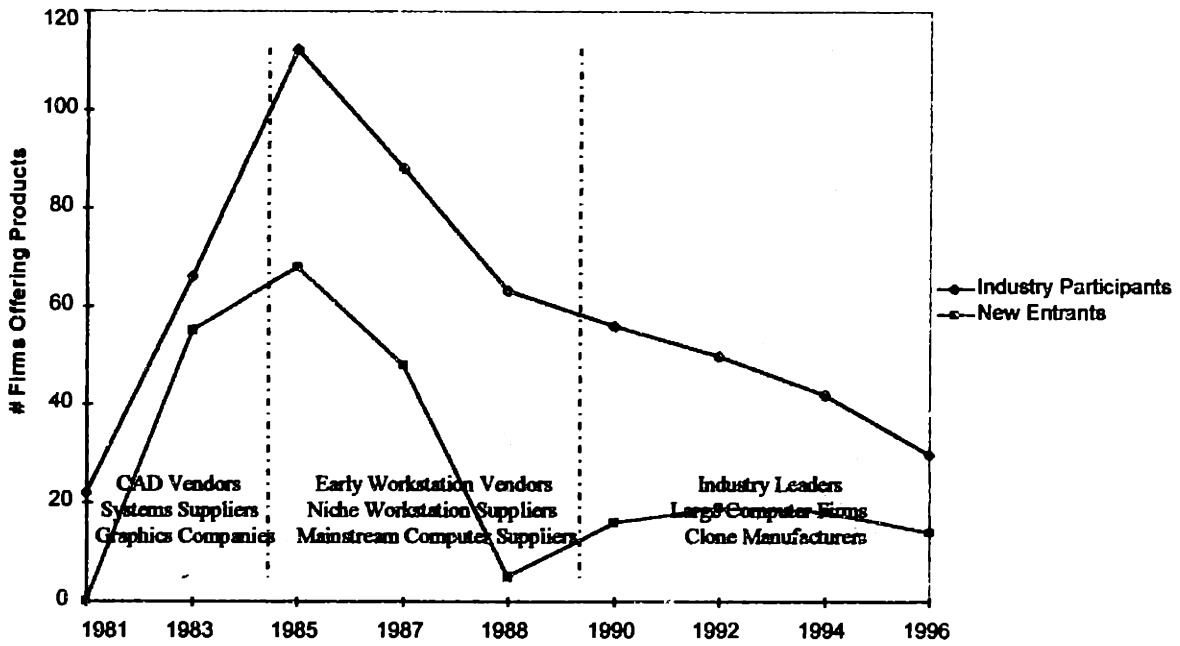

Figure 3.4 - Workstation Industry Participants (1981-1996)[28]

The information shown, demonstrates the industry's current position where the remaining workstation vendors are being challenged by the entrance of Intel based workstations to the competitive fray. The only new entrants to the industry, outside of the dominant computer suppliers, are niche firms offering "clone" systems that replicate the features and benefits offered by the mainstream Sun or Digital offerings. The challenge of the "WINTEL" platform represents

[27] Note: 1985 sample size = 46, 1996 sample size = 189, some values based on mean category value (when not obtainable from reliable source).

[28] Assembled by author based on information obtained from Data Sources Hardware Edition (1983-1996), Harvard Computer Graphics Directory (1981), & S. Klein Directory of Computer Graphics Suppliers (1984/85, 1985/86, & 1987)

another in the series of critical technology management problems that workstation vendors have had to face.

The Workstation Industry in 1997

Understanding the evolution of a dominant design is important for a variety of reasons. First, it is important to recognize the ground rules that the industry players are competing by. Failure to recognize this could lead to the design and development of products that the market will fail to accept (as discussed below). Second, as the design, or "feature bundle," is extended, customers will come to expect those features at a minimum. One could liken this to a consumers interest in buying a 1-year old PC design that is based on an Intel 486 processor, 8MB of memory, and a 100MB disk (with MS-DOS to boot!). While this may be a simplistic example, customers purchase products based on their perception of the products conformance with the industry standard. In the PC example that conformance embodies hardware and software packaging, interfacing, upgrade, and communications standards. Workstations have evolved to the same point where vendors are faced with complying to the standard or risking customer rejection.

The workstation industry has many examples of products that had elaborate combinations of technology and robust product features, but failed to capture a significant share of the market. While customers may have been attracted to the specific technology or performance advantage offered in the product, they were unwilling to compromise in the area of standards. Some examples include the Sun 386i, Stardent's Titan, the Digital VAXstation 8000, Sun's VX/MVX, and the Apollo DN10000. The Sun 386i offered a unique ability to have the best of both a PC and a Unix workstation running on the users desktop. Stardent's Titan was focused on the extremely high-end niche of both the graphics and supercomputer markets, offering a system architecture that used microprocessors to boost every element of system performance. The VS8000, VX/MVX, and the DN10000 all represented high-end graphics architectures that were eclipsed by mainstream

workstation offerings that gave users similar graphics performance without sacrificing portability or price considerations.

1997 marks the entrance of a new and potentially disruptive threat to the established workstation players. The introduction of Intel's Pentium Pro microprocessor and the release of a more stable and user-friendly version of Windows-NT offers users a high-performance and potentially easier to use alternative to RISC/Unix workstations. Recent developments such as IBM's adoption of Pentium Pro technology[29] for its desktop systems (in lieu of PowerPC technology), the announcement of numerous Pentium Pro workstations by mainstream PC suppliers[30], defections by "clone vendors" previously dedicated to RISC[31] (to the WINTEL platform), and system offerings which combine RISC microprocessors with Windows-NT all pose a threat to the existing suppliers of workstation solutions.

The introduction of this threat may demonstrate the emergence of a new dominant design in workstation technology, and underscore the importance of understanding the impact this design has on the industry's basis of competition. The remainder of this document is devoted to understanding the strategies successful workstation solutions providers have used to survive in an industry rife with change and intense competition.

[29] "PowerPC loses support," Information Week," 12/16/96, p. 20, "IBM readies Intel-based workstation," 12/2/96 p. 22
[30] "Compaq vs. workstation, Electronic Engineering Times, 12/96, p. 108
[31] http://www.netpower.com

- Chapter 4 -
Strategy Development & The High-Tech Enterprise

The high-performance workstation industry is not unlike many other high technology business segments which dictate a shift in corporate strategy based on the industry's evolving basis of competition. The ability to look back on the workstation industry's change in shape and size exemplifies this situation. This review also demonstrates that long-term industry dominance requires a firm's management team to continually re-create the organization's image and approach to the market to outdistance itself from the competition.

As the competitive landscape within an industry changes and the level of maturity within a given product segment increases, the organization needs to shift both its marketing and product strategies. The ability of an organization to sense these shifts and adapt its competitive strategy are essential to long-term success. In 1984 Apollo Computer executives were quoted as saying "we just knock of the also-rans," "we have the head start and the momentum," and "our task now is to manage growth[1]," while these cavalier comments may have been true at the time, history shows that Apollo's success was eclipsed by upstart Sun Microsystems, in a manner very similar to the way Apollo targeted Digital, Prime, and Data General product line weaknesses.

In order to fully understand how a strategy might evolve, it is necessary to gain a base understanding of the strategy a firm uses to enter the market. The information presented in the first 3 chapters highlights the tremendous differences between various workstation industry participants and their product offerings. This chapter focuses on analyzing the various technology strategies the industry's successful firms used to either enter the market or sustain their leadership position. There are a number of different frameworks that can be utilized to gain better insight to a particular firm's strategy. The Goodman & Lawless technology framework was selected due to the fact that most workstation providers leveraged a technological differentiator to gain market entry.

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[1] "Apollo Computer: Why a higflier isn't afraid of the big boys," Business Week, 7/30/84 p. 86

The Goodman & Lawless framework aligned nicely from this perspective. Upon analysis, it would appear that each of these firms approached the market with varying entry strategies which resulted in different levels of success.

Goodman and Lawless (1994[2]), in *Technology & Strategy*, highlight that technological strategies can be grouped into 1 of the 9 categories as shown in table 4.1. This framework is of interest with reference to workstation industry participants, due to the fact that most of these strategies have been effectively used by one or more firms to gain market entry. While the Goodman & Lawless framework provides a very sound basis for understanding how a firm might differentiate itself against existing industry players, it requires further clarification on the specific tactics that a firm might use.

Strategy Evolution	Timeframe	Corporate Example	Tactical Examples
Technological Commodity Search	1980 1978 1983	Apollo Computer 3 Rivers Heurikon	■ Leverage COTS technologies ■ "Give away technology" Standards ■ Shift in emphasis to system software
Pre-emption	1982 1985	Apollo Computer Sun Microsystems	■ Recruitment of application vendors ■ Distribution channels
Productive Efficiency	1990	Sun Microsystems	■ Utilization of Product Families ■ Leveraged R&D (partners) ■ Simplistic Design (low technology) ■ Standards
Producer Preference	Early 80's	Tektronix Silicon Graphics Intergraph	■ Targeted Marketing ("Cream Skim") ■ Targeting installed base ■ Targeting industry niche (e.g. CAD)
Production Flexibility	1987	Sun Microsystems Hewlett-Packard	■ Utilization of Product Families ■ Leveraging Complementary Design/Dist
Customer Preference	1983 198 1988	Sun Microsystems Intergraph Silicon Graphics	■ Standards ■ Application Integration/Industry Expert.
Product Pioneer/Leader/ Follower	1984-97 1989-93 1993-97	Sun Microsystems MIPS Computer Digital Equipment	■ Cultivation of clones, 3rd-party applications & peripherals ■ Feature Selection & Product Bundling
Vertical Integration	1985	Digital Equipment	■ Developed Alpha semiconductor plant ■ Internal development of software tools
Complementary Technology	1990-1997	Solbourne Auspex	■ Development of file/server solutions ■ Focused on complementary NFS solutions

Table 4.1 - Goodman & Lawless Technology Strategy Framework

[2] R. Goodman & M. Lawless, Technology & Strategy: Conceptual Models and Diagnostics, Oxford (1994)

By reviewing the workstation industry within the Goodman & Lawless framework we can see that each of these purported technology strategies can be aligned with the offerings of the major workstation industry players for a given point in time. These strategies were used by players to gain initial market entry, or in some cases launch a new product offering (e.g. Tektronix' diversification to address workstation market). The following paragraphs highlight some of these specific examples.

Technology Commodity Search (3 Rivers Computing) - The basis of 3 Rivers Computing's 1st workstation (The "Perq") strategy was the so called Carnegie Mellon SPICE proposal. The SPICE document exemplifies a technology commodity search in that it explored how low-cost, easily obtainable technology could be harnessed into a different computing model. Despite the fact that the SPICE Proposal never located the solution it sought, it fueled some of the ideas for the Perq workstation. This fact was reiterated in a conversation with Professor Ed Fredkin[3], who served as Chairman at 3 Rivers and cited the Perq's proprietary (non-standard) elements such as processor and operating system as the factors leading to its demise. A similar perspective was offered by Sun Microsystems CEO Scott McNealey who identified Sun's "proprietary advantage" as "the ability to make a Ferrari out of spare parts." In the case of these two vendors, and many other early industry participants, their advantage was based on utilizing low-cost commercial technologies.

Preemption (Apollo & Sun Microsystems Application Providers) - A preemptive strategy focuses on obtaining a resource strong hold that gives the firm a competitive edge against entrant firms on the basis of price or delivery flexibility. A couple of workstation industry examples relate to the recruitment of software applications providers and key distribution partners. Apollo's early recruitment of CAD/CAM suppliers led to its dominant position in the market and blocked a number of firms based on the lack of application portability from the Apollo platform.

Sun's proactive recruitment of software providers led to the Sun SPARC and 680x0 platforms becoming the leading ABI (application binary interface) for workstation applications and resulting in a dominant position from the late 80's and still today (with over 3000 applications). A secondary example of preemption relates to the strong distribution channels that firms like H/P and Sun have established with the nation's leading systems integrators and computer hardware distributors which block the entrance for emerging firms.

Productive Efficiency - One of the key determinants of success for Sun Microsystems has been the ability to leverage its promotion of standards into efficiently cultivating a launching new product iterations. Based on the organizations "open" specifications[4] around SPARC microprocessors, system buses, and software APIs, it has cultivated a large network of semiconductor, peripheral, and software providers that perform synergistic R&D with Sun. Sun's ability to leverage the R&D efforts of these firms (which produce microprocessor innovations and new peripheral products) at minimal cost, facilitates the rapid introduction of new offerings without incurring the full expense of designing an entirely new system. This advantage is clear upon review of Sun's introduction of the SPARCstation 20 system which utilized HyperSPARC technology, developed by Ross Semiconductor, which afforded Sun a "stop gap" solution until its 64-bit UltraSPARC solutions (developed in conjunction with Texas Instruments) could get to market. During this same period other vendors (such as Digital with its Alpha technology) were forced to "foot the bill" for all aspects of new system development.

Producer Preference - The producer preference concept can clearly be seen by Silicon Graphics (SGI) early focus on high-end users of graphics systems. SGI recognized its the market opportunity for its products was in "graphics-intensive" computing environments and focused its

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[3] Interview: Ed Fredkin, Chairman Emeritus, 3 Rivers Computing (via telecon) 4/97

[4] SPARC International, a consortium led by systems, peripherals, and applications providers, controls specifications and evolution of microprocessors and systems interfaces found in Sun-compatible systems, http:\\www.sparc.org

strategy on this market segment. Other vendors such as Intergraph, which specialized in key CAD/CAM segments (e.g. architectural, engineering, & construction [AEC] applications), focused their workstation offerings on specific user groups. In all cases the producer preference strategy allowed the firm to focus on a specific niche, gain market notoriety, and based on this strength expand into new niches. This is exemplified by the fact that both SGI and Intergraph, recognized (respectively) as the 5th and 7th largest providers of workstation solutions, have diversified into the mainstream segments of the industry.

These examples provide a simple overview of how the Goodman & Lawless framework might be applied. While the Goodman & Lawless approach focused on technical entry strategy, there may be alternate methods which could focus on the market or organizational aspects behind these unique firms. The technological approach was selected based on its fit with the workstation industry.

Gaining market entry is probably the most important aspect of entering a high technology industry. A secondary, but equally important element, is how to secure long-term success. The workstation industry has witnessed the entry of many firms that offered tremendous "one hit wonders," but were unable to sustain a long-term position in the industry. Fault could lie within these firm's poor strategy development, or could stand as examples where countering strategic decisions were made by the industry's dominant players. Regardless of the perspective, continued refinement of strategy is essential to long-term success. The remainder of this document is focused on exploring sustaining strategies a firm might use to continually re-shape their market image and address competitive threats. Based on a review of the industry's successful players, it is the author's perspective, that strategies such as Changing the Rules (re-shaping a firms market approach), Technological Re-positioning (moving base technologies into new market segments, use of Product Families, and Alignment of Feature Selection with Customer Benefits, have enabled firms to extend a successful market entry strategy into long-term industry dominance.

A brief synopsis of each strategy is given in the paragraphs highlighted below. A detailed analysis of the strategy and industry examples are given in the following chapters.

Changing the Rules on the Competition - Over the past 15 years, there have been times when an industry participant has introduced a new product concept or technology that challenges the industry norms. Apollo Computer's distributed computing concepts challenged the established norms in the minicomputer industry, and Sun Microsystems then eclipsed Apollo with a focus on standards-based computing. It is hypothesized that these types of "rule changes" have occurred numerous times in the industry and have resulted in positive marketshare increases for the initiating firm.

Technological Re-Positioning - The ability for a firm to take the base technology utilized in its product offering (in this case workstations) and apply the base technology to different market segments or customer problems. Christensen refers to this concept as moving a technology "upmarket" or "downmarket," and in the case of workstation players it is exemplified by these vendors moves into IT product segments such as multiprocessor enterprise and departmental servers (threat to large system suppliers), and most recently network computers (threat to Microsoft-based personal computers).

Use of Product Families - The utilization of product families has been a strategy used very effectively in the consumer electronics world[5]. In fast-paced industries such as high-performance workstations, the flexibility and production efficiencies offered by product families are essential. The ability to develop a platform which allows the vendor to accommodate multiple generations of microprocessors, memories, storage, and graphics devices is a key differentiator for the products cost not to mention technological "freshness" by the ability to rapidly introduce new product

[5] S. Sanderson & M. Uzumeri, "Managing product families: The case of the Sony Walkman," Policy Research (1995)

permutations. Examples of this strategy include Sun's successful SPARCstation 10 family and the Silicon Graphics Indigo (e.g. "Indy") product line.

Evolution of Competition... Feature/Value Alignment - The most essential strategy for the provider of high-technology products is the recognition of the rate and basis of change in competition. Review of the industry's product offerings (over the 15 year period) reveals that there have been numerous shifts in both the types of features and levels of performance that customers have demanded from workstation products. It is apparent that the successful vendors are those that have recognized and constantly monitored these shifts, and diligently work to align and cultivate those features that provide the greatest value to the end-user customer.

Framework for Analyzing Participant Strategy

Exploring the application of strategy is difficult to do at the level of an individual firm. Extrapolating these strategies across an entire industry is impossible. For purposes of this study, I am introducing the concept of the "Interesting Organization Framework." This framework is comprised of industry players that fall into 1 (or more) of 5 types of organizations that have participated (or still participate) in the workstation industry. These organizations have been selected based on their level of industry dominance (marketshare), technological creativity, and coherent product strategies; or the antithesis of these characteristics. The process of selecting these firms focused on identifying and contrasting the leading firms with an industry peer (eg. Sun Microsystems and H/P versus Digital), in order to isolate those strategies common to all participants, and those features that are true points of differentiation.

The organizations highlighted in Table 4.2 represent the industry's dominant players either in terms of marketshare (e.g. Sun Microsystems, HP [ex-Apollo]) longevity of industry participation (e.g. Digital), those with roots in graphics hardware/software (e.g. Silicon Graphics), those with roots in CAD/CAM applications (e.g. Intergraph & Computervision), and organizations that have focused on the development of "clone workstations" (e.g. Axil, Sanar, & Tatung).

Using these various types of industry participants as a frame of reference, each of the four strategies are highlighted in greater detail in the following chapters. These vendor examples are augmented by the various vendor product offerings that are included in Data Sources Hardware Edition 1983-1996. Through the examination of these examples it is possible to gain additional insight into the secrets leading to the success of firms like Sun, Hewlett-Packard (Apollo), and Silicon Graphics.

	Target	***Comparison Group***
New Entrants	**Sun Microsystems** - Early industry participant - Long-term industry dominance - Products "to beat" (benchmark) - Habit of CHANGING RULES - Standards promotion taken to new level - Eclipsed Apollo **Apollo Computer/Hewlett-Packard** - Approach as if no merger occurred - Industry pioneer - Dominant influence on H/P (still exists) - Relatively successful merger - Coexisting PC/Wkst product lines - Dominant player	**Digital Equipment** - Had resources & technology - Tried to support multiple architectures - Performance leader - Contributed marketshare/install base - Installed base management
CAD/CAD Roots	**Intergraph** - Early industry participant - Managed multiple platform transitions - Constant holder of marketshare/position	**Computervision** - Early workstation provider - Application provider - Now OEMs workstations
Graphics Roots	**Silicon Graphics** - Managed transition to general market - Dominant player - Most recent "rule changer" - Facing critical decision with NT - "Odd man out" in processor wars	**Tektronix** - Holder of key early technology - Failed with 3 separate families - Relegated to peripheral market **Stardent** - Largest visible industry failure - Elegant product eclipsed by market
Clones	**Sanar Systems** **Axil Computer** **Tatung Science & Technology** **Solbourne** **Orange Systems**	**Sony Microsystems** - Failed on multiple entry attempts - Patient market entry strategy - Commanded necessary resources - Strong distribution capability - Very strong brand name

Table 4.2 - Interesting Organization Framework

- Chapter 5 -
Changing the rules on dominant industry players

The concept of "changing the rules" of competition, relates to the introduction of an innovative product line (or service) that challenges existing industry norms and re-focuses potential customers on the innovative feature set the new product offers. In many cases these products address previously unfulfilled customer needs or a change in customer values that make the new product more attractive. Christensen[1] refers to this type of phenomenon as a "disruptive technology" which although potentially lacking in some specific performance or packaging attribute provides a better value to the customer. It is proposed that such as strategy has been successfully used by "attacker" firms to gain marketshare from the workstation (or minicomputer) industry's dominant players. Just as important, it would appear that the industry's successful firms use this strategy to continually distance themselves from encroaching competition.

The importance of "Changing the Rules" becomes significant as a new entrant firm faces the task of attacking the established infrastructure, customer base, and proven product line of the dominant firm. One can imagine this situation as small computer industry start-ups have faced the literal fortresses embodied in established firms like IBM, Digital, and more recently Microsoft and Intel. The information contained in this chapter relates to the type of "Changes" that firms have used to attack the workstation industry's dominant firms.

The workstation industry is full of examples where industry participants have used "rule changes" to re-shape their product offerings or market image to gain an advantage over existing industry dominating players. The best example of this is Apollo Computer's shifting the rules on existing minicomputer vendors like Digital, Data General, and IBM. Despite the fact that Apollo's products represented a clearly different style (distributed with local resources) of computing than those of its competitive targets, the company constantly positioned its systems as "high-end

minicomputers," but focused on offering this capability in a package that gave users "all the power of a high-performance supermini like the VAX-11/780" except "sitting at a desk[2]." The most recent example of changing the rules is Sun Microsystems clear diversification from its position as a "workstation vendor" to that of an "enterprise systems supplier," a move that some within Sun have highlighted as a defensive move against market predators such as Compaq Computer and Microsoft.

In order to provide a framework for examining the concept of "changing the rules," a representative list of marketing moves by various industry participants was assembled (as shown in Table 5.1) based on their uniqueness compared to industry norms at the time. These announcements were extracted from assorted press releases workstation vendors made over the past 10+ years[3]. Each of these announcements were analyzed with reference to the industry norm in place at the time and the impact that this new strategy had on the "attacking vendor's" market position (defined in terms of pre- and post- marketshare) within the workstation segment (e.g. analysis of workstation vendor's entry to high-performance servers was reviewed with respect to impact on workstation product line [as opposed to server marketshare]).

The belief is that in nearly all cases of major "rule changes," which can be defined as a controversial shift in the way technology was applied or introduced to the market, manner in which the product was positioned, or how the vendor itself was structured or organized to meet customer needs, resulted in an increase in marketshare for the "attacking vendor." The information shown in Table 5.1 is supportive of this claim. Examples of these tactics are quite diverse, ranging from Apollo's attack on the early minicomputer vendors, to Sun's "high-five deal making[4]," which gave external firms an equity interest, influence over products, and caused tremendous controversy

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[1] Bower, J. & Christensen, C., "Disruptive technologies: Catching the wave," HBR, Jan-Feb 1995
[2] Apollo Computer advertisement, Mini-Micro Systems, 1/84, p. 26-27
[3] Information extracted year to year from Predicast Basebook (1983-1995)

amongst other industry players[5]. The important point to note is that of the 19 cases examined over 89% resulted in increased marketshare in the following year, and all achieved increased marketshare within 3 years.

In the following pages some of these examples are explored in greater detail to understand how each of these vendor moves was introduced to the market, and the latency period for a competitive response.

Date	Attacker Strategy	Pre-MS	Post-MS	Primary Defender	Competitive Response	Lat
Dec 1980	***Apollo Computer*** - Development of high-performance systems utilizing standardized hardware components and proprietary SW	0	40+	Digital Data General	"Terminal-like" workstations (VS100) with proprietary intf. Micro-versions of minicomputers w/ workstation features DEC - 36 mos. Until Unix is offered	18 32+ 36
1983	***Apollo Computer*** - Focus on color graphics workstations	40	60+	Graphics HW companies (e.g. Adage)	Diversification into integrated workstation products	6+
1983	***Sun Microsystems*** - Development of systems using entirely COTS HW and standards-based SW	0	15+	Apollo	Adopts Unix, Ethernet, and migrates to NFS	12
1983	***Sun Microsystems*** - Gives up equity stake to partners (e.g. CV, Kodak, AT&T)	0	15+	Apollo	Alliances become the norm for start-up computer firms. Apollo acquired by H/P in 1992 (was losing marketshare)	
1985	***Sun Microsystems*** - Open licensing of SW which offers competitive advantage (e.g. NFS distributed file system)	15+	31[6]	Apollo Digital Data General	Adoption of NFS Other vendors maintain proprietary strategies (e.g. DEC & VAXBI)	12 48
1986	***Digital*** - Seeks outside assistance (MIT) with creation of consortium for industry standard windowing system (Athena/X-Windows)	10	20	Sun	Sun drops own windowing standard (NeWS) in favor of industry offerings	

[4] M. Hall & J. Barry, "Sunburst: The ascent of Sun Microsystems," (1990), Outlined details of Sun alliances, partnerships, and equity trading with firms like Computervision, AT&T, and Kodak.
[5] "The year of alliances makes for strange bedfellows," Computerworld, 12/26/88, p. 56-57
[6] Marketshare expressed in terms of "engineering workstation market," following years reported purely as workstation market (reasoning behind change from 31% to 23% in following year).

1987	***Sun Microsystems*** - Open licensing of new SPARC technology to numerous semicon suppliers	23	28	Digital H/P SGI	All major RISC ABI are now licensed. Vendors like Digital openly promoting technology sharing	20 5.2
1987	***Sun Microsystems*** - Develops alliances with Kodak & Bell Atlantic to augment & build Sun service ntwk	23	28	Digital IBM	Puts vendors with large service networks at cost disadvantage, while Sun gains credibility	
1988	***SGI*** - Drives high-end 3D graphics capability into new low-cost graphics workstations, setting standard for high-res. & 3D at entry-level prices	5.2	4.4	Sun H/P Digital	3D capabilities become standard element of most RISC/Unix workstation offerings	
1988	***HP & DEC*** - Focus on processor performance with RISC offerings	19	20+	Sun	SPARC & open licensing policy (clone market development)	
1989	***Sun Microsystems*** - Introduction of 1st RISC desktop system under $10K threshold	28	36	H/P Digital IBM	Vendors forced to respond with low-cost systems, further cannibalizing other product lines	
1989	***Sun Microsystems*** - Publishes specification for S-Bus (I/O bus) with no license fees	28	36	H/P Digital IBM	Digital responds in 1989 with open licensing of "Turbochannel"	<12
1990	***Sun Microsystems*** - Introduces systems with high I/O cap., focus on balanced performance & SMP	36	38	H/P Digital	Same as above	<12
1991	***Sun Microsystems*** - Migration of SMP technology into high performance servers	38	43	Pyramid Solbourne Auspex	Pyramid acquired by Siemens. Solbourne exits market. Sun commands over 90% of Unix SMP server market	
1993	***SGI & Intergraph*** - Workstations focused on multimedia, annimation, graphics	6 4	7 3	RISC/Unix industry participants	Dictates inclusion of video, audio, and graphics into all workstation systems	
1996	***Compaq Computer*** - Introduces SMP Intel machines clearly targeted at "heart" of workstation market	0	tbd	RISC/Unix industry participants	Creates disruptive current to existing workstation offering by allowing PC compat. to perform.	
1996	***Sun Microsystems, Oracle, IBM*** - Proliferation of Java and "OS neutral" computing platforms	41	tbd	Intel Microsoft	Java gaining support, Microsoft applying pressure on all fronts...outcome to be determined	

Table 5.1 - Representative "Rule Changes" in the workstation industry

Given that substantial consideration has already been given to Apollo Computer's early attack on minicomputers, the majority of the exploration is given to cases subsequent to this initial market move. One such move is Apollo's diversification outside the low-cost monochrome graphics systems into the realm occupied by providers of high-end graphics solutions. As outlined in Chapter 3, in the early stages of the industry there were numerous different types of workstations and add-on graphics peripherals. In 1983, Apollo challenged this norm by introducing workstation products that embodied all the features previously met by these other suppliers, within a single product. This single move can be considered one of the most significant within the industry, as it sent a clear message to industry participants that workstation could accommodate high-end graphics operations, thus relegating these companies to niche player status (and leading to the downturn of industry players as highlighted in Figure 3.4).

Beyond these Apollo examples, numerous other workstation providers have applied similar strategies to attack and expand into and beyond the primary workstation market. The following pages briefly discuss some of these strategies and their relative success.

Sun Microsystems & Standards - The disruption of Apollo by Sun's product offering is novel from the perspective, that in many ways the systems were very similar, except in one important aspect, that of proprietary technology. One of the most significant rule changes occurred with Sun's product introduction which focused on the utilization of industry standards such as Unix and Ethernet which despite the disparity between Unix offerings, allowed for some degree of portability between vendor workstation offerings. The early Sun product introductions did not have an immediate impact on Apollo's stronghold in the CAD applications market, but over time attracted a large share of the vendor software applications, which ultimately led to Sun's dominant marketshare. Over time Sun has embellished upon this strategy in the type of standards it promotes, and the level of proactive cultivation around using its "open systems" technologies.

Equity & Alliances - One of the faults of early workstation suppliers was customer concern over market staying power and financial stability. Traditional systems vendors would often cast barbs at new entrants like Sun, Apollo, and the myriad of other early suppliers, citing their risky nature based on limited financial resources. Sun created quite a stir, when the organization made numerous announcements of financial partnerships with large industry partners. The organization first aligned with Computervision (CV) to jointly develop workstations capable of supporting the CV "CADDS" product line, a vendor that to this day has kept Sun as the leading platform for their workstation solutions. A second and more controversial partnership was with AT&T[7]. The partnership called for the two to jointly develop a strong Unix derivative based on AT&T's System V product, while also allowing AT&T to take an equity stake in Sun with options for higher interests. A third partnership came through the organization's work with Kodak. In all cases, Sun challenged the industry norm by giving up equity and potential influence over its business and product decisions, in exchange for creating the appearance of financial strength and industry leverage. At the time, these moves were extremely controversial amongst Sun's competitors, but created a strong image of financial stability for potential customers. In retrospect, Sun has re-purchased the equity, continues to maintain good relations with all three organizations, and benefited through positive marketshare gains in all three cases. This type of model can be seen in the alliances that numerous small hardware and software firms are developing today.

Re-defining Open Systems... "Giving away proprietary technology[8]"- Quite possibly the most controversial rule changing has involved Sun Microsystems' promotion of "open systems." While many vendors adhere to an open systems policy and the adoption of emerging industry hardware and software standards, Sun has taken this concept to its most literal extreme, by giving away or providing access to its most sensitive proprietary computing elements. Affuah refers to

[7] "AT&T," PC Week, 10/27/87, p. 207
[8] Affuah, A., "Strategies for profiting from an innovation—a dynamic perspective," 1996, p. 18

this strategy as a combination of "Run & Blocking," referencing Sun's ability to give away technology and then "outpace" the competition in the market while "Blocking" through its reputation and distribution channel. The concepts highlighted by Affuah can be extended well beyond Sun's licensing of SPARC[9], to incorporate the 1st licensing of NFS, and subsequent moves with respect to the, NeWS windowing system, S-Bus I/O bus[10], the SunNet Manager network management system, ToolTalk desktop interoperability tools, and most recently access to its Java internet environment. Despite the fact that many of these "open" offerings have met with limited success, they have represented a different, and somewhat controversial market approach. The one fact that cannot be questioned, is that Sun's position on open systems has remained unwavering and sent a very strong message to the market its developers, and end-user customers.

Proactive Cultivation of Standards - An extension of the Sun approach to open systems relates to how a vendor cultivates or promotes standards. In the late 80's and early 90's the Sun SPARC technology attracted numerous semiconductor partners and systems suppliers interested in getting into the RISC computing business. Late in 1993 however, this support was beginning to wane, as the level of competition was increasing, and manufacturers of SPARC-based systems were taking a beating. It was during this timeframe that Sun made a move to proactively support the sale of its systems technologies as an avenue to help lower the cost of building systems based on SPARC technology by creating its SPARC technology business unit "SunTech Enterprises[11]." The creation of SunTech and the ready availability of motherboards, ASICs, and other Sun components attracted a number of new firms interested in building SPARC clones. Digital recognized this shift in Sun strategy and followed suit with the creation of its own Semiconductor

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[9] Refers to early Sun licensing agreements with semiconductor companies to design and produce SPARC-compatible microprocessors. Early agreements included BiT, Fujitsu, & Cypress (Electronic Systems News, 7/13/87, p. 31), LSI Logic & Texas Instruments (WSJ, 10/19/87, p. 2)

[10] Electrical Engineering Times, 9/18/89, p. 16

[11] "Sun creates SPARC technology business unit," San Francisco Chronicle, 10/11/93, p. D2

Business Unit[12]. The importance of this strategy shift is readily apparent as the level of competitive pressure increases on workstation systems suppliers. Utilizing these technology business units Sun is looking to expand its reach into manufacturers of PC servers[13], Digital is hoping to increase its base of clone systems suppliers[14], and most notable, H/P is looking to outsource the manufacturing of it PA-RISC systems[15].

Subcontracting of Service Delivery - A long standing tenet of the computer industry has been the depth and breadth of the vendor service organization. The IBM service technician has long been presented as the icon and definitive example of the service quality customers have come to expect. The establishment of a large service organization with global breadth was considered essential and a major barrier to entry for new systems providers. In 1983, Sun Microsystems challenged this norm by electing to work through "partnerships" and subcontracts to meet this requirement. Having established itself as a firm with a leveraged sales model, Sun focused on a similar strategy to rapidly develop a "big name" service organization without the added cost. Sun developed quality relationships with Bell Atlantic and Kodak (two of the largest U.S.-based, vendor neutral service networks) to augment their own internal service resources. The implementation of this strategy was quite successful in that it differentiated Sun from its low-cost competitors, and established the firm as a stable service provider, without the cost of developing a service network from "ground zero." It should be noted that overtime Sun has recognized the need to expand on this network and build more direct capabilities, but at the time it alleviated a substantial cost burden.

Migration into New Product Segments - A more thorough analysis of this strategy is provided in Chapter 6, but numerous examples exist of migrating base product technologies into

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[12] http://www.digital.com/info/semiconductor
[13] Sun set to attack new markets," Computer Reseller News, 3/24/97, p. 73
[14] "Digital bets on Alpha bits," Computer Reseller News, 3/24/97, p. 62
[15] "HP denies workstation unit sell-off," Computerworld, 3/24/97, p. 33

new market segments. Workstation providers such as Sun and SGI have been very successful in taking core systems technology into the development of large symmetric multiprocessing server lines, which have challenged both niche providers of Unix servers (e.g. Auspex, Solbourne, & Siemens/Pyramid) but also the large mainstream server lines offered by Digital, H/P, and IBM. A secondary example lies in SGI challenging the entry-level norms for color graphics workstations by placing entry level 3D capabilities in its base product set. This single move by SGI can be credited with establishing SGI as a mainstream provider of workstation solutions. The firm's introduction of 3D graphics capability in its Personal IRIS product line, established hi-resolution, accelerated graphics as a standard for mainstream workstation systems.

Redefinition of "Base" Feature Set - One of the most simplistic rule changes to envision relates to the base product features included within a given workstation segment. As previously highlighted, most workstations can be categorized as either entry-level, mid-range, or power user systems (as highlighted in Figure 3.1). Many of the vendors have "pushed" the limits of these categories by trying to re-define the features that should be included within a given product echelon. These changes can relate to redefining the "bottom" of the price range (e.g. pushing the price for a mid-range system "under $10,000"), or adding a specific feature like a color monitor, graphics accelerator, or high-speed network adapter. Some examples include Sun's diligent push against pricing thresholds (e.g. 1st <10K, 1st <5K, 1st color system <5K, 1st SMP system <10K) and SGI's radical incorporation of high-performance graphics and multimedia features (3D capabilities in entry level systems, hi-resolution standard [1280x1024], incorporation of audio/video features). In many ways, the re-definition of these base features represents the lowest risk and rapidly deployable opportunity to change the rules.

The conclusion that can be drawn from these example relates to how a vendor gains a sustainable advantage in a period when products start to look very similar. The examples shown above demonstrate how the industry's more successful workstation manufacturers have gained

marketshare on their competitors by challenging the ground rules and industry norms surrounding products and the features included. Given that the majority of these changes have resulted in positive marketshare gains, lends support to the concept of changing the rules on the dominant firms. The most notable of these changes (Apollo vs. Digital, Sun vs. Apollo) has established these firms as the industry leader, and in the case of Sun, constantly changing the rules has led to long-term industry dominance.

As the workstation industry moves forward, and Intel-based PC workstations begin to infiltrate those niches occupied by RISC/Unix workstations, rule changing will be even more critical. The recent moves by Sun, Oracle, and IBM, to launch low-cost Network Computers coupled with the Java toolset, can be viewed as one of the most significant defensive as well as offensive moves in the industry to date.

- Chapter 6 -
Technological Repositioning

A key element of participating in the high-performance workstation industry has been the vendors ability to adapt to changes in the way computers and their users interact, and adapt the organization's core technologies to meet and expand on these new user needs. When the first Apollo workstations were announced, they were targeted at users that valued local compute power on their desktop. Over the past 15-years this vision for computing has expanded opening new opportunities and threats for workstation industry participants. The proliferation of client/server computing to large global enterprises has expanded the opportunity for both workstations and high-performance servers based on workstation technology. The rejuvenation of the Internet has opened a wide range of opportunities for both workstations, Inter/Intranet servers, and the birth of so-called NCs (network computers). All of these represent a sampling of new niches that are being addressed based on the core technologies found in workstation systems.

Christensen[1] identifies that organizations pursuing disruptive technologies have one of two choices: "either go downmarket and accept lower profit margins," or "upmarket with sustaining technologies," and higher profit margins." As workstation manufacturers have evolved their technologies it would appear that they have pursued both approaches with marked success.

The first workstations announced by 3 Rivers Computing (Perq) and Apollo Computer (DN200) were relatively simple products based on mediocre processor, graphics, and I/O buses. As previously highlighted in Chapter 2, despite the fact that the internal features of these products were inferior to other computer systems available at the time they addressed a specific need and style of user computing. Over time, the features found in these early workstations evolved and the systems became populated with higher speed buses, co-processors (e.g. graphics, numeric, I/O,

[1] "Disruptive technologies: Catching the wave," Harvard Business Review, 1-2/95, p. 47

network, etc.), and software, which allowed the system to be adapted to more challenging applications. Congruent with Christensen's findings, these changes posed a market opportunity which once again encroaches upon the territory occupied by the dominant providers of computer systems.

One characteristic consistently displayed by the successful participants within the workstation industry has been their ability to recognize these technological opportunities and expand outside of the high-performance workstation niche. Furtney & Taylor aptly describe this situation as the "long-standing computer industry reality: the performance boundaries of all classes of systems are constantly advancing. While workstation products now easily handle some problems done on past generation supercomputers, supercomputers have evolved to tackle problems that were once intractable. PC's can now handle some tasks that required workstations only a few years ago[2]." This scenario provides a perfect framework for considering industry participants opportunistic development of market expanding product offerings.

Specific industry examples to be considered include the early adaptation of workstation technologies into some of the some of the areas highlighted in Figure 6.1. The information highlighted in Figure 6.1 demonstrates how vendors like Sun Microsystems and SGI have been able to diversify into new, fast growing segments of the computer industry, without substantially cannibalizing their existing product lines (with the exception being typical cannibalization due to increases in processor performance). The Digital example, highlights the drawbacks outlined by Christensen for a vendor migrating technology "downmarket" into market segments with lower margins. While it is true that Digital's announcement of its early VAX workstations (e.g. VAXstation 1) addressed the competitive response to the disruptive technology introduced by Sun and Apollo, these products also cannibalized Digital's existing revenue stream from users of its minicomputers for single user computational functions. Once the technology was established

downmarket, Digital had cannibalized its revenue stream in addition to migrating its technology to low margin price points to compete with Sun and Apollo.

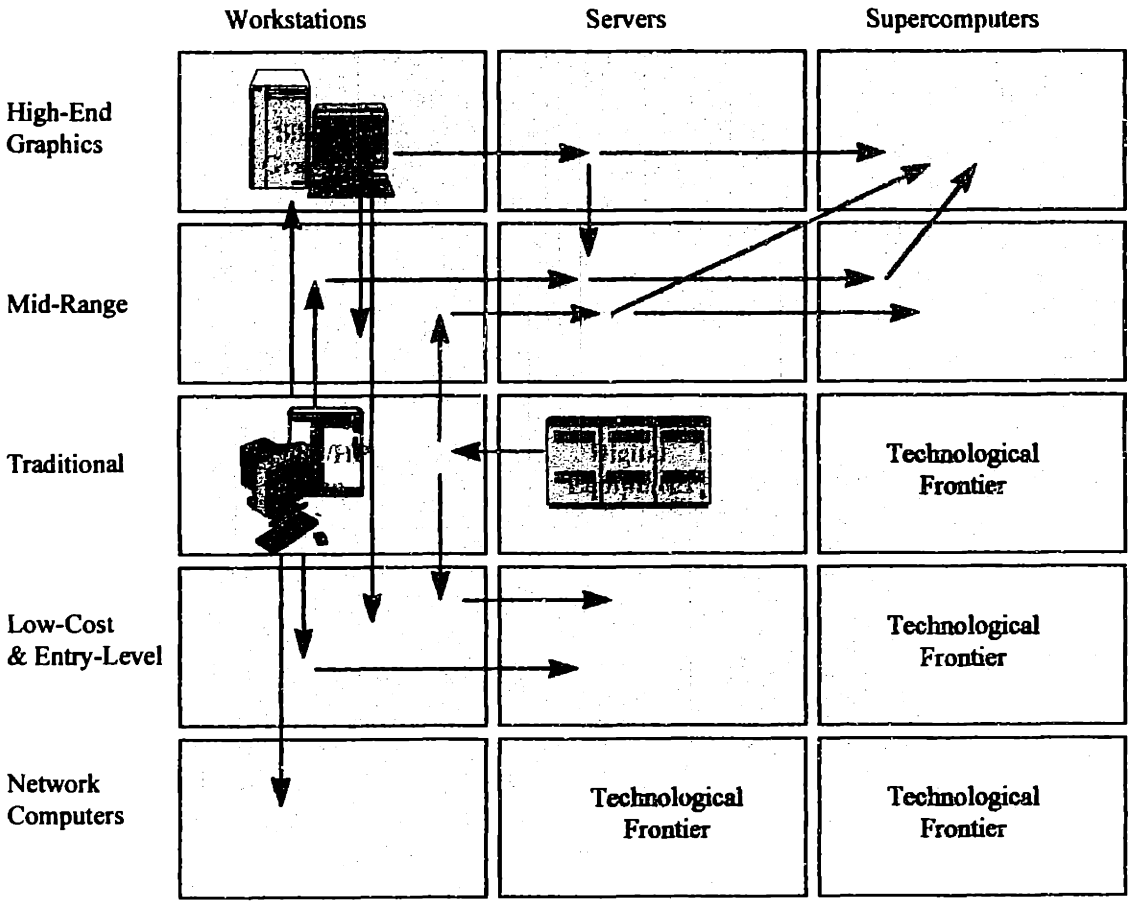

Figure 6.1 - Workstation Vendor Evolution into New Market Segments

Enabling Technologies

Prior to investigating the individual examples of organizations adapting technology to new market opportunities, it may be worthwhile to summarize the key enabling technologies that have made these adaptations possible. While the list is not exhaustive, or meant to be an all encompassing review of the technology itself, it at least provides a frame of reference for discussing the new products enabled.

[2] Furtney, M. & Taylor, G., "Of workstations and supercomputers," IEEE Spectrum, 5/93, p. 64

Bit-mapped Displays/Low-cost Memories - Enable high performance graphics, allowing workstation vendors to pursue both higher end graphics solutions, and as costs come down push sophisticated graphics into the desktop

NFS and TCP/IP - The introduction of Apollo's Domain, and eventually the industry's migration to NFS and TCP/IP as standards for distributed computing, opened a niche for file and compute servers. In 1984, Sun Microsystems announced the Sun 2/50[3] diskless workstation, signaling to the industry that all compute resources did not necessarily need to reside locally at the workstation. Over time this technology incentivized manufacturers to create larger server systems, with higher throughput capabilities, capable of handling more complex application services.

High-speed Buses - As workstations became capable of handling very complex graphics tasks such as virtual reality, simulation, and animation services, industry participants created products with the necessary complement of high-speed buses to feed the graphics generation hardware. Despite the fact these buses were originally intended for graphics workstations, astute vendors were able to adapt these technologies for other product offerings (e.g. Silicon Graphics adaptation of Onyx high-performance workstations into Challenge database server line[4]).

Symmetric Multiprocessing (SMP) Operating Systems & Multiprocessor Systems - While it is true that multiprocessor systems and SMP-capable operating systems have existed in the industry ever since the early IBM mainframes, the introduction of these technologies into mainstream workstation products, opened a vast array of market opportunities, the most lucrative being the market for high-end database and application servers. The introduction of low-cost desktop multiprocessing systems from vendors like H/P, Digital, and Sun (not to mention a host of clone offerings) have had a marked impact on industry participants. This year the market for Symmetric Multiprocessing (SMP) servers is expected to exceed $11.66B, with RISC/Unix still claiming the

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[3] Furtney, M. & Taylor, G. "Of workstations & supercomputers," IEEE Spectrum, 5/93, p. 64
[4] "SGI aims at supercomputers," Electronic Business Buyer, 3/94, p. 28-30

majority (over 75%) of these sales. The leading suppliers in this space, Sun, H/P, Digital, and SGI have all evolved workstation technologies to address the market need for SMP servers. Sun Microsystems, which eclipsed the leading supplier of Unix servers (Pyramid Technology) back in 1993, within 120 days of announcing its new SPARCserver 600 series, offers an excellent example of the disruptive power found in moving into new product segments.

Internet Services - Access to the Internet has been a long standing element of the Unix style of computing. As the Internet began to experience its explosive growth in the corporate computing world, numerous providers of Unix-based workstations and servers were quick to adapt core capabilities into "Internet-specific" solutions. Most notable of these includes Sun's Netra webserver offering. Secondary, but more significant developments include the repositioning of these Internet capabilities into the vastly different low-cost Network Computers ("NC") and software protocols (e.g. Java) touted by Sun, IBM, and other industry participants.

As previously highlighted, workstation industry participants have constantly faced encroachment from all perspectives. High-end system manufacturers (IBM, Digital, etc.) have longed to replace vendors like SGI and Sun on the engineering desktops. Most recently, developers of Intel-based PC workstations have launched a significant assault on the high-performance workstation segment. At a minimum this encroachment has begun to escalate a "price war" as vendors attempt to compete with the low-cost packaging of PC workstations. This competition has made diversification into other industry segments that much more important.

Industry Examples

Christensen[5]'s work highlights that attempts migrate sustaining technologies "upmarket" are typically be more successful based on the "profit margins that are alluringly high," and explains that similar efforts to move downmarket are usually met with less success due to thin margins, and it is assumed, cannibalization of the vendors existing product lines. Within the

workstation industry, successful examples can be found of technological re-positioning both upmarket and downmarket. The most significant of these, if successful, could be the attempt by Sun Microsystems and IBM to move downmarket with their NC solutions as an offensive weapon against Microsoft. A move that could meet with significant challenges given Microsoft's pending acquisition of WebTV[6]. Some specific industry examples of these maneuvers are highlighted on the following pages, and upon review reveal that these moves expand both vendor market share, but also influence demand for the organizations primary (workstation) product offering.

Graphics Workstations - The most simplistic example of workstation manufacturers moving technology upmarket involves the creation of graphics workstations themselves. As previously outlined, the early Perq and Apollo workstations were single-plane, monochrome workstations with limited resolution. Based on this early positioning there remained market opportunities for manufacturers of graphics terminals and systems integrators who combined workstation products into complex graphics solutions. In the mid-80's however, as exemplified by the Apollo advertisement[7], workstation manufacturers began displacing these graphics systems producers with high-end solutions of their own.

High-performance Database Servers - Perhaps one of the most lucrative applications of early workstation technology is into the realm of high-performance servers. The market for RISC/Unix servers accounts for over $11.66B[8] annually. In the early years of the workstation industry, this niche was occupied by the large providers of minicomputer and mainframe solutions. In the early 90's however, workstation providers like Sun Microsystems, Silicon Graphics, & Hewlett-Packard, rely on the sales of high-end server products for the bulk of their corporate

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[5] "Disruptive technologies: Catching the wave," Harvard Business Review, 1-2/95, p. 47
[6] "Microsoft to buy WebTV for $425M," WSJ, 4/7/97
[7] Apollo Computer advertisement, Mini-Micro Systems, 3/86, p. 37
[8] Hayes, M. & Garvey, M., "Server economy," InformationWeek, 3/24/97, p. 40

growth[9]. These vendors have developed systems which rival the performance of their mainframe counterparts in compute intensive applications such as data warehousing, transaction processing, and simulations. The opportunity for these new servers was best summed up by Richard Ratcliff, Vice President of Sabre (American Airlines) and early customer of the Sun E10000 Enterprise Server, who claimed "The mainframe was an option, but we wanted to build software we could run anywhere in the world, and we wanted it to run on a good, cost effective number crunching platform[10]." A claim backed up by industry analyst Jerry Sheridan (Dataquest) "Sun wants to be positioned as a solution provider from the desktop to the highest echelon of the computer environment," a somewhat lofty goal that Sun shares in common with most providers of Unix workstation solutions.

Low-cost, High-performance Graphics - A good example for the migration of technology downmarket can be found in Silicon Graphics (SGI) product line. SGI is an organization founded on the graphics technology developed at Stanford in 1979[11] by Professor Jim Clark. The early products developed by the organization leveraged a proprietary geometry engine into a workstation package, which occupied the high-end graphics niche, sold for $37,500, and often relied on a high-priced minicomputer for additional processing power. SGI over the following years continually re-packaged and miniaturized its high-performance graphics capabilities into smaller and lower priced systems. Review of industry trade press confirms that SGI provided an excellent example of migrating technology to newer high-performance systems while also redefining the standard for low-cost 3D graphics[12].

Internet Servers - The emergence of the Internet as a resource to corporate computing users, posed a new opportunity for workstation suppliers. Users of Unix systems had long relied

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[9] "Sun continues to push into high-end server arena," Computer Reseller News, 5/23/94, p. 82
[10] "Sun takes aim at the mainframe," InformationWeek, 1/13/97, p. 20
[11] "Stanford graphics spin-off offers real-time workstation, Mini-Micro Systems, 12/83, p. 58, 61

upon the Internet as an information resource and communication tool. Workstation vendors recognized this as a potential opportunity for market diversification and numerous vendors addressed this situation by announcing products such as Netra (Sun), which were servers, combined with the necessary hardware and software connectivity elements to allow corporate America simplistic connectivity to the Internet. Vendors such as Sun translated this opportunity into a leadership position in Internet-enabled computing[13].

High-end Virtuality, Visualization, & Simulation Workstations - The workstation industry in the early 90's was marked by the appearance of numerous start-ups with products focused on ultra high-end graphics capabilities (e.g. Stellar and Ardent, later to merge and form Stardent). These organizations hoped to capitalize on users seeking graphics capabilities beyond those offered by mainstream workstation solutions. In the words of Stellar founder Bill Poduska, "[they] underestimated the speed with which vendors like SGI would incorporate features similar to those found in Stellar's with their mainstream product line[14]." The incorporation of these high-end graphics features was not unique to Stellar, as vendors like Sun (VX/MVX), Apollo (DN10000), and Digital (VAXstation 8000), had robust graphics systems eclipsed by their own mainstream offerings within a few short years.

Network Computers - The most significant technological re-positioning may be occurring at this very moment. The slew of announcements by the industry's leading workstation players of NC systems represents an offensive move by workstation players to re-position technology the computer industry's lowest levels. At the same time, NC's represent an entirely different model of computing, one which relies on the previously highlighted multiprocessor servers for compute power and storage resources. While it remains to be seen whether NC systems will rival the

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[12] "Silicon Graphics stretches IRIS with low-end, high-end models," Mini-Micro Systems, 10/88, p. 22-23; "Silicon Graphics adds low-cost models," InformationWeek, 7/22/91, p. 45

[13] "..... Sun marketshare in web servers....." Communications Week, 11/20/95, p. IA3, IA7

[14] Interview: J. William Poduska, founder Stellar Computer, 3/17/97, Lexington

capability of traditional network-based personal computers, these new announcements clearly highlight yet another opportunity by workstation vendors to leverage their base technologies into new markets.

Review of these industry examples highlight how the industry's successful players have expanded their presence by moving into new areas, leading one to believe that long-term success may be dependent on continually reshaping technology both to address emerging opportunities, but also meet changes in customer needs.

- Chapter 7 -
Utilization of Product Families

The utilization of product families to achieve both production flexibility and reduced design costs has been a crucial strategic element in consumer electronics for many years. Sanderson & Uzumeri have reviewed the significance of using product families in a wide variety of product settings, including the Sony Walkman, and more recently, a synopsis of product families within the high-performance workstation industry[1]. Sanderson & Uzumeri's work addresses a key issue in the workstation industry, that of managing multiple competing and incompatible product lines, with the work highlighting the difficulties that Digital had in introducing RISC technologies that undermined their existing VAX-based, proprietary product offering. While it is true that Digital has been criticized for the manner in which they introduced this new disruptive technology, much can be learned from analyzing the number and type of platforms that the industry's leading players have required to service their customer base.

Morris & Ferguson[2] address two of the central reasons for leveraging the use of product platforms, namely, those of cost and the accommodation of fast moving technology elements. Utterback, Myer, and Tertzakian provide an interesting extension, by offering an approach for measuring platform efficiency, or the amount of leverage a given vendor gets out of a base platform offering. The purpose of this chapter is to explore the number, type, and longevity of product platforms that workstation vendors have used in the prime growth period of the workstation industry (1989-1997). The analysis performed takes a simplistic look at the number of platforms a vendor utilized (defined as a unique product package consisting of buses, motherboards, and base packaging) and did not consider all permutations of processors, graphics,

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[1] Sanderson, S. & Uzumeri, "Managing product family transitions: computer workstations," *Managing Product Families*, (1996), p. 99-109.
[2] Morris, C. & Ferguson, C., "How architecture wins technology wars," in *Seeing Differently*, Seely-Brown, John, p. 40

and I/O peripherals that may have been options within that package. The analysis also considers the lifespan (platform longevity) of these major workstation platforms.

Morris & Ferguson highlight that "competitive success flows to the company that manages to establish proprietary architectural control over a broad, fast moving competitive space[3]." While some might question the use of the term "proprietary," especially given the open nature of today's workstation products, few would question the importance of maintaining and driving a common, or minimal number, of architectural platforms for workstation products. These authors highlight the "astonishing rate of improvement in microprocessors and other semiconductor components," (although this rate has actually accelerated to a 4-6 month cycle as opposed to the 12-18 months which they cite in 1993) and the fact that "no single vendor can keep pace with the deluge of cheap, powerful, mass-produced components, customers insist on stitching together in their own local system solutions." These comments are readily evident in the fact that vendors must constantly refresh their product offerings with the latest in disks, memories, and other peripherals, in order to keep customers satisfied. All of these issues lend evidence to the importance of utilizing product platforms which help accommodate changing technology elements without constantly facing the high cost of redesigning the base product.

The development of a new workstation product can often run into the millions of dollars. Early and more simplistic workstations such as the DN200 were estimated to cost between 1-1.5M to develop, and very high-end, graphics supercomputers such as the Stardent Titan which cost in excess of $500M without delivering a product that achieved dominant marketshare. A typical product launch of a current generation workstation (such as Sun's SPARC Ultra workstation) was estimated by an industry executive to cost in "excess of $50M, and grow to $100M over the

[3] Morris, C. & Ferguson, C., "How architecture wins technology wars," in *Seeing Differently*, Seely-Brown, John, p. 40

product's lifecycle[4]." The same executive was quick to point out that the company's product development strategy was to "separate packaging and buses" from the other technology elements and focus on stretching the life out of the platform while accommodating changes in the technological elements that occur on what is approaching a "quarterly basis."

The cost to create these complex systems, at a time when the industry is experiencing tremendous cost pressures, makes production efficiency a significant criterion for new developments, a fact consistent with Utterback & Abernathy's Theory of Dominant Design. The fact that product families allow vendors to create a base platform that can then be extended into many different permutations and product generations, presents the opportunity to amortize development costs across numerous product launches, and hopefully, many years. A secondary aspect of utilizing product families relates to the flexibility it presents to the organization. The original workstation products, and even later products such as the Apollo DN10000, Sun VX/MVX, and Digital VAXstation 8000, could be viewed as "1 hit wonders," or products that were introduced in one configuration, but experienced a short life, never evolving into 2nd or 3rd generation products. As previously highlighted these systems represent a significant expense, but also a missed opportunity in obtaining flexibility to pursue new market niches or customer requirements.

One method for gaining appreciation for the impact product families might have on an organization is through the analysis of comparative vendor offerings. Table 7.1 highlights the various platforms and operating systems offered by three of the companies in our "interesting organizations" framework, namely Sun, Digital, and H/P. The table summarizes the major platforms offered each year by the organization. Analysis was performed on products offered from 1989 through 1997 based on the fact that prior to 1989 most vendor's workstation products were in their infancy stages. 1989 marked a significant point in the industry when vendors were

[4] Interview: Ed Zander, President, Sun Microsystems Computer Corporation, 4/9/97 (via telecon)

grappling with the transition to new architectures (e.g. RISC) and multiple competing product lines. In addition, the table outlines the differences in the number of operating systems and processor architectures a vendor supports, which can also be translated into additional costs for customer service, support, applications development, and marketing.

	Sun Micro			Apollo & HP			Digital Equip		
	Platform	BI	os	Platform	BI	os	Platform	BI	os
1989	3/140,160 3/50 3/60 3/260 4/110 4/150 SS1	2	1	M236 M318,319 M320 M330 M340 M350 M360 M370	1	1	VS3100/30 VS3100/40 VS3200 VS3500 VS3520/40 DS3100 DS2100	2	2
1990	386I SS1,1+ SS330 SS370 3/260, 280 3/470 3/60 3/80	3	1	M318,319 M330 M340 M350 M360 M370,375 M825 M834,835	2	1	VS3100/30,38 VS3100/40,48 VS3200 VS3500 VS3520/40 DS2100 DS310? DS5000/200	2	2
1991	SS2 SS IPC SS SLC SS330 SS370,470	1	1	M318,319 M330 M340 M350 M360 M370,375 M825 M834,835	2	1	VS3100/38 VS3100/48 VS3100/76 VS3520/40 DS5000/200 DS5000/1xx DS3100	2	2
1992	SS2 SS330 SS370,470 SSELC SSIPC SSIPX	1	1	M318,319 M330 M340 M350 M360 M370,375 M825 M834,835 Series 425e,t Series 700	3	2	A3000/400 A3000/500 VS4000VLC VS4000/60 VS4000/90 DS5000/2x DS5000/1xx DS5000/240	3	3

Table 7.1 - Workstation Vendor Product Platform Comparison (1989-1997)

	Sun Micro			Apollo & HP			Digital Equip		
1993	SS10 SS630 SS670 SPARClassic SS LX	1	1	9000/318,319 9000/330 9000/340 9000/350 9000/360, 9000/370,375 9000/825 9000/834,835 Series 425e,t 9000/705	3	2	A3000/300 A3000/300L A3000/600 A3000/800 A150PC VS4000VLC VS4000/60 VS4000/90 DS5000/3x DS5000/1xx DS5000/2xx	3	3
1994	Classic SS LX SS10 SS630 SS670 SS1000	1	1	Series 425 Series 433 9000/700 9000/705 9000/710 9000/715 9000/720,725 9000/725,735 9000/754,755 74Xi (rugged)	3	2	A3000/300 A3000/300L A3000/600 A3000/700 A3000/900 DS5000/1xx DS5000/2xx VS4000VLC VS4000/60 VS4000/90	3	3
1995	Voyager Classic SS5 SS10 SS20 SS1000	1	1	9000/700 9000/715 9000/725 9000/735 9000/755 74Xi (rugged)	1	1	A200 4/1xx A250 4/2xx A700 A800 A900 VS4000/96 DS5000/133 DS5000/2xx	3	3
1996	SS4 SS5 SS20 Ultra	1	1	9000/712 9000/715 9000/725 C100,110 C160,180XP J200,210,XC K260,460 74Xi (rugged)	2	1	Personal Wks AlphaXL A250 A255 A500 A600	1	3
1997	SS4 SS5 Ultra Ultra2	1	1	9000/712 9000/715 C110,160 B132 C160, 180 J210,280 K260,460	2	1	Personal Wks A200 A255 A500 A600	1	3

Table 7.1 (cont.) - Workstation Vendor Product Platform Comparison (1989-1997)

The conclusion that can be drawn from Table 7.1 is that while all three vendors appear to have adopted a product platform strategy, each required a differing number of platforms to service their customer base. It can also be noted that at some point, all three vendors chose to offer product families that spanned multiple incompatible Application Binary Interfaces (ABI), or processor architectures that would require unique support and manufacturing requirements. In some cases the management of these multiple ABIs was a conscious decision (e.g. Digital and its VAX, MIPS, Alpha strategy) and for other like Sun and H/P it was to manage the organization's transition to a RISC-based platform or to accommodate the integration of a technology acquisition (e.g. H/P and Apollo).

The information presented would indicate that Sun Microsystems has continuously covered the entire product segment with relatively few product platforms, with H/P following a similar strategy, but slightly behind Sun (assumed most likely due to the complexity of integrating the Apollo product lines into its primary offering). Some of the additional platforms in the H/P line may also be due to the company's focus on ruggedized and rackmountable systems, a segment which both Sun and Digital have delegated to channel and integration partners. Throughout the 9 year period Digital required more platforms than its primary competitors.

While it could be argued that there can be some efficiencies gained by sharing platforms across various processor architectures (resulting in a more rapid amortization of platform development costs), these savings can be quickly swept away by additional costs for marketing and support infrastructure. It should be noted that carrying multiple architectures also "buys" a vendor a certain degree of protection when the marketability of a given technology may be uncertain (e.g. Digital, IBM, and H/P all appear to be "hedging their bets" by offering RISC/Unix and "WINTEL" workstations).

Evidence of the fact that carrying multiple ABI platforms has become burdensome, coupled with the decreasing price/performance trajectories of the WINTEL platform, can be seen

in the recent announcements by vendors such as Intergraph, IBM, and Deskstation Technology. All three vendors with significant RISC workstation lines, and significant marketshare, have recently announced they are abandoning RISC workstation desktop lines in lieu of focusing solely on Pentium-Pro-based systems. A similar prediction comes from Ed Zander, who stated, "the only viable competition [he saw] was from SGI based, [on the expectation] that both Digital and H/P would abandon their RISC architectures for strictly Intel desktops [in the very near-term][5]."

Flexibility and Product Platforms

In a fast moving market, like the workstation industry, maximum flexibility is essential to staying ahead of the competition. The individual technology elements that comprise workstations are moving on separate price/performance trajectories, and can be individually impacted by swings in market price and production factors (e.g. quality or yield problems in microprocessor or peripheral components). At the same time, vendors are under constant pressure from their customers, to offer workstations with the latest advances in disks, memories, and graphics technology. In order to take advantage of the newer technology elements (e.g. disk drives, graphics accelerators, I/O cards), vendors require a flexible platform that can easily accommodate their integration. Product platforms, if designed appropriately, afford vendors the opportunity to meet these objectives. A second issue relates to the introduction of a product that closely matches the needs of the market (as addressed in Chapter 8). In the event a new platform is announced that fails to address a certain aspect valued by the market, the vendor needs the flexibility to rapidly re-shape the product and launch a new configuration. Properly developed product platforms address these requirements.

In order to gain a proper understanding of the flexibility found in these platforms, it is best to review an industry example. The scenario shown in Figure 7.1 is representative of the typical

[5] Zander comment actually stated that Digital, H/P, and IBM had already decommitted, unable to get comment from Digital as of this date. IBM press release is cited.

vendor product offering in the "desktop" segment of the workstation industry. The example highlights three generations of Sun product platforms that address this market segment. The first thing to be noted from this example is the segmentation between individual technology elements. Ed Zander liked to think of this separation as between "packaging," "buses," and "chips & graphics." The second item worthy of note is that the individual technology elements transcend a given platform. While the speeds of the various processors, buses, and peripherals, vary from vendor to vendor, this example can be used to gain better insight to the applicability of product platforms across most workstation vendors.

Review of the Sun example reveals the degree of isolation amongst the technology elements. Despite the fact that there are certain limitations on the speed at which the buses operate, the memories that may be supported, and the operating system support for various peripherals, the platform(s) highlighted demonstrate many degrees of extensibility.

The level of extensibility resident in the SPARCstation 20 gave Sun the flexibility to introduce a number of different processor configurations (16 in total [various speeds, quantities, and cached vs. non-cached]) representing two different microprocessor families [Ti SuperSPARC & Ross Technologies HyperSPARC]), a range of graphics solutions (8 different co-processors, representing two generations of graphics adapters), and many different storage options over the lifecycle of the platform. The most important aspect is that this occurred at a time when Sun was making a crucial transition to its 64-bit UltraSPARC technology, and required a platform (such as the SPARC 20) to bridge the gap.

The conclusion that can be drawn, is that product platforms designed like the SPARCstation 20, enable workstation vendors to span the gaps found within disparate workstation technologies. Given that memories, disks, and peripherals appear on the market at differing rates, vendors want the flexibility to add and upgrade to their systems based on these new technologies.

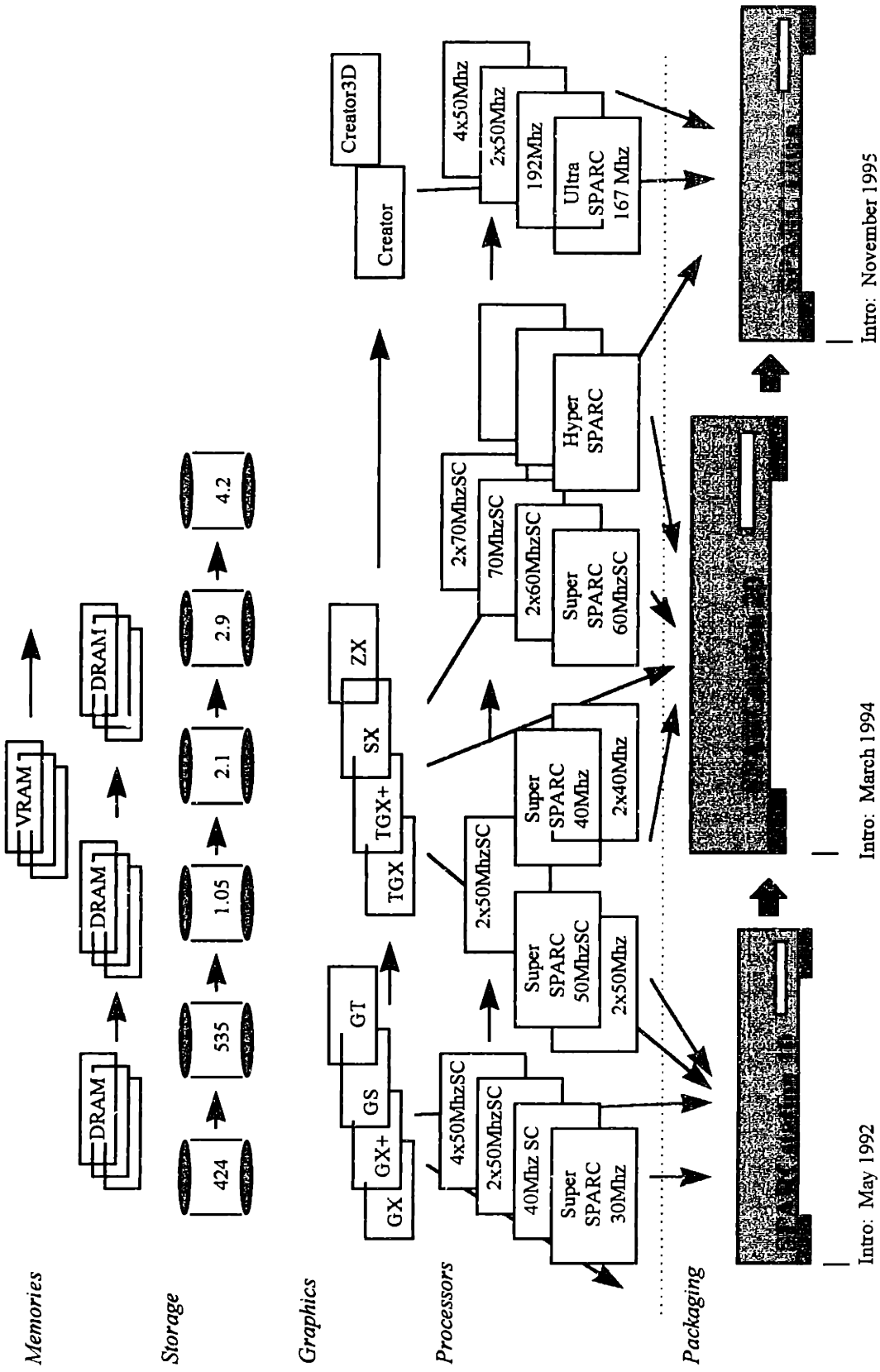

Figure 7.1 - Isolating Fast Moving Technologies from Workstation Platforms

Platforms that lock a vendor into any single configuration or technology may be an indicator of long-term market difficulties. A second degree of flexibility relates to platforms as a tool to address specific market "sweet spots." Sun Microsystems highlights that one of their success factors relates to their ability to find specific niches (or "sweet spots") for high customer demand. The organization has a history finding these niches (e.g. 1st workstation under $10K, 1st under $5K, 1st color workstation under $5K, 1st workstation with 100MB/sec Ethernet, etc.) and experiencing solid product sales. The flexibility of platforms allow the ability to quickly churn a new product configuration capable of addressing a new niche is the perceived as a key to this success.

Platform Longevity

Returning to our sampling of workstation providers, we can explore the concept of platform longevity (platform lifespan). The platforms highlighted in Figure 7.2 demonstrate that the average lifespan for all three vendor product offerings was 28.2 months, with H/P and Digital leading with an average life of 29.2[6] and 31.3 months, and Sun trailing with a platform life of 24.1 months. This would indicate that Sun is churning its product line at a more rapid pace than Digital or H/P (but at an increased cost). A secondary point of interest is to note that all three vendors have steamlined their product lines from the point in 1989 that the average # of platforms was 8.3 to the point in 1997 where the vendors are covering the workstation segment with an average of 5.0 platforms (with Sun being the most efficient with 4 major platforms and Digital trailing with 7).

The conclusion that can be drawn from Figure 7.1 is that all three vendors are striving to utilize product families that will maximize a cost efficient platform and accommodate multiple

Figure 7.2 - Representative Workstation Platforms & Longevity (1989-1997)

[6] Note: H/P numbers were calculated from a minimal product set (10 platforms), earlier 68000-based systems may drive this number higher (data unavailable). All calculations based on vendor introduction

generations of technological change. Given the information presented and the fact that all three vendors have consistently held significant marketshare, it would be safe to assume that product platforms have assisted in protecting this leadership position. It would also follow that any vendor entering the market at this point in time would need to cultivate a similar strategy in order to compete effectively.

Logical Product Platforms as an Extension to Physical Platforms

The analysis of individual workstation vendor product offerings reveals an interesting aspect to these workstation platforms. While the focus of the research performed for this thesis (in addition to that of Sanderson & Uzumeri) was on individual physical product platforms (as highlighted in Figure 7.1) it would appear that a case could also be made for the use of "logical product platforms." Based on discussions with vendor product managers, they revealed that while individual development efforts specifically focus on a given platform and product offering, each of these products fall within a given echelon (e.g. entry level desktop workstation) which leverages off the technological developments within the previous product generation. From this perspective, it would appear that as new products are brought to the market they incrementally build upon the feature set and designs of past generations.

While it is true that products such as the Sun SPARCstation 10, 20, and Ultra are physical product platforms, with an identified product manager and support team, all three products fit into a niche that could be described as "mid-range" workstation products (refer to Figure 3.1), which are bracketed on the upper bound by "power user workstations," and "entry-level" on the lower end. As vendors develop new product offerings they form extensions to the logical product family that fits into one of these niches. An interview with a Sun product manager revealed that low-end products such as the SPARCstation SLC, ELC, IPC, and IPX, while all being unique product

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information, actual retirement of products could extend the platform longevity (varies by vendor).

platforms, with incremental enhancements for the introduction of a new generation,[7] were all products fitting into the entry-level "logical product family." These logical families have their features shaped by the need to fit within a given price bracket in the product hierarchy. Products attempt to maximize the design of the previous generation product, but may involve an entirely different packaging scheme (especially in low-end products).

Based on the estimates highlighted at the beginning of this section, the information presented would lead to the conclusion that depending on the level of platform efficiency (measured in terms of lifespan and product permutations) vendor profitability (through reduced design and development costs), their ability to respond to market pressures, and accommodation of technological shifts can vary greatly. It would also suggest that vendors attempting to market multiple product lines, based on different processor architectures, may be working at a cost disadvantage. All of these elements can be found upon review of vendors attempting to support multiple ABI platforms, most notable being Digital (e.g. VAX, MIPS, Alpha, and Intel).

Congruent with the findings of Sanderson & Uzumeri, it is my perspective that offering a simplistic product family based on a single processor architecture appears to be the winning combination. Given the encroachment by Intel-based workstation utilizing the Window-NT operating system, it would appear that Digital and H/P have done a good job of "hedging their bets," by having the option of running multiple operating environments (despite the fact that this adds cost). These moves by Digital, H/P, IBM (and numerous other clone vendors) will pose an industry "rule change" that both Sun and SGI will be forced to address.

[7] Interview: Greg Nicastro, ex-Sun product manager, 386I, SLC, ELC, and IPC. Discussion revealed that all products were targeted at the <$5K market niche, focused on SBC (Single Board Computer) design, but differentiated based on packaging and graphics functionality included.

- Chapter 8 -
The Evolving Basis of Competition...
Aligning Product Features & Customer Value

As previously discussed, it is hypothesized that the basis of competition in the workstation industry has continually evolved over the past 15 years. Based on first appearance, many would suggest that processor performance has always been the key driver in the workstation industry. While processor performance will always be an important factor, and an element where customers will demand continuous performance enhancements, there are many other aspects to workstation solutions which may be of equal or greater value.

The appearance of the first Perq and Apollo workstations represented a very different style of computing, one that allowed users to be co-located with a dedicated computing resource. As previously noted, these workstations represented a disruptive technology to the existing minicomputer systems, and in many cases were at a performance disadvantage from many aspects (e.g. processor performance, disk I/O, and expandability). The fact that the appearance of workstation technology attracted or "stole" potential minicomputer purchasers would suggest that these customers valued something other than the processing power or expandability that was readily available in existing minicomputer systems, hence the first shift which created the workstation industry, and one of many which have occurred over the past 15 years (as highlighted in Figure 8.1).

As shown in Figure 8.1, it is proposed that the workstation industry underwent numerous other shifts beyond the initial packaging, graphics, and distributed computing features embodied in the first wave of workstation computing. In alignment with Christiansen's[1] work on the evolution of product competition, the specific features or value proposition of individual workstation products has evolved to focus on new aspects of product performance or vendor support (e.g. maintenance or applications availability). The analysis performed on workstation offerings reveals

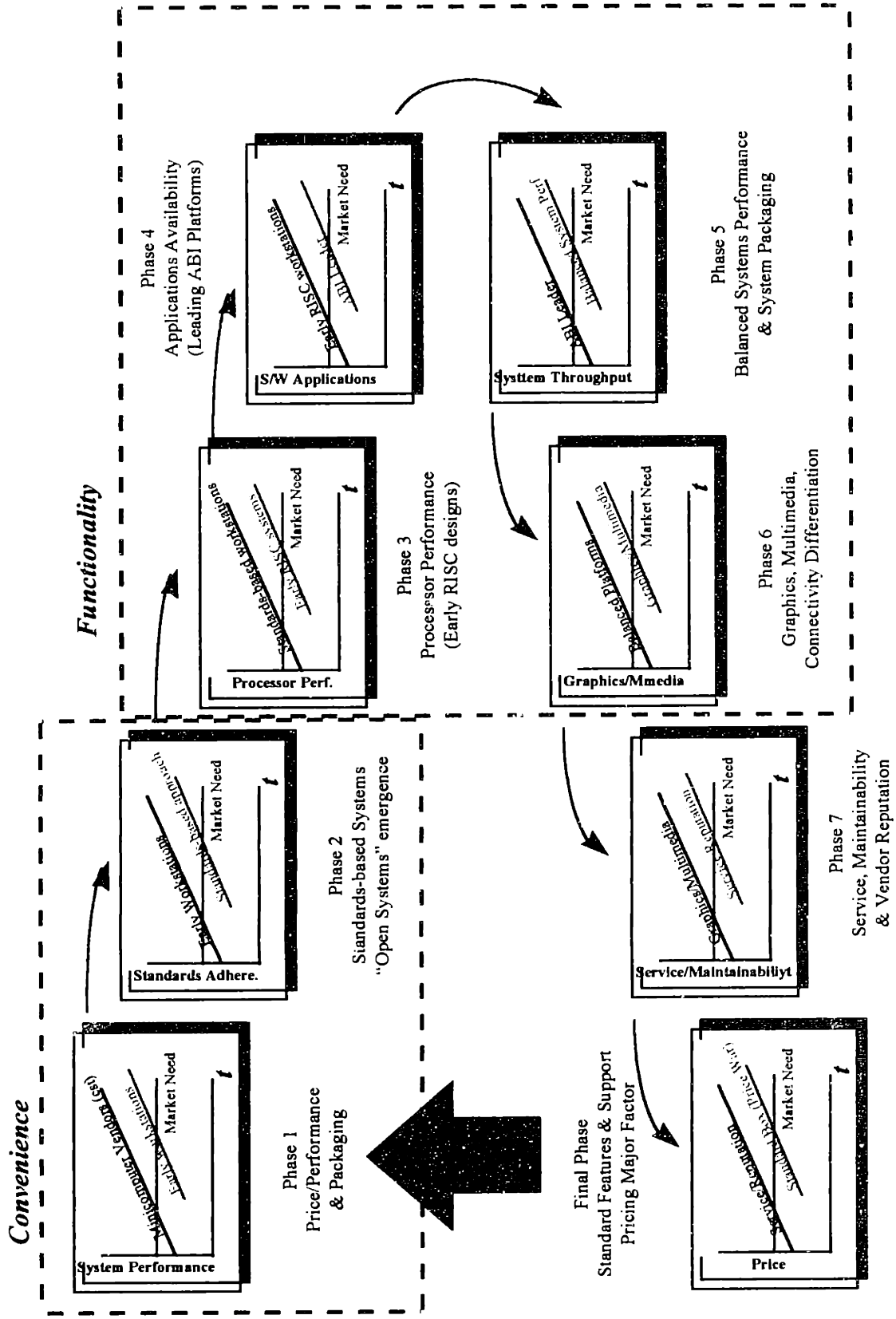

Figure 8.1 - The Evolving Basis of Competition in High-Performance Workstations

[1] Christiansen, C., "Patterns in the Evolution of Product Competition," HBS Working Paper #97-048

that all four phases of competition (functionality, reliability, convenience, & price) are readily apparent, but appear in a different order than that shown in Christensen's work. The early workstations offered customers a more convenient style of computing (at their desks) than minicomputers. Beyond this early aspect of convenience, workstation vendors engaged in numerous phases of competition based on functionality. In the final stages of competition it is proposed that workstation features have become more homogenous, leaving vendor support (service & application availability) and product reliability as the sole discriminators beyond price.

These shifts are exemplified by the appearance or growth of new firms as the features of their product offerings attracted new customers from the competition. Sun Microsystems was successful by focusing on an "opens systems approach" which developed "standards-based" solutions leading to the attraction end-users and numerous software developers[2] from Apollo's proprietary Domain offering, despite the fact that these systems offered less performance than the Apollo systems. As standards adherence became a uniform aspect of most vendor offerings, access to software applications became a key factor with industry onlookers measuring the "ABI (application binary interface) count," or number of applications available for a given platform (still a key factor today). In the late 1980's RISC processors were becoming readily available in a number of platforms and the 2-3x performance increase was attractive to many customers. The customer shift to solutions like H/P's PA-RISC (Precision Architecture) is interesting from the perspective that these systems lacked the both the number of applications and throughput capabilities of Sun systems, but attracted customers nonetheless.

Beyond the "processor wars" that characterized the late 80's, vendors have shifted to focus on system attributes such as I/O buses (or throughput) which contribute to more balanced system performance, and a wide variety of graphics and multimedia features. The addition of these features complements the processing power of workstations, which affords an opportunity for

differentiation in a time when the performance specifications of RISC microprocessors are becoming similar, and the appearance of multiple processor (or SMP) machines has made comparison more difficult.

At this stage of industry evolution, workstation manufacturers are at an interesting juncture. In line with Christiansen's findings and the Theory of Dominant Design, workstation offerings have become very uniform in their hardware and software aspects, a point one executive described as "competition has become more fierce than when Apollo entered the market... [today] there are fewer differentiators, products look more similar[3]." Discussions with industry executives have revealed that elements such as the robustness of the operating environment and availability of applications continue to be essential to success, and other more global issues such as product line breadth (complementary offerings such as web servers and data warehouse engines as outlined in Chapter 6), vendor service and support, and lifecycle price and supportability are becoming the tenets of vendor differentiation.

Many would suggest that the industry itself is currently experiencing its most significant change based on the disruptive technology embodied in the new "WINTEL" workstations which couple multiple Pentium Pro microprocessors and Microsoft Windows-NT into a high-powered personal computer chassis. This disruptive threat might suggest that the workstation industry is coming full circle, to a point similar to the environment Apollo and Perq faced in the early 1980's. Our retrospective look at the workstation industry, its participants, and their product offerings affords the perfect opportunity to analyze these shifts.

Methodology

Evidence of the shifts in competition appear in a number of different qualitative and quantitative forms. A review of product introductions and marketing materials readily highlights

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[2] "Computerdom's Heavenly Brawl," Fortune, 2/4/85, p. 98

[3] Interview: Ed Zander, President, Sun Microsystems Computer Corporation, 4/10/97 (via telecon)

the features and benefits of the various workstation offerings, focused on the key elements of differentiation. The manner in which vendors compare their product performance, industry benchmarks, have also shifted numerous times over the past 15 years, once again lending support to the fact that customers are focusing on other elements of these system offerings. A third and more detailed perspective can be gained by analyzing vendor product offerings utilizing tools such as hedonic regression (as highlighted in Chapter 1) to gain insight to the product attributes which most significantly contribute to changes in product price. The value of such as regression analysis lies in both the identification of features a vendor should focus on, but also highlights the price/performance trajectories over time. Evidence from each of these analytical approaches is presented in the following sections.

Industry Literature

Review of various product marketing materials (selected exhibits included in Appendix 8.A) demonstrates the differing nature in which vendors present the value of their firm and products to the industry. These advertisements for a given vendor product, while not exhaustive, exemplify the element(s) of product value the vendor felt were of greatest importance during that period of industry evolution.

Evidence of the first phase of evolution can be seen in Apollo's presentation of its products as complementing the "two sides to every professional[4]" and having all the power of a superminicomputer "except... at a desk," thus highlighting the organization's focus on a distributed computing offering very different from existing minicomputers. Similar advertisements from Ridge Computer's promoting "computational power without the frustrations of timesharing[5]," and Cadmus Computer Systems "mainframe that can be in 1000 places at the same time[6]," and 3

[4] Apollo Computer advertisement, Mini-Micro News, 1/84, p. 26-27
[5] Ridge Computers advertisement, Mini-Micro News, circa 1983
[6] Cadmus Computer Systems advertisement, Mini-Micro News, 1/84, p. 145

Rivers Computing's "processor per person machine[7]," are representative of the focus early vendor offerings had on shifting computing out to the users desktop. All of these elements were supported in an interview with Bill Poduska[8], founder and CEO of Apollo Computer, who identified this shift in computing style as the key factor in the organization's early success.

The shift to solutions which focus more on standards-based systems is exemplified by the appearance of numerous new firms offering "workstation-like" products, and highlighting the technical, standards-based elements, of their systems. OEM systems suppliers such Sun Microsystems, Charles River Data Systems, Wicat, Cromemco, and a myriad of other suppliers focused on elements such as Unix, Motorola 68000 processors highlight these aspects in their advertisements appearing in the 1984-85 timeframe. The Perq announcement of the Perq workstation as "the Standard," referring to its use of Unix, Ethernet, and other standards-based elements, best exemplifies the features which set itself, and companies like Sun Microsystems, apart from other mere integrators of hardware technology elements, despite the fact that Perq's use of a non-standard processor and operating system would be one factor attributed to the organization's demise[9].

The availability of software applications has long been a key element of any system provider's sales strategy. In the late 80's and on through the 90's vendors have continually harped on the vast array of software available for its platforms. Sun Microsystems effectively used this as a differentiation for its firm in a period when many of the 68000-based workstation products looked very similar. Another example can be found in a 1992 advertisement for Data General's new 88000-based workstation which highlights the "breadth and depth[10]" of the applications available for its workstations.

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[7] 3 Rivers Computing advertisement, Mini-Micro News, 4/82, p. 124
[8] Interview: J. William Poduska, Founder Apollo Computer, 3/17/97, Lexington, MA
[9] Interview: Ed Fredkin, Chairman Emeritus, 3 Rivers Computing, 4/97 (via telecon)
[10] Data General advertisement, Information Week, 3/26/96, p. 36-37

The introduction of RISC microprocessors offered many vendors an opportunity to tout the performance of their systems vis-a-vis the competition. Ridge Computers, one of the industry's earliest suppliers of RISC technology in commercial systems[11], demonstrates this in its reference to vastly superior performance over a Digital system by asking consumers "instead of asking how we can offer VAX 8600-like [the leading DEC offering at the time] performance for $50,000... ask how they can charge $400,000??!" One of the greatest benefactors of the focus on processor performance, the Hewlett-Packard 9000 Series[12] product line, highlights this with their introduction of the Model 840, which was the first of many H/P Precision Architecture products which stole market share from Sun Microsystems in the early 90's.

Similar conclusions can be drawn by reviewing advertisements and product technology overviews for Sun (SPARCstation 2, 10, & 20), Digital (DECstation 3000 and early Alphastations), and Silicon Graphics products which demonstrate the industry's focus on features other than processor performance. Many of these product brochures and advertisements go to great length in explaining the balanced nature of their system's performance or the intricacies of their graphics and multimedia features.

A final perspective on the current basis of competition in the workstation industry can be gathered by perusing recent Sun advertisements which mostly focus on Java and internet technology, the robustness of the Solaris operating environment, and most intriguing is an add for SunService which highlights the organization's support team which is focused on the clients "fate of their mission critical systems...100% committed to Unix client/server computing... and support[s] over half a million systems worldwide[13]," clearly indicating customer interest in service and support. Sun President Ed Zander confirmed this by highlighting Sun's focus on "ease-of-use,

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[11] Ridge Computers advertisement, Mini-Micro News, circa 1988
[12] Hewlett-Packard advertisement, Mini-Micro News, 10/87, p. 31
[13] Sun Microsystems advertisement, Information Week, 4/15/96, p. 21

graphics, quality, reliability, and availability[14]" as their perceived top market needs, which was a clear shift from his perception of the industry in the late 80's which emphasized "raw floating point, CPU, and graphics performance[15]."

The current state of the workstation industry, the level of product similarity, and attempts by vendors to differentiate their product offerings is exemplified by Silicon Graphics bold attempts to market its new O2 workstation offering[16]. The radical packaging shown for SGI's new product highlights the difficulty workstation vendors are experiencing in a market packed with products sporting a similar feature set.

Industry Benchmarks

The introduction of the disruptive technology represented by workstations required the new companies to position their products against a known industry product. One manner of comparison is to use benchmarks, or synthetic computer workloads, which can be run across different computer systems. Given that minicomputers represented the fastest growing and hottest competitive prospect for workstations, they became the early measurement target.

At the time of Apollo introduced the Domain Network 200 (DN200), Digital Equipment's VAX-11/780 minicomputer was the industry's dominant product offering. Many vendors (e.g. Data General and Prime Computer) would position their products utilizing the VAX-11/780 performance metric as an industry "yardstick." Industry participants would refer to the capabilities in terms of VAX Units of Processing (or "VUPs"). In a similar fashion, early workstation vendors would promote their products stating the number of VAX equivalents, or VUPs, their systems were capable of performing.

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[14] Interview: Ed Zander, President, Sun Microsystems Computer Corporation, 4/9/97 (via telecon)
[15] "Ed Zander speaks out," online version of SunWorld interview with Ed Zander, http://www.sun.com/sunworld
[16] Silicon Graphics advertisement, Wired, 3/97, p. 129

This type of positioning would lead to the emergence of various benchmark suites (available from application providers, academic institutions, or industry consortia) that would focus on the measurement of those attributes most important to the purchasers of workstation products (highlighted in Table 8.1). While this document is by no means intended to be an endorsement of any of these industry benchmarks (or metrics) as a reasonable method for measuring performance, it is the opinion of the author that they provide some insight to the elements which were of most importance to users at a given point in time. By analyzing the elements these benchmarks measured and how they evolved, we can identify support for the shifts highlighted in Figure 8.1.

The problem with early comparisons against the VAX-11/780 related to the overall system performance of the new "disruptive" workstation products. As previously highlighted, new disruptive product offerings "introduce a very different package of attributes from the one customers historically value, and they often perform far worse along any one or two dimensions that are particularly important to those customers[17]." Such was the case with the early workstation products which were inferior to larger minicomputer systems in many aspects (system I/O, floating point operations, and expandability to name a few). Based on the delta in performance represented, and the fact that MIPS (Millions of Instructions Per Second, also fondly known of as "Meaningless Indicator in the Performance of Systems") were limited to measuring integer performance and could frequently be "gamed," which left customers looking for ways to measure system performance attributes. These methods also lacked any consideration for system I/O performance[18].

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[17] "Disruptive technologies: Catching the wave," Harvard Business Review, 1-2/95, p. 45
[18] "Apples, oranges... and benchmarks," Mini-Micro Systems, 12/87, p. 87-96

Timeframe	Benchmark	Element Measured	Comparison Group
early 80's	MIPS (Dhrystone)	Integer performance	Microprocessors
early 80's	Mflops (LINPACK)	Floating point performance	Microprocessors
early 80's	Khornerstone	Combined testing of integer and FP with some testing of disk, system I/O	All Systems
1984-86	AIM Suite III	Measures multi-job performance with weighted performance for each element of system measured	All Systems
1988-90	PLB (Picture Level Benchmarks)	Measures common graphics operations (e.g. generation of shapes and surfaces)	Graphics workstations
1989	SPECmarks-SPEC89	Processor performance attributes	All Systems
1990-92	SPECthroughput	Overall throughput of system, including multiprocessor configs.	Symmetric Multiproc Systems (SMP)
1990-92	LATTIS	System fileserving capabilities-NFSops	file servering cap.
1992	SPECweb	Ability to services http requests	Web servers
1989	TPC-A	Measures transaction processing capabilities via a range of scenarios. Based on debit/credit benchmark	Transaction processing systems and servers
1993	SPEC92	Measures overall system performance, was replaced due to vendor familiarity and abuse by running entire benchmark in local memory and cache	All Systems
1996	SPEC95	Measures balanced system performance, stresses beyond central CPU and Cache memories	All Systems
1998	SPEC98	Benchmark unreleased	TBD

Table 8.1 - Evolution of Industry Benchmarks to Map with User Needs[19]

The problem with benchmarks, as identified by Mogal[20] lies in the fact that most processors and systems architectures found in workstations today "provide a mix of 32- and 64-bit capabilities for addressing and computation, as well as assorted cache sizes, levels, and buses" and he further identifies that "variations in core architecture often produce varying benchmark results." The solution as identified by Mogal was the development of a benchmark which "put the entire system through its paces, from the cache and main memory to the disk, I/O, and compute subsystems as well." Achieving this goal is what the industry has been striving to do ever since the inception of workstation systems. A secondary industry goal as highlighted by Mr. Wong relates

[19] Assembled by author based on input from "Workstation Metrics" as noted in 19, and interviews with Brian Wong (Sun) and Derrick Knight (Sun), and other industry trade press.
[20] Mogal, J., "Workstation metrics," IEEE Spectrum, 5/93, p. 50-58

to ensuring that "uniformly available" benchmarks, were "uniformly executed[21]," referring to the vendor manipulation of benchmarks that often yielded performance metrics 4-5x faster than similar competitors.

The benchmark types highlighted in Table 8.1 clearly show an evolution from being focused on core CPU performance (MIPS) to floating point performance which is a key factor in executing engineering applications (e.g. CAD/CAM), to benchmark suites such as Khornerstone and AIM III which purported to offer measurements of balanced system performance. The problem with all of these tests (not to mention the level of simplicity for vendors to "game" the benchmark) was the fact that they failed to measure the performance and level of integration for the vendor's graphics capabilities and a true measurement of system I/O or "throughput capabilities."

Further evolution of industry benchmarks came in the form of tests like PLB, "X-stones," and a host of other performance measurement suites. The most significant development in this space came in 1989 with the formation of the "SPEC" Consortium by the industry's major suppliers of computer systems and the definition of "rules for benchmarks." Over the years SPEC has released, and continued to evolve benchmarks that provide an even measurement of vendor systems. The organization also attempts to develop benchmark "suites" which provide insight to various types of computing environments that might be of value to users at a given point in time. Some examples include SPECweb (measures http [web serving] operations), LATTIS (measures file serving operations), and SPECthroughput (measures balanced system performance, including multiprocessor operations).

According to Brian Wong, Chief Scientist for Enterprise Systems (Sun Microsystems)[22], all of these benchmarks, including SPEC may be of little use to users in determining actual system performance, based on the fact that vendors can tune the benchmark to meet specific performance

[21] Interview: Brian Wong, Sun Microsystems, 4/3/97 (via telecon)
[22] Ibid

goals. One such example occurred when a vendor tuned the Linpack benchmark to achieve "infinite performance[23]." Despite these shortcomings, discussion with Mr. Wong revealed some interesting facts in relation to the shift in customer values over time. First, despite focusing on the "processing power" element of these benchmarks, Mr. Wong explained that the benchmarks have continually moved beyond the individual processor, to measure external elements which could impact systems performance, the best example being the recent release of the SPEC benchmark[24] (SPEC95) which contains changes to the earlier benchmarks forcing the systems to look beyond their large internal cache memories[25], and thus produce more realistic benchmark results. He also validated the evolution of benchmarks as highlighted in Table 8.1 and the various attributes measured.

The second and most intriguing element identified in this interview was the obsolescence of various benchmarks due to performance achievement beyond market demand, a concept in support of Christensen's "trajectory overachievement[26]." The specific benchmarks highlighted in Table 8.2 and real life scenarios highlighted by Mr. Wong, clearly indicate that in the case of the three examples performance had clearly gone beyond market needs, and thus users shifted to focus on different attributes of system performance.

The data presented demonstrate that while benchmarks may not have tracked exactly with the purported changes in customer value, they clearly demonstrate a shift in the element of system performance being measured, and move toward the direction of measuring balanced system performance and graphics capabilities which are in line with the features highlighted in Phases 5 &

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[23] Ibid

[24] http://www.spec.org

[25] Newer systems include cache memories ranging up to and beyond 1MB, which could allow the system to perform the entire benchmark within local memory, thus skewing benchmark results. SPEC changed the benchmark to alleviate this problem (explanation based on information obtained through Wong interview).

[26] Christensen, C., "Patterns in the evolution of product competition," HBS Working Paper #97-048, 1996 p. 5

6 within Figure 8.1. Second, the information highlighted in Table 8.2, exemplifies the fact that beyond a certain point incremental performance is not as highly valued as other system attributes, thus rendering benchmarks and metrics obsolete.

Benchmark	Typical System Performance	Real Life Scenario
SPECweb	600-800 transactions/sec	Performance requirements of the Internets busiest site (netscape.com estimated at 1500 transactions/sec) can be met by 2-4 mid-range workstation/servers.
LATTIS	Unknown	The file serving capabilities of nearly all workstations and low-cost servers has eliminated the need (or interest) in a benchmark targeted at large enterprise file servers.
TPC-C	Highest performance achieved = 23K/tps	The top performance (50K/tps) on TPC-C (debit/credit type benchmark) is capable of servicing all of the ATM workload for the largest bank in the Northeastern United States (which required approximately 7tps).

Table 8.2 - Benchmarking Demonstrates Overachievement vs. Market Needs[27]

Evaluation of Industry Product Offerings

A more comprehensive insight to the shifting basis of competition in the workstation industry can be obtained through a direct analysis of the vendor product offerings. Over the past 15 years their have been in excess of 400 companies representing thousands of product offerings. It is hypothesized that upon analysis we will find that the while processor performance has always been an important aspect of the product offerings, there are other features represented in these products upon which customers have put equal or greater value. Further, it is assumed that once a shift has occurred, continued emphasis on the feature highlighted in the previous Phase affords the vendor little additional leverage with potential customers. By understanding these shifts and the indicators that might predict a shift could allow industry participants an opportunity to change the rules on their competitors and obtain temporary advantage. A strategy described by one industry executive as looking for "technological dislocations" and "the sweet spots in customer demand[28]."

[27] Examples were based on Sun benchmarking initiatives as described by Brian Wong

[28] Interview: Ed Zander, President, Sun Microsystems Computer Corporation, 4/9/97 (via telecon), referring to Sun's targeting of customer rich niches (e.g. 1st color workstation <$5K)

Christensen's (1996) working paper[29] highlights a model for the evolution in the basis of competition for the disk drive industry. This model highlights four unique phases including competition based on capacity, reliability, convenience, and ultimately price. Based on this concept, it is hypothesized that the workstation industry has undergone 7 different shifts (or phases) in competition (as highlighted in Figure 8.1).

Initially, organizations such as Apollo Computer and 3 Rivers Computing (along with numerous other providers of Motorola 68000-based systems) introduced low-cost, deskside systems (Phase 1) that some customers valued greater than their minicomputer peers. Nearly 18 months later, Sun Microsystems introduced products that were focused on technology elements that were entirely standards-based (Phase 2) and a corporate commitment to "open systems," which re-focused the industry on standards for interconnectivity and software development. Over the next 10+ years it would appear that similar shifts have occurred in areas such as uniprocessor performance (Phase 3), availability of software applications (Phase 4), balanced systems architectures (Phase 5), graphics (Phase 6) and multimedia features, and service/vendor reputation (Phase 7). While it is believed that the majority of the workstation industry participants are engaged in competition between Phases 6 and 7, it would appear that the industry is clearly headed towards a point of pure price discrimination.

In order to test this hypothesis a database was created capturing vendor product offerings from 1983 through 1997. Emphasis was given to collect products that were similar in nature (graphics workstations, or "minicomputer-like" systems) and which accounted for dominant marketshare (e.g. Sun, Digital, and HP/Apollo which have continually held in excess of 70% marketshare), specific care was given to exclude Intel-based personal computer products, or the recent RISC/Unix server offerings that might skew price information. It is important to note that many of the early "workstation-like" products offered by CAD applications providers bundled

[29] Christensen, C., "Patterns in the evolution of product competition," HBS Working Paper #97-048, 1996

CAD/CAM or CAE applications with their custom hardware offerings (e.g. Computervision CADDS), in this case we have tried to obtain vendor pricing information to extract the value of the software application and isolate the amount applicable to the hardware and system software platform. In the event this isolation was not possible the product was excluded from the analysis.

The database constructed contains product offerings primarily from Sun, Digital, and Hewlett-Packard/Apollo in the 1983-1997 timeframe. Additional products from SPARC clone vendors and CAD system suppliers have been added to determine the value of vendor reputation and market longevity. Primary information for the company's product offering(s) was obtained from various volumes of Data Sources[30] covering the period 1983 through 1996. The data sources information was then transformed into detailed product price and configuration information which was obtained directly from vendor configuration and pricing guides. Secondary information was obtained on product technical and configuration aspects through vendor literature (data sheets), trade press, or interviews with company representatives (as outlined in Appendix 8). In the event a single element was not obtainable from any source (e.g. specific disk capacity, or bus bandwidth) the mean value in this category and specific time period was utilized. The data set (see Exhibit 8A) analyzed contained 1745 unique product configurations from over 15 different vendors, with the majority of these products representing the industry's top 3 providers which have consistently held in excess of 70% marketshare.

The hedonic regression method, as utilized by Christiansen[31] in his analysis of the winchester disk drive industry, identifies the "shadow prices" attributable to any given feature within the disk drive "product bundle." These shadow prices are represented by the co-efficient of a given variable in the regression equation. In the case of our workstation dataset, estimates were developed for the following equation which represent the workstation "feature bundle:"

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[30] Data Sources Hardware & Data Communications Edition, Ziff Davis Publishing Co., New York, NY
[31] Christiansen, C., Harvard Business School, PhD Thesis, Chapter 7

$$LN\ PRICE = YEAR + B_0FPa + B_1FPco + B_2COMPerf + B_3Mpix + B_4Dclr + B_5Tclr + B_6ACC2D + B_7HI2D + B_8ACC3D + B_9HI3D + B_{10}XTR3D + B_{11}MEMBS + B_{12}IOBUS + B_{13}BSMEM + B_{14}SYSEXP + B_{15}BSSTOR + B_{16}MONSZ + B_{17}LRGcache + B_{18}CONN + B_{19}AUXSTOR + B_{20}10MBenet + B_{21}AUDIO + B_{22}PKGcroom + B_{23}PKGldsk + B_{24}PKGmdsk + B_{25}PKGtwr + B_{26}PKGdesk + B_{27}BUSexp + B_{28}REPhp + B_{29}REPdigital + B_{30}REPclone$$

with each of the variables representing:

LN PRICE - The list price for a given workstation package as represented in a) vendor price books for a given quarter in a given year, or b) the price as listed for a given configuration shown in the Data Sources volume corresponding to same time period of vendor pricing highlighted above (e.g. every attempt made to use Data Sources 2nd Edition for a given year). In the event Data Sources gave a price range (e.g. lowest to highest price) or feature range (e.g. low resolution monitor to high resolution), the lowest value in the range was utilized. If pricing was to ambiguous clarification was sought from vendor or product was eliminated from database.

FPa - System includes floating point arithmetic accelerator

FPco - System includes numeric co-processor

COMPerf - Composite performance of system utilizing "normalized" MIPS[32]

Mpix - Workstation displayable resolution given in millions of pixels ("Mpix")

Dclr - "Dumb Color" frame buffer (offers no hardware acceleration) displays 256 colors

Tclr - "True Color" frame buffer (offers no hardware acceleration) displays 4096 colors

ACC2D - 2D, acclerated graphics co-proc., 8-bitplanes

HI2D - 2D, accelerated graphics co-proc., offering 8-bitplanes, higher res. & performance

ACC3D - True color, 3D accelerated graphics co-processor

[32] Recognizing disparity of benchmarks, and given that the regression analyzes performance at individual element level, study utilized "adjusted MIPS" ratings for each configuration to measure processor performance. SMP system performance was determined by converting SPECrate figures into MIPS ratings (where uniprocessorMIPS/SPECrate = SMPMIPS/SPECrate) a similar estimate was determined for systems with large external caches based on SPEC 92 (cached and uncached) benchmark results.

HI3D - High-end 3D accelerated graphics co-proc., offering higher res. & performance

XTR3D - High-end ("Extreme") 3D visualization and animation engine

MEMBS - Measured performance of the systems dedicated CPU to memory bus

IOBUS - Measured performance of the systems I/O (peripheral) communication bus

BSMEM - Base memory included with packaged system

SYSEXP - Composite expansion of system (CPU, memory, storage, & upgrade metrics)

BSSTOR - Base storage (disk capacity) packaged with the workstation configuration

MONSZ - Size of monitor included with system (measured in inches)

LRGcache - Large external cache memories (typically 1MB or greater)

CONN - # of connectors (Serial, Parallel, IEEE488, ISDN) for external communications

AUXSTOR - Auxiliary peripherals included in base system configuration (e.g. CD or tape)

10MBenet - Build in standard ethernet adapter

AUDIO - Inclusion of audio adapter and speaker(s)

PKGcroom - Computer Room packaging (typically minicomputers)

PKGldsk - Large deskside packaging (typically includes large # of slots and storage bays)

PKGmdsk - Medium deskside packaging

PKGtwr - Workstation tower packaging (similar to pedestal PC configuration)

PKGdesk - Desktop workstation package ("pizza box")

BUSexp - # of expansion slots included in base system package

REPhp - Perceived premium (discount) for Hewlett-Packard brand and service

REPdigital - Perceived premium (discount) for Digital brand and service

REPclone - Perceived reputation of mainstream vendor versus clone supplier

Anticipated Findings

Performance of the regression analysis on the dataset should yield the following findings on the aggregate (total history) with isolation of the individual shift in competition based on year by year analysis (yearly shifts roughly aligning with Phases highlighted in Figure 8.1).

1. We would expect to see a decrease in overall workstation pricing in the 20% range with the greatest change occurring in high-priced system configurations.
2. Processor performance (COMPerf) should be a significant element of system price in all periods, but especially important in the late 80's and early 90's (aligning with shift to RISC technology).
3. Availability of software applications would be a of significance in the early 90's but of less significance in all other periods.
4. Graphics capabilities should be a significant price driver in all periods, with values tapering off in the current period (1997).
5. Vendor service while relatively unimportant in all periods up until 1993 should be of increasing importance in the last 3 periods.
6. Expect to see a 20% price premium paid for "mainstream" vendor solutions, as opposed to those offered by "clone" vendors for similar technology and packaging.

The findings in this case as summarized in Table 8.3 reveal that the equation outlined above accounts for over 82.6% (R^2 adjusted = 82.2% on 1694 degrees of freedom) of the features driving the price of workstation systems. The Table also reveals in aggregate and by year, those features which are the significant contributors to the price of the systems.

Variable	Coefficient	t-ratio	System Aspect
Constant ($)	20.3116	17.8	Configuration Price
Year	-0.140237	-17.6	
LRGcache	0.060597	1.58	Processor Performance
FPa	0.490765	8.67	Processor Performance
FPco	0.253046	4.60	Processor Performance
COMPerf	1.82137 e-3	8.07	Processor Performance
Mpix	0.078316	1.74	Base Graphics
Dclr	0.286871	11.0	Base Graphics
Tclr	0.669889	14.1	Enhanced Graphics/Multimedia
ACC2D	0.403153	14.2	Enhanced Graphics/Multimedia
HI2D	0.672102	20.1	Enhanced Graphics/Multimedia
ACC3D	0.781811	24.1	Enhanced Graphics/Multimedia
HI3D	0.937945	25.9	Enhanced Graphics/Multimedia
XTR3D	0.518969	3.95	Enhanced Graphics/Multimedia
MEMBS	-1.23276 e-4	-1.74	System Expandability/Throughput
IOBUS	-1.10760 e-3	-2.77	System Expandability/Throughput
STORIO	0.018101	4.11	System Expandability/Throughput
SYSEXP	-2.89117 e-4	-2.88	System Expandability/Throughput
BSSTOR	0.017870	0.900	Base Features
BSMEM	3.64967 e-3	23.5	Base Features
MONSZ	3.77863 e-3	1.07	Base Graphics
AUDIO	-0.264034	-6.70	Base Features
BUSexp	0.065759	12.9	System Expandability/Throughput
10MBenet	.0.640427	7.51	Base Features
PKG/Comp Room	2.27546	11.0	Packaging/Expandability
PKG/L.Deskside	0.419938	7.12	Packaging/Expandability
PKG/M.Deskside	0.643816	13.9	Packaging/Expandability
PKG/Tower	0.509515	12.0	Packaging/Expandability
PKG/Desktop	0.275586	11.0	Packaging/Expandability
REPdigital	0.15545	0.466	Service/Reputation
REPhp	0.561810	14.8	Service/Reputation
REPclone	0.318525	-6.57	Service/Reputation (clones)

Table 8.3 - Aggregate Workstation Values (Entire Dataset & Desktops)

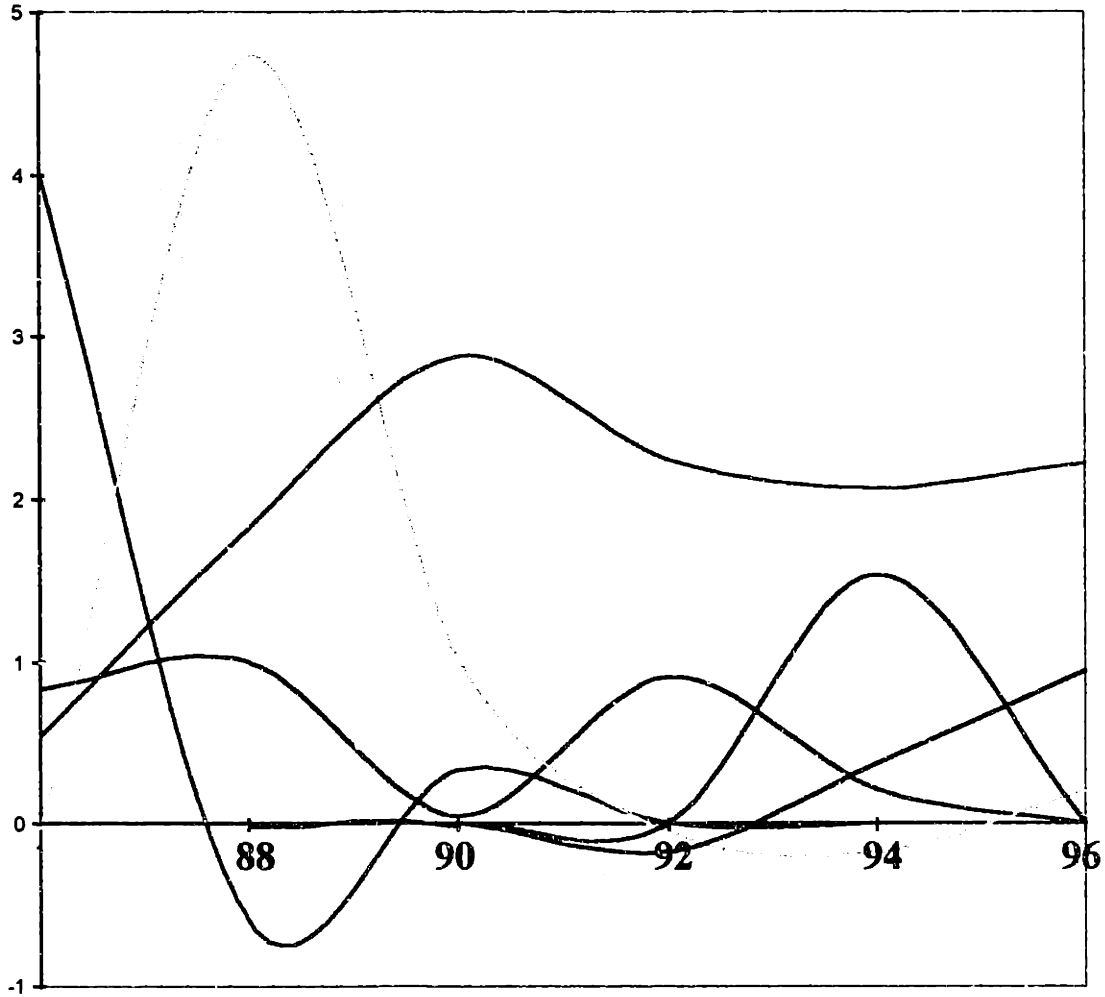
The conclusion that can be drawn, is that over the past 15 years workstation prices have continued to decline at a constant rate of 14%+, which many industry analysts would claim is a conservative estimate. The analysis also reveals that comparison of equivalent Sun and H/P products reveals a 50%+ price premium for vendor service and reputation, a similar analysis of Sun to SPARCclones reveals the 30%+ decrease clone vendors must offer to attract potential customers. It should also be noted that in the aggregate, floating point performance,

graphics/multimedia features, and systems throughput and expansion are the major drivers in workstation price. The most interesting aspect is that the composite performance of individual workstations (COMPerf) while a significant element of pricing is a minuscule price discriminator which is intriguing given the level of emphasis vendors place on their substantial increases in processor performance.

A more detailed view of the value placed on individual system attributes and the purported shifts in the basis of competition becomes apparent by performing the regression analysis on a yearly basis. The information highlighted in Figure 8.2 demonstrates how values have shifted over the various periods of competition in the workstation industry. The early emphasis on local packaging versus computer room (minicomputers) can be determined by the dramatic price difference in packaging (adjusted in graphic, but analysis shows local packaging at one third the price of computer room). The 1988 analysis reveals the emphasis on processor performance and basic graphics features (resolution, color, etc.) which aligns with the introduction of early RISC systems. An interesting development was the indication of a second emphasis on processor performance in the 1992 timeframe which would align with the introduction of 2nd generation RISC microprocessors such as the Digital Alpha and Sun Superscalar offerings. The most important factors to be gathered from the analysis is that the most significant drivers in overall system price are related to high-end graphics, multimedia, system expansion, and vendor service/reputation.

The information highlighted in Figure 8.2 clearly shows that the value of high-performance graphics features such as the ability to manipulate 3D objects and display high-definition color images has consistently driven price in workstation systems. A preliminary analysis on the 1997 products reveals that this value is beginning to taper off as these features become a standard element in most system designs. The graphic also shows the emphasis on the aspects of expandability and throughput (based on packaging factors) in the 1996 timeframe, which also tapers off as system providers began to include additional standards-based, low-cost, buses such as

High-Performance Workstations - Shadow Prices



Notes:

1. Processor performance normaized to 1.0 in 1988 with coefficient of .2974
2. Packaging in time 0 =41.182, set to equal 4.0 for scale
3. Findings based on 2000+ products offered by Digital, Sun, and H/P from 1983-1997 (pricing obtained from vendor price files)

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Figure 8.2 - Analysis of Yearly Shifts in Basis of Competition

PCI, EISA, and S-BUS as a base feature in most of their systems. The most significant finding is that comparison of H/P and Digital products in the earlier phases hover above and below the Sun price points which might suggest the variance in pricing strategy used by these two vendors. In the 1994+ timeframe the data would suggest that H/P is beginning to charge a price premium for their reputation and service/support network which indicates a shift to the service/reliability phase.

A more detailed perspective can be obtained by viewing the individual shadow prices (as represented in the regression coefficients) shown in Table 8.4.

Conclusions

The evidence presented would confirm that the workstation industry has undergone a number of shifts in customer values as they relate to the individual features contained in workstation systems. These shifts appear in numerous forms including the vendor marketing materials, industry benchmarks, and based on regression analysis of the product features themselves. The ability to understand, identify, and predict both shifts and the feature(s) accentuated, could allow vendors to have greater insight to the elements of the product "feature bundle" that would make their offerings more attractive to potential customers and thus more successful in the market. This would be a contrasting approach to that currently used by vendors which tends to be focused on processor performance and utilizes few tools (other than customer surveys) to derive the incremental feature value and customer benefits.

The leadership team of today's enterprise computer suppliers are described as "laying awake at night wondering who is going to clobber them next[33]." The fact that Digital and Apollo both succumbed to disruptive new market entrants based on missing a shift in customer values, should act as both a warning to workstation executives. The best guidance lies in the comments of Ed Zander, who stated "the fastest box does not win all the time, Digital is a perfect example." "[Apollo] had better technology than Sun in the early days... the difference was Sun was more

System	Shadow Prices					
Attribute	pre-1988	1988	1990	1992	1994	1996
n =	57	99	245	119	101	379
R^2	96.0%	88.2%	92.6%	87.2%	94.5%	91.3%
Constant	-60.3625	5.52873	7.74785	8.37462	8.99833	6.20223
FPa	N/A	*	*	0.264249	*	*
FPco	N/A	0.232106	*	0.00	*	*
COMPerf	N/A	0.047868	0.012238	3.907 e-3	1.743 e-3	2.471 e-3
Mpix	-0.609419	4.25031	0.545318	*	*	0.161791
Dclr	.538541	*	0.411486	*	*	*
Tclr	N/A	N/A	0.552835	*	N/A	0.420051
ACC2D	N/A	N/A	0.420228	*	0.306546	0.233222
HI2D	N/A	N/A	0.617616	0.526727	0.511230	0.438474
ACC3D	.537627	0.634488	0.786956	0.497513	0.468974	0.511765
HI3D	N/A	1.18768	0.501865	0.696686	0.774832	0.618247
MEMbs	N/A	N/A	N/A	*	*	-9.279 e-4
IOBUS	N/A	*	-4.094 e-3	*	0.00	*
BSMEM	.032038	0.060517	*	*	9.114 e-3	3.733 e-3
SYSEXP	N/A	*	5.662 e-3	*	*	1.983 e-3
BSSTOR	2.87512	1.70067	0.658550	0.457252	0.303028	*
MONSZ	0.046106	0.056434	0.062612	0.041802	-0.024912	0.035699
CLR	N/A	*	0.00	*	*	*
SERIAL	*	-1.35097	*	*	*	*
AUDIO	N/A	N/A	N/A	-0.771472	*	*
AUXperi	*	-0.287437	0.916504	*	*	*
PKGlgdsk	*	*	0.332394	*	N/A	*
PGKmdsk	*	N/A	*	*	0.880933	*
PKG/twr	*	-0.603423	*	*	N/A	*
PKG/desk	*	*	*	*	*	-0.401380
REPhp	*	*	0.00	-0.172331	0.365071	0.941785
REPdigital	*	*	-0.264897	-0.959933	-0.285971	*
REPclone	N/A	N/A	-1.22405	N/A	-0.127762	N/A

Table 8.4 - Annual Shifts in Workstation Shadow Prices[34]

hungry, focused, and listened to customers." "In the world of high-technology products, you are always trying to catch the next wave." The thoughts as expressed by Mr. Zander emphasize the market conditions of the workstation industry, and outline the identification of these shifts as the key to long-term success. The information presented in this chapter offers a number of different methods to identify these potential shifts and guard the organization from potentially disruptive upstarts.

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[33] Interview: Ed Zander, President, Sun Microsystems Computer Corporation, 4/9/97 (via telecon)

[34] Shadow prices are not shown for those elements containing t-ratio <2.00, N/A=no entries in period.

- Chapter 9 -
Conclusions

The information presented would suggest that the high-performance workstation industry and its participant companies have evolved to a point where there are few product discriminators other than service, reliability, and price. The characteristics of the workstation industry in the period following the emergence of the purported dominant design are not unlike others as described by Utterback and Abernathy. The intriguing aspect to the workstation industry relates to the fact that industry leadership has been the sole possession of a few strong willed organizations that have developed a recipe for not only surviving, but continually re-shaping themselves to target and address new market segments.

Looking forward into 1998, workstation manufacturers are once again facing a critical juncture in the industry's evolution. Recent announcements by Hewlett-Packard, IBM, and Digital coupled with aggressive moves by traditional PC manufacturers suggest radical shifts in workstation product strategy and indicate signs of the future basis for competition. It would also suggest that perhaps the industry is migrating back to the centralized style of computing that was the targeted point of exploitation for the early 3 Rivers and Apollo Computer workstations. The analysis performed is consistent with these recent moves and shows that the industry and its product offerings have come full circle and not only face a difference in the type of products demanded (e.g. RISC/Unix workstations), but also face a difference in the way computing is performed (e.g. shift back to centralized computing resources and an emphasis on thin clients [network computers and net PCs).

The objective of this study was to understand the workstation industry from the perspective of Dominant Design and the impact it had on industry composition. Second, based upon this understanding it was important to derive strategies that contributed to long-term vendor success, while also extracting those elements leading to a vendor's demise. A third, and forward

looking element is to consider how the understanding of the workstation industry and successful participant's strategy may be applied to other fast paced IT market segments. The information presented would suggest that not only are the strategies presented essential to continued participation in the workstation industry, but one would find similar applicability to other high-technology product segments.

Workstation Dominant Design & Industry Composition

The information presented in Chapter 2 & 3 is supportive to Utterback & Abernathy's Theory of Dominant Design. Review of the industry participants shows that the number and type of firms flourished in the early 80's during a period when the industry lacked any standards around the hardware, software, or applications that were offered by a wide range of firms. In the late 80's as numerous hardware and software standards began to emerge, coupled with a standard "recipe" for workstations, the number of firms began to taper off dramatically. It was also during this same period that a number of "star" performers began to emerge, namely, Apollo Computer, Sun Microsystems (Sun), and 3 Rivers Computing (to later become Perq Systems), and Silicon Graphics (SGI). These emergent firms would form the nucleus of the early workstation industry, with Sun and Apollo (via H/P) driving the lionshare of the workstation industry for most of its 15-year history.

Over the 15 year period there would be numerous resource and technology rich firms that would attempt to gain a foothold in the workstation industry, but having limited success. Most notable of these were firms like Sony, Xerox, Evans & Sutherland, Tektronix which were either technologically and "brand superior," but eliminated from industry participation nonetheless.

Strategies for Success

In this document four type of strategies were presented as "common themes" behind the success of the industry's dominant workstation firms, namely: changing the rules on the dominant players, technological re-positioning, leveraging product families, and evolving product features to

align with changing customer needs. The information reviewed demonstrates that the firms which have had mediocre performance were more focused on introducing "me too" products, as opposed to developing more aggressive strategies which would diversify the organization's product offering a build potential barriers to entry against emergent firms. Sun Microsystem President, Ed Zander, was quoted as saying "there is no excuse for letting a competitor catch you from behind." "Apollo should never have let Sun succeed... for that matter, Digital should never have let Apollo succeed." "We must be successful with Java and network-centric computing... we must be successful." Mr. Zander's comments echo the current strategic path for Sun, SGI, H/P, IBM and other industry participants gearing up for the battle for future workstation users, strategies which for the industry leaders demonstrate their innate ability to re-shape their organizations to align with an ever changing customer base.

Technological Re-positioning - The technological re-positioning of workstation technologies into new segments such as enterprise servers and hi-end annimation and imaging systems has continued to fuel the growth of the industry's top players. More importantly, this strategy could be essential to sparing organizations previously solely focused on graphics workstations (e.g. SGI) from certain demise at the hand of Microsoft and its partners.

Leveraging Product Families - Recognizing the escalating costs of developing new systems platforms, while accommodating rapid change in individual technology elements has dictated vendors maximize the life and flexibility in product platforms. The industry's leading firms would all appear to use a mix of "logical" and "physical" product platforms to meet this market challenge. Logical platforms are products which address the needs of a specific market niche and build upon the design and technological elements of the previous generation. Physical platforms (or "packaging") are designed for maximum life and accommodation of anticipated technology elements (e.g. future processors, memories, and storage devices) which change on a quarterly basis. The successful vendors are those that have been able to service the needs of their

customer base with the fewest platforms and squeeze maximum life out of the platforms offered (platform longevity).

Aligning Product Features with Customer Needs - As demonstrated in Chapter 8, the information reviewed would suggest that the industry has undergone a number of shifts in the elements of greatest value to purchasers of workstation solutions. The successful companies have been those vendors that recognize an upcoming shift (or can prompt a shift, via "changing the rules") and offer a product set that provides an ideal alignment with the new suite of customer needs. The author has presented three potential sources of information highlighting these shifts such as industry press (e.g. advertisements and product reviews), benchmarks, and analytical tools such as hedonic regression. It is believed that tools such as hedonic regression, can not only provide a retrospective analysis of these changing values, but also act as a tool in assisting vendors to select the technological elements which maximize product value. The tool may be of additional use to new entrants to the market, hoping to assess those product features of greatest value and as a "yardstick" to existing firms hoping to predict a change in feature trajectory.

Changing the Rules on the Dominant Firms - Most significant of the four strategies, Changing the Rules, affords industry players the opportunity to "slingshot" past the leader into new and more profitable segments. Looking back on industry moves, few would have predicted that Apollo Computer could topple Digital, or that Sun Microsystems could pose a threat to Apollo given their established relationships with software providers.

The primary message behind all four of the strategies centers on the need for a firm to continually re-shape its market approach while operating efficiently. It is the author's belief that many firms do not recognize the impact of operating in an industry influenced by a dominant product design. Their lack of awareness or understanding leads to product strategies which emphasize that "more is always better," when in reality the market has shifted and requires

products to be reconstituted to meet a change in customer values. The industry survivors are the organizations that not only address, but know how to predict such shifts.

Applicability to other Information Technology Segments

The analysis of the high-performance workstation industry provides a unique retrospective look at an industry impacted by the emergence of a dominant design. Even more intriguing is the fact that the industry is currently undergoing a shift that will dictate a different style of computing and role for the workstations themselves. The purpose of this analysis was to understand those strategies which a firm might use as it approaches the emergence of a dominant design. At this point our focus turns to a brief discussion on three industries that appear to be approaching such a situation, namely, Networking Hardware (e.g. hubs, routers, switches, and concentrators), Client/Server Financial Applications (e.g. SAP, Baan, etc.), and Digital Photography products. Each of these product segments represent a fast-paced industry, growing number of competitors, and lack any standards that would indicate a clear dominant design. The intent of this brief review is to lay the groundwork for future study in each area.

Networking Hardware - As the "network computing epidemic" continues to spread and fuel the need for connectivity for all individuals, companies, and governments, the demand for high-performance network hardware will continue to increase. The rapidly increasing demand has posed a unique opportunity for new start-ups as well as existing players who are forming consortia and making acquisitions to bolster their market position. Given these characteristics and the lack of solidified standards would suggest an emerging standard in networking hardware.

Client/Server Financial Applications - The rapid growth in companies migrating their enterprise financial systems to client/server or to avoid Year 2000 barriers has led to the emergence of innovative, fast-growing, and flashy firms such as SAP, Baan, and PeopleSoft. While all of these firms purport to be offering standards-based, client/server applications, they have been faulted for their lack of capabilities in customization and interfacing with legacy applications. The recent

emergence of standards and user groups promoting APIs would suggest that this segment could signal the emergence of a dominant design.

Digital Photography - Last, and probably furthest out the Dominant Design curve is in the Digital Photography space. Digital photography which has long been the quest of firms like Kodak and Polaroid, who both seek a new frontier in photography, could be ripe for the emergence of a new dominant design. Recent developments in the area of Kodak's Advanced Photography System (APS) could suggest that a new standard could be on the way, or may just be a signal of increasing efficiency based upon the predicted emergence of a new digital medium. In either case, digital photography poses yet another opportunity for an organization to differentiate itself.

The conclusion that can be drawn from each of these areas is that they display the characteristics of industries approaching the emergence of a dominant design. In some cases product standards and consortia are forming that will serve as the catalyst to bring this design forward. Given that these indicators are present begs the question of the strategic tools these organizations will select to ensure their long-term viability. It is the authors belief that the tools outlined in this paper could provide a similar recipe for success as that found in the workstation industry.

Appendix 1 - Dominant Design Compliance Matrix

	Commercial Processor		Processor Type	Numeric Coprocessor	Low-cost SIMM Memory	"3 Piece" Design (pkg)	Standard-based I/O Bus	Hierarchical Bus Architecture	Bit-mapped Raster Display/Input	Display Mpixels	Mpixels/mean	Integral Graphics Co-processor	Std-based Storage I/O (SCSI/EISA	Base Storage	Base Storage/mean	Ethernet	OS (Unix w/ POSIX/Xopen)	Dist. Computing (NFS/TCP/IP)	X-Windows	Defined API (portability)	Aux Comm (Ser/Par)	Total
ACD Computers																						
APEXworkstation/100	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	3	3	63
APEXworkstation/110	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	3	3	63
APEXworkstation/230	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	3	3	63
Aries Research																						
Marix MS/85	6	0.00	mSP	3	3	3	6	3	3	1.0	2	3	6	1.37	3	3	6	3	3	3	3	62
Marix SI	6	0.00	SSP	3	3	3	6	3	3	1.0	2	3	6	1.37	3	3	6	3	3	3	3	62
Marix SS-ds Workstation	6	0.00	SSP	3	3	3	6	3	3	1.0	2	3	6	1.37	3	3	6	3	3	3	3	62
Marix SS-dt Workstation	6	0.00	SSP	3	3	3	6	3	3	1.0	2	3	6	1.37	3	3	6	3	3	3	3	62
Aspen Systems																						
Alpine 275XS	6	0.00	AXP	3	3	3	6	3	3	0.8	1	3	6	1.37	3	3	6	3	3	3		58
Telluride Power Workstation 275	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	3		59
Timberline Alpha 266	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	3		59
Timberline Alpha 300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	3		59
Axil Computer																						
Ultima 1 U140	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Ultima 1 U170	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	2.10	3	3	6	3	3	6	3	66
S/420	6	0.00	SSP	3	3	3	6	3	3	1.0	2	3	6	2.10	3	3	6	3	3	6	3	65
M240	6	0.00	mSP	3	3	3	6	3	3	1.0	2	3	6	0.50	1	3	6	3	3	6	3	63
M245/85	6	0.00	mSP	3	3	3	6	3	3	1.0	2	3	6	2.10	3	3	6	3	3	6	3	65
M245/110	6	0.00	mSP	3	3	3	6	3	3	1.0	2	3	6	2.10	3	3	6	3	3	6	3	65
M245/50	6	0.00	mSP	3	3	3	6	3	3	2.0	3	3	6	1.37	3	3	6	3	3	6	3	66
M311	6	0.00	SSP	3	3	3	6	3	3	0.8	1	3	6	1.37	3	3	6	3	3	6	3	64
M320/66	6	0.00	HSP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
M320/50	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
M320/60	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
BTG																						
AXP 275 Entry System	6	0.00	AXP	3	3	3	6	3	3	0.8	1	3	6	1.37	3	3	6	3	3	6	3	64
AXP 275 Ultra System	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.37	3	3	6	3	3	6	3	66
Carrera Computers																						
Cobra 200 AXP	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Cobra 275 AXP	6	0.00	AXP	3	3	3	6	3	3	0.8	1	3	6	0.53	1	3	6	3	3	6	3	62
Carrera R4000 Personal Wkst	6	0.00	AXP	3	3	3	6	3	3	0.8	1	3	6	0.50	1	3	6	3	3	6	3	62
Carrera R4400 Personal Wkst	6	0.00	AXP	3	3	3	6	3	3	0.8	1	3	6	0.50	1	3	6	3	3	6	3	62
Hercules 200	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	0.43	1	3	6	3	3	6	3	64
Data General																						
AV 450H	6	0.00	M88K	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
AV550H	6	0.00	M88K	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Digital																						
Alphastation 200 4/100	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	0.32	1	3	6	3	3	6	3	64
Alphastation 200 4/166	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 200 4/233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 250 4/266	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 255/233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 255/300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 255/300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 400 4/233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 500/266	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 500/333	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 500/400	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 600 5/266	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 600 5/300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Alphastation 600 5/333	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-300X ZLX/E1	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-300X ZLX/M1	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-600HX+	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-700 ZLX/E1	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-700 ZLX/M2	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-800HX+	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-800 ZLX/M2	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-900 ZLX/E1	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
3000-900 ZLX/M2	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
5000-133HX	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
5000-240HX	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
5000-260PXG+	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
5000-260PXGT+	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65

	Commercial Processor		Processor Type	Numeric Coprocessor	Low-cost SIMM Memory	"3 Piece" Design (pkg)	Standard-based I/O Bus	Hierarchical Bus Architecture	Bit-mapped Raster Display/Input	Display Mpixels	Mpixels/mean	Integral Graphics Co-processor	Std-based Storage I/O (SCSI/EIS	Base Storage	Base Storage/mean	Ethernet	OS (Unix w/ POSIX/Xopen)	Dist. Computing (NFS/TCP/IP)	X-Windows	Defined API (portability)	Aux Comm (Ser/Par)	Total
VAXstation 4000 VLC	0	35.28	Prop	3	3	3	0	3	3	1.3	3	3	6	0.25	1	3	6	3	3	6	3	52
VAXstation 4000-90	0	35.28	Prop	3	3	3	0	3	3	1.3	3	3	6	0.83	2	3	6	3	3	6	3	53
Flight Technologies																						
BarnStormer	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.37	3	3	6	3	3	6	3	66
KittyHawk Pro	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
KittyHawk	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.00	2	3	6	3	3	6	3	65
Phantom	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	4.00	3	3	6	3	3	6	3	66
Graphic Systems Tech																						
GST Chameleon	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
HAL Computer Systems																						
HALstation 300/M330	6	0.00	SP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
HALstation 300/M350	6	0.00	SP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Hewlett-Packard																						
9000 J200/210	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
9000 700/M715-100	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
9000 700/M715-100XC	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
9000 700/M715-64	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
9000 700/M715-80	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
9000 700/M735-125	6	0.00	PA	3	3	3	6	3	3	1.3	3	3	6	1.37	3	3	6	3	3	6	3	66
IBM																						
POWERstation 25T	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 25W	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 37T	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 3AT	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 3BT	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 3CT	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 40P	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
POWERstation 41T	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
POWERstation 41W	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
POWERstation 42T	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 42W	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
POWERstation 43P-100	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
POWERstation 43P-120	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.20	2	3	6	3	3	6	3	65
POWERstation 43P-133	6	0.00	Power	3	3	3	6	3	3	1.3	3	3	6	1.20	2	3	6	3	3	6	3	65
Mariner International																						
CheetahRack 2061	6	0.00	SP	3	3	3	6	3	3	1.3	3	3	6	1.10	2	3	6	3	3	6	3	65
CheetahRack 2075	6	0.00	SP	3	3	3	6	3	3	1.3	3	3	6	1.10	2	3	6	3	3	6	3	65
CheetahRack 2090	6	0.00	SP	3	3	3	6	3	3	1.3	3	3	6	1.10	2	3	6	3	3	6	3	65
Maxvision																						
Symbion 5	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Symbion 5100	6	0.00	AXP	3	3	3	6	3	3	3.1	3	3	6	4.30	3	3	6	3	3	6	3	66
Symbion 6100/6133	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.00	2	3	6	3	3	6	3	65
Symbion Alpha	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	4.30	3	3	6	3	3	6	3	66
National Computers +																						
Viper 1000	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.37	3	3	6	3	3	6	3	66
Viper 275	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.37	3	3	6	3	3	6	3	66
Viper 300	6	0.00	AXP	3	3	3	6	3	3	2.1	3	3	6	1.37	3	3	6	3	3	6	3	66
NEKOTECH																						
3-D Power Toaster MACH I-233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Bobcat 275	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Cougar 289	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Cougar 300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Jaguar 266	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Jaguar 300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Jaguar 333	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
LC Power Toaster MACH I-233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Lynx 166	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	0.34	1	3	6	3	3	6	3	64
Lynx 233	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	0.51	1	3	6	3	3	6	3	64
Personal Pwr Sta. MACH III-300	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
NetPower																						
MP150	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	1.00	2	3	6	3	3	6	3	63
MP200	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	1.00	2	3	6	3	3	6	3	63
MP250	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	1.00	2	3	6	3	3	6	3	63
SP	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	0.53	1	3	6	3	3	6	3	62
100	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	0.24	1	3	6	3	3	6	3	62
200	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	0.53	1	3	6	3	3	6	3	62

	Commercial Processor		Processor Type	Numeric Coprocessor	Low-cost SIMM Memory	"3 Piece" Design (pkg)	Standard-based I/O Bus	Hierarchical Bus Architecture	Bit-mapped Raster Display/Input	Display Mpixels	Mpixels/mean	Integral Graphics Co-processor	Std-based Storage I/O (SCSI/EIS	Base Storage	Base Storage/mean	Ethernet	OS (Unix w/ POSIX/Xopen)	Dist. Computing (NFS/TCP/IP)	X-Windows	Defined API (portability)	Aux Comm (Ser/Par)	Total
300	6	0.00	MIPS	3	3	3	6	3	3	0.8	1	3	6	1.00	2	3	6	3	3	6	3	63
Polywell Computers																						
Poly 275P-A	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	1.20	1	3	6	3	3	6	3	64
Poly 300P-A	6	0.00	AXP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Silicon Graphics																						
Crimson RE	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	3.60	3	3	6	3	3	6	3	66
Indigo2 High Impact	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Indigo2 Maximum Impact	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Indy Modeler	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Indy R4400SC	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
Indy R4600PC	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	4.00	3	3	6	3	3	6	3	66
Indy R4600SC	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	4.00	3	3	6	3	3	6	3	66
Indy R5000PC/150	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	4.00	3	3	6	3	3	6	3	66
Indy R5000SC/150	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	4.00	3	3	6	3	3	6	3	66
Indy R5000SC/180	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	4.00	3	3	6	3	3	6	3	66
Indy XL	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Indy XZ	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
IRIS Indigo2 XL	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
IRIS Indigo2 XZ	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
Onyx Extreme	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	3.60	3	3	6	3	3	6	3	66
Onyx RE	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Onyx RealityStation	6	0.00	MIPS	3	3	3	6	3	3	2.1	3	3	6	3.60	3	3	6	3	3	6	3	66
Onyx VTX	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	3.60	3	3	6	3	3	6	3	66
Power Indigo2	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Power Indigo2 Extreme	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	1.20	2	3	6	3	3	6	3	65
Power Indigo2 XZ	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
Power Onyx Extreme	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	3.60	3	3	6	3	3	6	3	66
Power Onyx RE2	6	0.00	MIPS	3	3	3	6	3	3	1.3	3	3	6	3.60	3	3	6	3	3	6	3	66
Sun Microsystems																						
20 MHS11	6	0.00	HSP	3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
20SX	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
20 TurboGX	6	0.00	SSP	3	3	3	6	3	3	1.1	2	3	6	1.05	2	3	6	3	3	6	3	64
20 TurboGX+	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX M151	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX M152MP	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX M71	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX M712MP	6	0.00	SSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX MHS14MP	6	0.00	HSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX MHS21	6	0.00	HSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
20 TurboZX MHS22MP	6	0.00	HSP	3	3	3	6	3	3	1.3	3	3	6	1.05	2	3	6	3	3	6	3	65
5 S24	6	0.00	mSP2	3	3	3	6	3	3	1.1	2	3	6	0.54	1	3	6	3	3	6	3	63
5 TurboGX	6	0.00	mSP2	3	3	3	6	3	3	1.1	2	3	6	0.54	1	3	6	3	3	6	3	63
5 TurboGX+	6	0.00	mSP2	3	3	3	6	3	3	1.3	3	3	6	0.54	1	3	6	3	3	6	3	64
Ultra1 Creator	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	4.20	3	3	6	3	3	6	3	66
Ultra1 Creator3D	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	4.20	3	3	6	3	3	6	3	66
Ultra1 M140	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	4.20	3	3	6	3	3	6	3	66
Ultra1 M170	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	4.20	3	3	6	3	3	6	3	66
Ultra2 Creator3D	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	4.20	3	3	6	3	3	6	3	66
Tatung Science & Tech																						
COMPstation 40	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.52	1	3	6	3	3	6	3	64
microCOMPstation 1	6	0.00		3	3	3	6	3	3	1.1	2	3	6	0.52	1	3	6	3	3	6	3	63
microCOMPstation 5	6	0.00		3	3	3	6	3	3	1.1	2	3	6	0.52	1	3	6	3	3	6	3	63
microCOMPstation 5/85	6	0.00		3	3	3	6	3	3	1.1	2	3	6	0.52	1	3	6	3	3	6	3	63
microCOMPstation II	6	0.00		3	3	3	6	3	3	0.8	1	3	6	0.52	1	3	6	3	3	6	3	62
microCOMPstation II-385	6	0.00		3	3	3	6	3	3	0.8	1	3	6	0.52	1	3	6	3	3	6	3	62
microCOMPstation LC	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.21	1	3	6	3	3	6	3	64
microCOMPstation LX	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.68	1	3	6	3	3	6	3	64
Super COMPstation 10/30	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.51	1	3	6	3	3	6	3	64
Super COMPstation 10/40	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 10/402	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 10/41	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 10/51	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 10/512	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 10/514	6	0.00		3	3	3	6	3	3	1.3	3	3	6	2.00	3	3	6	3	3	6	3	66
Super COMPstation 10/54	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 20HS/151	6	0.00		3	3	3	6	3	3	1.1	2	3	6	1.05	2	3	6	3	3	6	3	64

	Commercial Processor		Processor Type	Numeric Coprocessor	Low-cost SIMM Memory	"3 Piece" Design (pkg)	Standard-based I/O Bus	Hierarchical Bus Architecture	Bit-mapped Raster Display/Input	Display Mpixels	Mpixels/mean	Integral Graphics Co-processor	Std-based Storage I/O (SCSI/EISA	Base Storage	Base Storage/mean	Ethernet	OS (Unix w/ POSIX/Xopen)	Dist. Computing (NFS/TCP/IP)	X-Windows	Defined API (portability)	Aux Comm (Ser/Par)	Total
Super COMPstation 20HS/152-MP	6	0.00		3	3	3	6	3	3	1.1	2	3	6	1.05	2	3	6	3	3	6	3	64
Super COMPstation 20S/50	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.50	1	3	6	3	3	6	3	64
Super COMPstation 20S/502B	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.50	1	3	6	3	3	6	3	64
Super COMPstation 20S/612B	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.50	1	3	6	3	3	6	3	64
Super COMPstation 20S/61B	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.50	1	3	6	3	3	6	3	64
Super COMPstation 20S/712	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 20S/812	6	0.00		3	3	3	6	3	3	1.3	3	3	6	1.00	2	3	6	3	3	6	3	65
Super COMPstation 7/20	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.52	1	3	6	3	3	6	3	64
Super COMPstation 7/30	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.52	1	3	6	3	3	6	3	64
Super COMPstation 7/41	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.52	1	3	6	3	3	6	3	64
Super COMPstation 7/52	6	0.00		3	3	3	6	3	3	1.3	3	3	6	0.52	1	3	6	3	3	6	3	64
UltraSPARC COMPstation U140	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	2.10	3	3	6	3	3	6	3	66
UltraSPARC COMPstation U170	6	0.00	USP	3	3	3	6	3	3	1.3	3	3	6	2.10	3	3	6	3	3	6	3	66
Category Mean	5.937	0.377		3	3	3	5.937	3	3	1.289	2.8	3	6	1.37	2	3	6	3	3	6	3	65
Category Std Deviation	0.62	0.62		0	0	0	0.62	0	0	0.26	0.6	0	0	0.98	0.8	0	0	0	0	0	0	1.89
Samples = 189																						

Notes:

1. Assumed that PA-RISC is openly licensed and considerable as commercially available technology
2. Multiprocessor systems were measured on performance of uniprocessor peers, in order to compare equally with SPEC benchmarks (e.g. SPEC92)
3. "Standards" for purposes of this study reference the availability of specification and open licensing for 3rd-party peripherals suppliers (e.g. PCI bus)

	Commercial Processor	Processor Type	Numeric Coprocessor	Low-cost SIMM Memory	"3 Piece" Design (pkg)	Standard-based I/O Bus	Hierarchical Bus Architecture	Bit-mapped Raster Display/Input	Display Mpixels	Mpixels/mean	Integral Graphics Co-processor	Std-based Storage I/O (SCSI/EIS	Base Storage	Base Storage/mean	Ethernet	OS (Unix w/ POSIX/open)	Distributed Computing (NFS)	X-Windows	Defined API (portability)	Auxiliary Communications		Total
Adage																						
CADstation 2/50 (from Adra)	6	68K	0	3	3	0	0	3	1.00	3	0	3	37	3	3	0	0	0	0	3	0 8	27
Advanced Electronics Design																						
AEDS11/10	0	PDP	0	0	3	3	0	3	0.99	3	0	3	31	2	0	0	0	0	0	0	4 4	15
Acyon																						
APS Integrated Desktop Wkst	6	68K	0	3	3	0	0	3	0.31	1	0	0	10	2	3	6	0	0	0	3	0 8	28
Apollo Computer																						
DN300	6	68K	0	3	3	0	0	3	0.82	2	0	3	0	0	3	3	0	0	0	3	0 8	29
DN320	6	68K	0	3	3	0	0	3	1.00	3	0	3	0	0	3	3	0	0	0	3	0 8	30
DN550	6	68K	3	3	3	6	3	3	0 82	2	3	3	0	0	3	3	0	0	0	3	0 8	44
DN460	0	Prop	0	3	3	6	0	3	0.82	2	0	3	0	0	3	3	0	0	0	3	0 8	29
DN660	0	Prop	0	3	3	6	0	3	1.00	3	0	3	0	0	3	3	0	0	0	3	0 8	30
Appllcon																						
Series 4000	0	Prop	3	0	0	6	3	3	0 48	1	3	0	76	3	3	0	0	0	0	3	0 8	25
Auto-trol Technology																						
AGW III	6	68K	0	3	3	6	0	3	1.00	3	3	3	0	0	3	3	0	0	0	3	0 8	39
AGW-11/FP	6	68K	0	3	3	6	0	3	0 82	2	3	3	0	0	3	3	0	0	0	3	0 8	38
Advanced Raster Workstation	0	Prop	0	0	0	6	3	3	0 82	2	3	0	76	3	3	0	0	0	0	3	0 8	23
Cadmus Computer Systems																						
9740	6	68K	0	3	3	6	0	3	1 30	3	0	3	65	3	3	6	0	0	0	0	4 4	36
9750	6	68K	0	3	3	6	0	3	1 30	3	0	3	65	3	3	6	0	0	0	0	4 4	36
9760	6	68K	0	3	3	6	0	3	1 30	3	0	3	65	3	3	6	0	0	0	3	0 8	39
9790	6	68K	0	3	3	6	0	3	1 30	3	0	3	65	3	3	6	0	0	0	3	0 8	39
Calcomp																						
CAD System 25 (Masscomp base)	6	68K	3	3	3	3	0	3	0 50	1	0	3	51	3	3	6	0	0	0	0	4 4	34
Celerity																						
C1200	0	Prop	3	3	3	3	3	3	1 30	3	3	3	120	3	3	3	0	0	0	3	0 8	36
Control Data																						
ICEM	0	Prop	0	0	3	0	0	3	1 00	3	0	0	40	3	0	0	0	0	0	3	0 8	12
Electronics Design Wkst	0	Prop	0	0	3	0	0	3	1 00	3	0	0	40	3	0	0	0	0	0	3	0 8	12
Data General																						
DS/4000	0	Prop	3	3	3	3	0	3	1 00	3	3	0	37	3	3	3	0	0	0	0	4 4	27
DS/4200	0	Prop	3	3	3	3	0	3	0 23	1	3	0	30	2	3	3	0	0	0	0	4 4	25
GW/8000	0	Prop	3	0	0	3	3	3	1 30	3	3	0	37	3	3	3	0	0	0	0	4 4	24
GW/10000	0	Prop	3	0	0	3	3	3	1 30	3	3	0	37	3	3	3	0	0	0	0	4 4	24
Digital Equipment																						
VAXstation 100	0	Prop	0	0	0	0	0	0	0 77	2	0	0	0	0	0	0	0	0	0	0	4 4	2
VAXstation 1	0	Prop	0	3	3	3	0	3	0 83	2	0	3	31	2	3	3	0	0	0	3	0 8	26
Forward Technologies																						
FT-3000 Workstation	6	68K	0	3	3	6	0	3	0 82	2	0	3	0	0	0	6	0	0	0	3	0 8	35
Masscomp																						
Workstation 500	6	68K	0	3	3	6	0	3	0.50	1	0	3	45	3	3	6	0	0	0	3	0 8	37
Dual User 500	6	68K	0	3	3	6	0	3	0 50	1	0	3	168	3	3	6	0	0	0	3	0 8	37
500DP	6	68K	0	3	3	6	0	3	0.50	1	0	3	168	3	3	6	0	0	0	3	0 8	37
Metheus																						
Lambda	6	68K	0	3	0	3	0	3	0 79	2	0	3	30	2	3	6	0	0	0	3	0 8	32
Orcatech																						
Orca 3000	6	68K	0	3	0	0	0	3	0 79	2	0	3	10	1	3	6	0	0	0	3	0 8	29
Orca 3050	6	68K	0	3	0	0	0	3	1.30	3	0	3	80	3	3	6	0	0	0	3	0 8	30
NBI																						
U Factorial Workstation	6	68K	0	3	3	0	0	3	0 79	2	0	3	0	0	3	6	0	0	0	3	0 8	32
Perq Systems																						
LN 3000	6	68K	3	3	0	0	0	3	0 79	2	0	3	32	2	3	0	0	0	0	0	4 4	23
LN 3500	6	68K	3	3	0	0	0	3	0.79	2	0	3	32	2	3	0	0	0	0	0	4 4	23
Pixel Computer																						
80/G Graphics Workstation	6	68K	0	3	3	0	0	0	3 76	3	3	3	65	3	3	6	0	0	0	3	0 8	33
100/AP	6	68K	0	3	3	0	0	0	0 00	0	0	3	40	3	3	6	0	0	0	3	0 8	27
PSI Systems																						
MX150	6	68K	3	3	3	0	0	3	0 48	1	3	3	31	2	0	0	0	0	0	0	4 4	25
Mentor																						
Idea 1000 Series	6	68K	0	3	3	6	0	3	0 82	2	0	3	0	0	3	6	0	0	0	3	0 8	38
Ridge Computers																						
Ridge 32S	0	Prop	3	3	3	6	3	0	0 00	0	0	3	37	3	3	6	0	0	0	0	4 4	30
Sun Microsystems																						
Model 2/120	6	68K	0	3	3	3	0	3	1 00	3	0	3	0	0	3	6	3	0	3	3	0 8	42
Model 2/170	6	68K	0	3	3	3	0	3	1 00	3	0	3	0	0	3	6	3	0	3	3	0 8	42
Model 2/50	6	68K	0	3	3	3	0	3	0 31	1	0	3	0	0	3	6	3	0	3	3	0 8	40
Xyvision																						
Xycomp	6	68K	0	3	3	6	0	3	2.10	3	0	3	70	3	3	6	0	0	0	3	0 8	39
Mean	3.91		0.78	2.41	2.28	3.13	0.46	2.67	0.90	2.11	0.78	2.28	37.41	1.80	2.54	3.72	0.20	0.00	0.20	2.09	1.81	29.57
Standard Deviation	2 80		1.31	1.14	1.23	2.54	1.08	0.85	0.57	0 88	1.31	1.23	39.63	1.30	1.01	2.37	0.74	0.74	0.74	1.35	1.35	8.56
Sample = 46																						

Appendix 2 - Workstation Industry Participants

A.B. Dick										
Accell				1						
Accugraph					1					
ACD Computers										1
Acer America									1	1
Ad-Tech		1			1					
Adage		1	1	1	1	1	1			
ADDS/Datatype			0	1		1	1	1	1	
Adra Systems						1	1	1		
Advanced Electronics Design			1	1		1				
Advanced Processing Labs								1	1	
Alcyon										
Alliant Computer Systems							1			
Alpharel							1			
AMF Logic Science					1					
Andromeda Systems			1							
Apogee Systems									1	
Apollo Computer			1	1	1	1	1	1		
Applicon		1		1	1	1				
Ardent							1			
Aries Research									1	1
Aries Technology					1	1				
Aristo Graphics				1						
Arrigoni Computer Graphics			1			1				
Artecon						1				
Artronics				1	1					
ASIC Design Technology						1				
Aspen Systems										1
AT&T Pixel Machines							1			
Atex, Inc.				1	1					
Audio Visual Labs				1	1					
Audre			1			1	1			
Aurora Systems					1					
Auto-Trol Technolo		1	1	1	1					
Axil Comp									1	1
Aydin Co ls			1	1	1	1	1			
Aztec						1	1	1	1	1
Barco Video & Communications				1					1	1
Bell & Howell					1					
Boeing Computer Services										
Broomall Industries			1							
BTG										1
Butler Computer Graphics				1						
C.Itoh							1			
CADD Midwest					1					
Cademic Electronics				1						
Cadlinc				1						
Cadmus Computer Systems				1						
Cadnetix						1	1			
CAE Systems				1						
Calay Systems					1					
CALCOMP		1	1	1		1				
Calma Co.		1	1	1	1	1				
Camex					1					
Carrera Computers									1	1

Catronix			1							
Celerity Computing				1	1	1	1			
Centec			1							
Ceram									1	
CGX Corporation			1	1		1				
Chancellor Computer			1	1						
Chorus Data Systems					1					
Chromatics		1	1	1			1			
Chyron					1					
Cimlinc					1					
CMS Enhancements								1		
Colorgraphic Communications			1	1	1		1			
Compaq Computer										1
CompuAdd								1		
Computer Graphic Labs					1	1	1			
Computer Research			1							
Computers & Graphics Products				1						
Computervision		1	1	1	1	1	1	1		
Comtal/3M				1	1					
Control Data			1	1	1	1	1	1	1	
Convergent Technologies			1			1				
Cromemco					1					
Daisy Systems				1	1	1				
Darius Technology									1	
Data General			1	1	1	1	1	1	1	1
Data Translation					1					
Datacopy			1							
Datacube				1						
Dell Computer										1
Deskstation Technology									1	1
Diad Systems					1					
Dicomed			1							
Digital			1		1	1	1	1	1	1
Dipix Systems					1					
DTK Computer								1	1	
Dupont Design Tech							1			
Electrohome				1						
Engineering Automation Systems				1						
Envision Technology			0	1						
EOS Technology									1	
Evans & Sutherland		1	1			1	1	1		
Executive Presentation Systems			1	1						
Ferranti Computer Systems				1						
Ferranti Infographics Div.				1						
Figgie Systems					1					
First Computer								1		
Florida Computer Graphics			1	1						
Forward Technology			1							
General Electric						1				
Genisco Computers		1	1	1						
GEO Based Systems			0							
Geovision					1					
Gerber Systems Technology		1	1	1		1	1	1	1	
Goldstar Technology								1		
Gould			1	1	1					

Graftek				1	1					
Graphic Constructions		1								
Graphic Horizons			1							
Graphic Systems Technologies										1
Graphica Computer				1						
HAL Computer Systems								1	1	1
Harris			0		1		1			
Heurikon					1					
Hewlett-Packard			1	1	1	1	1	1	1	1
Hitachi Machine Tools			0							
HMW Enterprises			0	1						
Holguin					1					
I.S.G. Technologies						1	1	1	1	1
IBM			1	1	1	1	1	1	1	1
ID Systems				1						
Ikier Technologies			0							
Image Graphics, Inc					1					
Image Peripherals				1	1					
Imagitex					1					
Imlac			1	1						
Impres			1		1					
Industrial Data Terminals (delete)										
Infinite Graphics					1					
Infodetics					1					
Information Displays, Inc		1	1							
Information International								1		
Intecolor			1	1						
Integrated Computer Tech				1						
Integrated Solutions (NBI)						1	1			
Integrix								1	1	1
Intel				1						
Intelligent Graphic Systems				1						
Interactive Graphic Services				1						
Interactive Machines			1	1		1	1			
Interand					1					
Intergraph			1	1	1	1	1	1	1	1
Interleaf					1					
International Applied Systems			1							
Intron				1						
IRTH				1						
Itau Tecnologica				1						
Japan Computer Corp				1			1		1	
Jupiter Systems			0	1		1	1			
Kern Instruments					1					
Kongsberg			1							
Kubota Pacific									1	
Landmark Graphics				1	1	1				
Lazerus							1			
Lexidata			0							
Lundy Electronics & Systems		1	1	1	1	1	1	1		
M&S Computing		1								
MacDonald Dettwiler & Assoc					1					
Management Graphics				1						
Marner International										1
Mars Microsystems								1	1	

Masscomp				1	1	1				
Matra Technology				1						
Matrox Electronics Systems			0	1						
Maxvision										1
McDonnell/Douglas			1			1	1			
Media Cybernetics			1	1						
Megatek			1		1	1				
Megavision					1					
Mentor Graphics			1	1		1	1	1		
Metheus					1					
Micro-Term				1						
Micro Control Systems				1						
MicroCAD Ltd				1						
Mindset (delete)										
MIPS Computer							1	1		
Mobius								1	1	1
Mosaic Technologies				1						
Motorola Computer Group										1
National Computer Systems		1								
National Computers Plus										1
NEC Information Services					1	1			1	1
Nekotech										1
NetPower									1	1
Neuralware								1		
New England Technology Group							1	1		
New GEA Corp				1	1					
NeXT Computer							1	1		
Nixdorf Computer					1					
Norpak				1	1					
Novadyne Computer Systems								1		
NPS-Automation Services				1						
Omnicomp Graphics				1						
Omnitech			0							
Opus							1	1		
Orange Systems								1		
Orcatech				1	1					
Paragon Technology			0							
Parity Systems									1	
Perceptics					1					
Perq Systems (3 Rivers)		1	1	1		1	1			
Phoenix Computer Graphics			1	1						
Photonics Technology					1					
Pinnacle Data Systems									1	
Pixel Computer										
Polywell Computers										1
Posthauer Technology					1					
PRC/Image Data Systems Co.		1								
Prime Computer			1	1		1	1	1		
Psitech			0	1						
Qubix						1				
Quentron Systems					1					
Racal-Redac		1	1	1						
Ramtek		1	1	1		1				
Raster Technologies			0	1						
Resource Dynamics				1						

Ridge Computers						1				
Riva Terminals Ltd.				1						
Robert Bosch Corp.,Video Div.				1	1					
Robo Systems				1						
Saber Technology				1						
SAG Electronics										1
SAI Technology			0		1					
Samsung								1	1	
Sanar Systems										1
Sanders Associates (Lockheed)		1								
Scientific Calculations			1	1		1				
Scion Corporation					1					
Scitex America					1					
Scitex America								1		
Seiko Instrumentation						1	1			
Sequent Computer Systems				1						
SET Technology								1	1	
Sigma Design			1	1						
Sigmex Ltd				1						
Silicon Graphics				1	1	1	1	1	1	1
Solarix Systems								1		
Solbourne							1	1		
Solid Computer									1	
Sony Microsystems							1	1		
Spectragraphics			1	1	1	1				
Stellar Computer							1	1		
Stereographics				1						
Stone Systems								1		
Summagraphics			1							
Summit CAD			0							
Sun Microsystems (VLSI Syst)				1	1	1	1	1	1	1
Superset			0							
Symbolics			1		1	1	1	1	1	
Sys Scan					1	1	1			
System Research Labs			0							
Systems Group of Colorado				1						
Tatung Science & Technology						1		1	1	1
Tektronix		1	1	1	1	1	1	1		
Telesis Systems			1	1	1					
Terak			1							
Terminal Display Systems			0	1						
Transtech Parallel Systems									1	
Trillium										
Trilobyte Computer Corporation										
Twinhead								1	1	
U.S. Data					1	1				
Unisys CAD/CAM							1			
Valid Logic Systems				1						
Vector Automation			1							
Vector General (VG Systems?)			1			1				
Vectrix				1	1					
Vectron Graphic Systems				1						
Versatec			1	1						
Versys									1	
Verticom				1						

Vertos Technology								1		
VG Systems (duplicated)					1					
Via Systems				1						
Vicom Systems					1					
W.W. Gaertner Research					1	1				
Wang			0			1	1	1		
Weber Systems					1					
Westward Technology				1						
Wicat Systems			0	1						
Wild Heerbrugg Instruments					1					
Workstation Products & Services						1				
Wright Technologies										1
Xepix Systems						1				
Xerox			1			1				
Xyvision			1				1			
Xyztek				1	1					
Zaiaz International							1			
Zeno Computer Products								1		

Note: Information assembled by author based on information obtained from Harvard Director of computer Graphics Suppliers, S. Klein Computer Graphics Director, and Data Sources Hardware Edition

Appendix 3 - Workstation Product Database

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dum'b Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf	Accel 3D	High End 3D	Extreme 3DVIs	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
AlphaSTATION 200 4/100	1	100.0	106.0	95	9775	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	16	980.9	0.34	21	1	1	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	384	325	1	0
AlphaSTATION 200 4/100	1	100.0	106.0	95	10481	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	620.5	0.54	21	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	384	325	1	0
AlphaSTATION 200 4/100	1	100.0	106.0	95	10981	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	338.0	1.00	21	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	384	325	1	0
AlphaSTATION 250 4/266	1	167.0	177.0	95	15470	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	321.5	1.05	21	1	1	0	1	0	0	0	0	0	1	1	0	0	1	6	0	0	0	0	1	0	192	325	1	0
AlphaSTATION 250 4/266	1	267.0	283.0	95	17705	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	618.5	0.54	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	256	325	1	0
AlphaSTATION 250 4/266	1	267.0	283.0	95	23837	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	316.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	256	325	1	0
CompuAdd SS1	1	12.5	12.5	91	5995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	49.0	0.00	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
CompuAdd SS1	1	12.5	12.5	91	9695	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	16	41.5	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
DEC 3000/300 AXP	1	101.0	101.0	93	4995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	15.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	101.0	101.0	93	4995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	15.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	101.0	101.0	93	6495	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	101.0	101.0	93	6495	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9695	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	27.3	0.43	19	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9695	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	27.3	0.43	19	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	27.3	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	9995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	27.3	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	10595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	10595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	10995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	10995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	12295	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	12295	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	17.0	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	15195	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	13.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	15195	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	13.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	16195	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	13.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/300 AXP	1	151.0	151.0	93	16595	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	13.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	256	7.35	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	19870	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	26.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	19870	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	26.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	19995	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	201.6	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	20795	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	32	26.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	20795	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	32	26.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	20870	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	26.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	21270	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	26.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	21465	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	92.9	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	21730	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	21730	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	21795	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	32	26.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	22195	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	32	26.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	22590	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	18.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	22590	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	18.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	22730	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	23130	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	23515	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	64	18.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	23515	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	64	18.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	23590	AXP	1	1	0	1.3	0	0	0	0	1	0	0	0	64	18.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	Comp.MIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unitool Mono	Dumb Color	True Color	Accelerated 2D	Accel'd Real'd Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (yrs)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DEC 3000/600 AXP	1	177.0	177.0	93	23990	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	18.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	24185	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	84.9	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	24450	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	24450	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	24515	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	64	18.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	24915	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	64	18.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	25080	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	25080	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	25450	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	25850	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	26080	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	26480	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	26.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	27800	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	27800	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	28800	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	29080	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	26.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	29080	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	26.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	29200	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	18.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	30080	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	26.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	30480	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	26.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	31800	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	18.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	31800	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	18.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	32800	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	18.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	33200	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	18.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	36350	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	14.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	36350	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	37275	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	14.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	37275	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	37350	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	14.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	37750	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	38210	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	38210	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	38275	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	14.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	38675	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	39210	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	39610	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	41560	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	41560	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	42560	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	42960	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	45560	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	14.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	45560	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	46560	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	14.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	46960	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	55550	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	12.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	55550	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	12.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	56475	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	12.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	56475	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	12.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	56550	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	12.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Unaccel Color	Dumb Color	True Color	Accelerated 2D	Accel Hi Res Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DEC 3000/600 AXP	1	177.0	177.0	93	56950	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	19	1	1	0	1	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	57410	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	17	0	1	0	1	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	57410	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	19	0	1	0	1	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	57475	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	256	12.0	0.00	16	1	1	0	1	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	57875	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	256	12.0	0.00	19	1	1	0	1	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	58410	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	58810	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	60760	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	60760	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	61760	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	62160	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	256	12.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	64760	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	256	12.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	64760	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	256	12.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	65760	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	256	12.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	177.0	93	66160	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	256	12.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	77.6	1	0
DEC 3000/600 AXP	1	177.0	187.6	94	17495	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	626.5	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/600 AXP	1	177.0	187.6	94	19261	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	328.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/600 AXP	1	177.0	187.6	94	21501	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	320.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/700 AXP	1	226.0	239.6	94	27698	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	320.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/700 AXP	1	226.0	239.6	94	27698	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	320.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/700 AXP	1	226.0	239.6	94	39703	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	64	320.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/700 AXP	1	226.0	239.6	94	38703	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	64	320.5	1.05	21	1	1	0	1	0	0	0	0	1	1	0	0	1	3	0	0	0	0	1	0	512	325	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	31685	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	31685	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	32610	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	32	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	32610	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	32	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	32685	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	33085	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	33545	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	33545	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	33610	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	32	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	34010	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	32	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	34405	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	34405	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	34545	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	34945	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	35330	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	64	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	35330	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	64	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	35405	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	35805	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36000	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	0	64	212.1	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36265	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	64	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36265	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	64	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36330	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	64	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36730	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	0	64	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36895	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	36895	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	37265	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	64	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	37310	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	0	64	117.4	2.10	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DEC 3000/800 AXP	1	200.0	200.0	93	37665	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	37895	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	38295	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	39615	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	39615	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	39845	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	96	112.2	2.10	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	40615	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	40895	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	40895	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	41015	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	41895	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	42295	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	43615	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	43615	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	44615	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	45015	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	48165	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	48165	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	49090	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	49090	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	49165	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	49565	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	128	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	50025	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	50025	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	50090	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	50490	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	128	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	51025	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	51425	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	53375	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	53375	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	54375	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	54775	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	57375	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	57375	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	58375	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	58775	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	128	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	67365	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	67365	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	68290	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	68290	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	68365	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	68765	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	256	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	69225	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	69225	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	69290	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	69690	AXP	1	1	0	1.31	0	0	1	0	0	0	0	0	256	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	70225	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	70625	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	72575	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Kpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Basic Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lrg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DEC 3000/800 AXP	1	200.0	200.0	93	72575	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	1	8	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	73575	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	73975	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	76575	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	256	112.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	76575	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	256	112.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	77575	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	256	112.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/800 AXP	1	200.0	200.0	93	77975	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	256	112.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	1000	199	1	0
DEC 3000/900 AXP	1	276.0	292.6	94	43373	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	176.4	2.10	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	1000	326	1	0
DEC 3000/900 AXP	1	276.0	292.6	94	43373	AXP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	176.4	2.10	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	1000	325	1	0
DEC 3000/900 AXP	1	276.0	292.6	94	54378	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	176.4	2.10	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	1000	325	1	0
DEC 3000/900 AXP	1	276.0	292.6	94	54378	AXP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	176.4	2.10	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	1000	325	1	0
DEC3000/400 AXP	1	134.0	134.0	92	14995	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	38.3	0.43	17	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	16395	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	38.3	0.43	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	17495	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	38.3	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	18795	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	38.3	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	20145	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.5	1.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	21445	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.5	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	27995	AXP	0	1	0	1.31	0	0	0	0	0	1	0	0	48	20.2	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/400 AXP	1	134.0	134.0	92	29995	AXP	0	1	0	1.31	0	0	0	0	0	1	0	0	48	20.2	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	512	9.5	1	0
DEC3000/500 AXP	1	151.0	151.0	92	38995	AXP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	42.9	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1000	11.6	1	0
DEC3000/500 AXP	1	151.0	151.0	92	48995	AXP	0	1	0	1.31	0	0	0	0	1	0	0	0	64	27.2	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1000	11.6	1	0
DEC3000/500 AXP	1	151.0	151.0	92	49995	AXP	0	1	0	1.31	0	0	0	0	0	1	0	0	64	27.2	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1000	11.6	1	0
DEC3000/500 AXP	1	151.0	151.0	92	57995	AXP	0	1	0	1.31	0	0	0	0	0	1	0	0	64	27.2	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1000	11.6	1	0
DECpc AXP 150	1	151.0	151.0	93	4999	AXP	1	1	0	0.00	0	0	0	1	0	0	0	0	16	44.6	0.25	0	0	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	128	7.25	1	0
DECpc AXP 150	1	151.0	151.0	93	5379	AXP	1	1	0	0.79	0	0	0	1	0	0	0	0	16	45.0	0.25	14	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	128	7.35	1	0
DECpc AXP 150	1	151.0	151.0	93	8359	AXP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	24.7	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	1	0	0	128	7.35	1	0
DECstation 2100	1	10.0	10.0	89	7950	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	14.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 2100	1	10.0	10.0	89	8550	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 2100	1	10.0	10.0	89	11450	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	14.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 2100	1	10.0	10.0	89	13950	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 2100	1	10.0	10.0	89	18750	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	24	1.33	0	0
DECstation 2100	1	10.0	10.0	89	20750	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	14.3	0.10	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 2100	1	10.0	10.0	90	4995	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 2100	1	10.0	10.0	90	5950	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 2100	1	10.0	10.0	90	10550	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	16.4	0.31	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 2100	1	10.0	10.0	90	11550	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	12	15.4	0.31	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 2100	1	10.0	10.0	90	14490	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.4	0.31	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	89	11900	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	14.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	89	12900	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	89	17700	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	16	14.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	89	17900	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	89	22700	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	14.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	89	24700	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	14.3	0.10	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	1.33	0	0
DECstation 3100	1	14.0	14.0	90	6995	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	94.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	90	8495	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	90	8900	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	94.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	90	10995	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	90	11900	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	16	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	90	15900	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DECstation 3100	1	14.0	14.0	90	19900	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.4	0.31	19	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	91	4995	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	91	7495	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	91	8995	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 3100	1	14.0	14.0	91	12995	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	4.2	0	0
DECstation 5000 3x & 5x	1	34.3	34.3	93	6295	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	66.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000 3x & 5x	1	34.3	34.3	93	6795	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	66.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000 3x & 5x	1	34.3	34.3	93	9940	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	66.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/120 & 125	1	26.8	26.8	91	4995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	85.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	34.4	34.4	91	6495	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	85.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	34.4	34.4	91	8495	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	16	71.5	0.42	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	26.8	26.8	91	9495	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	95.7	0.33	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	26.8	26.8	91	13995	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	95.7	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	34.4	34.4	91	15995	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	71.5	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/120 & 125	1	34.4	34.4	91	17995	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	71.5	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	8490	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	66.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	9390	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	9640	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.4	0.43	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	9790	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	10540	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.4	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/133	1	34.4	34.4	93	10940	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/1xx	1	26.8	26.8	92	6495	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	64.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/1xx	1	34.4	34.4	92	8495	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	64.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/1xx	1	34.4	34.4	92	9695	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	64.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/1xx	1	34.4	34.4	92	10995	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	64.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/1xx	1	34.4	34.4	92	12440	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	64.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	128	25.3	1	0
DECstation 5000/200	1	27.3	27.3	90	14995	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	102.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	16500	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	102.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	18495	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	102.3	0.33	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	19000	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	102.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	20000	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	102.3	0.33	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	21500	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	102.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	22500	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	102.3	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	25000	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	102.3	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	25900	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	102.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	27900	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	102.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	29400	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	94.8	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	31400	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	94.8	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	34900	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	102.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	38400	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	94.8	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	53800	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	24	94.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	90	57300	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	24	92.3	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	28	1	0
DECstation 5000/200	1	27.3	27.3	91	8995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	85.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	9995	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	85.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	10495	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	85.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	12995	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	85.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	13995	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	85.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	15295	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	16	85.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	16995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	16	86.7	0.33	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Inpixels	Unpixel Mono	Dumb Color	True Color	Accelerated 2D	Accel/H Res/H Perf 2D	Accel 3D	High End 3D	Extreme 3D/Viz	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10/GB Ethernet	10/MB Ethernet	Video Adapt/Accel	Audio Adapter	Bus Expansion Slots	Comp Room	Lg Desktop	Med Deskside	Tower	Desktop	Sm Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
DECstation 5000/200	1	27.3	27.3	91	18700	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	85.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	20000	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	85.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	38595	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	24	85.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/200	1	27.3	27.3	91	52600	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	24	84.2	0.33	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	120	25.3	1	0
DECstation 5000/2x & 3x	1	21.6	21.6	92	3995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	64.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	34.3	34.3	92	6995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	8	64.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	25.7	26.7	92	8145	MIP	0	1	0	1.31	0	1	0	0	0	0	0	0	8	64.4	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	21.6	21.6	92	10145	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	64.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	34.3	34.3	92	10995	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	64.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	34.3	34.3	92	12355	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	24	64.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2x & 3x	1	26.7	26.7	92	19005	MIP	0	1	0	1.31	0	0	1	0	0	0	0	0	24	61.1	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2xx	1	42.9	42.9	92	11995	MIP	0	1	0	1.31	1	0	0	0	0	0	0	0	16	64.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	92	14995	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	64.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	92	24300	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	24	64.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	92	37650	MIP	0	1	0	1.31	0	0	0	0	0	0	1	0	24	53.9	0.85	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	34.3	34.3	93	8495	MIP	0	1	0	0.79	1	0	0	0	0	0	0	0	8	66.4	0.43	17	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2xx	1	34.3	34.3	93	9445	MIP	0	1	0	0.79	0	1	0	0	0	0	0	0	8	66.4	0.43	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2xx	1	34.3	34.3	93	11440	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	8	66.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	1	0	40	25.3	1	0
DECstation 5000/2xx	1	42.9	42.9	93	13190	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	93	16790	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	45.5	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	93	18615	MIP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	45.5	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	93	20495	MIP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	45.5	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
DECstation 5000/2xx	1	42.9	42.9	93	27195	MIP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	45.5	1.05	19	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
Digital VAXstation 2000	1	0.9	0.9	87	4638	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.0	0.00	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	5438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.0	0.00	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	6638	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	8.0	0.00	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	7438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	8.0	0.00	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	7438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.2	0.07	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	7938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.0	0.00	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	8238	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.2	0.07	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	9438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	7.7	0.07	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	9638	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	4.5	0.16	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	9938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	8.0	0.00	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	10238	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	7.7	0.07	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	10438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	4.5	0.16	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	10738	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.2	0.07	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	11638	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	4.0	0.16	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	11938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.0	0.00	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	12438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	4.0	0.16	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	12738	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	7.7	0.07	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	12938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	4.5	0.16	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	13938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	8.0	0.00	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	14738	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.2	0.07	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	14938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	4.0	0.16	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	16738	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	7.7	0.07	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	16938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	4.5	0.16	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 2000	1	0.9	0.9	87	18938	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	4.0	0.16	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
Digital VAXstation 500	1	0.9	0.9	86	18850	VAX	0	0	0	1.31	0	0	0	1	0	0	0	0	2	337.1	0.03	19	1	0	1	0	0	0	0	0	0	1	0	0	0	9	0	0	1	0	0	0	9	10	1	0
Digital VAXstation 500	1	0.9	0.9	86	20212	VAX	0	0	0	1.31	0	0	0	0	1	0	0	0	2	333.1	0.03	19	1	0	1	0	0	0	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
Digital VAXstation 500	1	0.9	0.9	86	20895	VAX	0	0	0	1.31	0	0	0	0	1	0	0	0	2	337.1	0.03	19	1	0	1	0	0	0	0	0	0	1	0	0	0	9	0	0	1	0	0	0	9	10	1	0
Digital VAXstation 500	1	0.9	0.9	86	38016	VAX	0	0	0	1.31	0	0	0	0	0	1	0	0	2	337.1	0.03	19	1	0	1	0	0	0	0	0	0	1	0	0	0	9	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	17750	VAX	0	0	0	0.00	0	0	0	0	0	0	0	0	1	150.0	0.00	0	0	0	1	0	0	0	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	20800	VAX	0	0	0	1.31	1	0	0	0	0	0	0	0	1	150.0	0.00	19	0	0	1	0	0	0	0	0	0	1	0	0	0	9	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	24995	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	3	148.8	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	4	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	25995	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	3	148.8	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	4	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	26000	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	2	151.3	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	26500	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	2	333.1	0.03	19	0	0	1	0	0	0	1	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	26500	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	2	333.1	0.03	19	0	0	1	0	0	0	1	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	29640	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	2	151.3	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II	1	0.9	0.9	86	30500	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	3	149.8	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	24995	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	25995	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	26000	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	2	151.3	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	30530	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	5	151.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	8	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	34490	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	5	151.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	8	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	37745	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	5	151.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	8	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	38480	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	5	151.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	8	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	39950	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	148.6	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	44595	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	70.7	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	44990	VAX	0	0	0	0.79	1	0	0	0	0	0	0	0	5	151.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	8	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	48700	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	148.6	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	87	58595	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	16	69.5	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	89	22688	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	22688	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	25745	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	0	0	1	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	26745	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	29147	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	29147	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	145.6	0.07	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	29738	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	67.7	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	29738	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	67.7	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	37438	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	36.2	0.32	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	37438	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	36.2	0.32	19	1	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	37638	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	70.7	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	37638	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	70.7	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
Digital VAXstation II/GPX	1	0.9	0.9	88	48700	VAX	0	0	0	0.79	0	0	0	1	0	0	0	0	5	148.6	0.07	19	1	0	1	0	0	1	0	0	0	1	0	0	0	5	0	0	1	0	0	0	9	10	1	0
DTK 1+	1	16.0	16.0	93	6295	SP	0	0	1	0.00	0	0	0	0	0	0	0	0	8	49.9	0.21	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
DTK 2	1	28.5	28.5	93	9300	SP	0	1	0	0.00	0	0	0	0	0	0	0	0	8	49.9	0.21	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
DTK 2	1	28.5	28.5	93	9995	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	8	34.1	0.43	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
DTK 2	1	28.5	28.5	93	11800	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	8	49.9	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
DTK Classic+	1	59.0	59.0	94	3700	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	6	261.2	0.24	14	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	512	41	1	3
HP 9000/705	1	40.0	40.0	91	6150	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	20.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/705	1	40.0	40.0	91	9330	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	20.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/705	1	40.0	40.0	91	10400	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	20.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	9860	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	24.5	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	11950	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	24.5	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	12550	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	26.5	0.42	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	13000	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.5	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	13100	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	26.5	0.42	19	0	1	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/710	1	57.9	57.9	91	14650	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	26.5	0.42	16	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	15700	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	26.5	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	20450	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	13.3	0.84	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/710	1	57.9	57.9	91	20450	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	24.5	0.42	19	1	1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	64	9.45	1	0
HP 9000/712	1	73.0	73.0	94	3995	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	117.7	0.26	15	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	94	13350	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	94	16900	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	3995	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	38.0	1.00	15	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	5665	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	5915	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6185	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6315	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6435	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6565	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6705	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6835	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	6955	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7085	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7315	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7355	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	7370	PA	0	[illegible]	0	0.79	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	7370	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7605	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	7720	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	7720	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7835	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	7965	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	7990	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	7990	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8120	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8120	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	8355	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8370	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8370	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	8485	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8510	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8510	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8640	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8640	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8760	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8760	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	8785	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	8890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	8890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	9005	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	9035	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	9120	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MaxMB	CompMIPS	Year	Package $S	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unscrol Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/712	1	92.0	92.0	96	9120	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	38.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	9160	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	9160	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	9410	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	9410	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	9435	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	9640	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	9640	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	35.3	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	9685	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	9770	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	9770	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	24.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	10160	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	10160	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	34.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	10290	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	10290	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	24	21.3	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	10435	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	10590	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	10590	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	10810	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	10810	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	20.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	10840	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	10840	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	73.0	73.0	96	11085	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	11240	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	11240	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	11365	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	11365	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	11490	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	11490	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	11615	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	11615	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	17	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	12240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	12240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	32.0	1.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	12890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	12890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	20	1	0	1	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	125.0	125.0	96	13015	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	20	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/712	1	92.0	92.0	96	13015	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	18.0	2.00	20	1	0	1	1	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	28	1	0
HP 9000/715	1	41.0	41.0	92	5590	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	74.6	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	6590	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	74.6	0.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	7890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	142.7	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	9415	PA	0	1	0	0.79	0	1	0	0	0	0	0	0	16	142.7	0.53	17	1	1	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	9890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	142.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	9990	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	142.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	10890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	143.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	11590	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	136.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	62.0	62.0	92	11790	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	147.7	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	41.0	41.0	92	13240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	74.6	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	13890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	16	142.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	62.0	62.0	92	13890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	147.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	68.6	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Proprietor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3DVis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	62.0	62.0	92	13990	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	147.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	259	68.6	1	0
HP 9000/715	1	41.0	41.0	92	14890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	16	143.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	62.0	62.0	92	15590	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	139.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	62.0	62.0	92	17240	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	77.6	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	62.0	62.0	92	17890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	16	146.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	41.0	41.0	92	18890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	142.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	41.0	41.0	92	19890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	143.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	192	68.6	1	0
HP 9000/715	1	62.0	62.0	92	20915	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	77.6	1.00	19	1	1	0	1	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	62.0	62.0	92	22890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	146.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	62.0	62.0	92	27890	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	16	146.7	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	256	68.6	1	0
HP 9000/715	1	41.0	41.0	93	6200	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	91.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	6695	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.0	0.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	7300	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.2	0.53	15	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	7405	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	177.0	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	41.0	41.0	93	8425	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.2	0.53	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	63.0	63.0	93	9030	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	16	173.2	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	9395	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	9500	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	10780	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	165.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	63.0	63.0	93	11125	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	11280	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	91.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	13395	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	165.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	63.0	63.0	93	15125	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	41.0	41.0	93	16395	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	165.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	63.0	63.0	93	18125	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	63.0	63.0	93	25125	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	173.2	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	78.0	78.0	94	23495	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	67.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	97.0	97.0	94	27100	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	122.0	122.0	94	32505	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	11530	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	91.0	1.00	19	0	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	13625	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	91.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	17625	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	91.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	17770	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	85.0	1.00	19	0	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	19865	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	85.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	20625	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	91.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	23865	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	128	85.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	26865	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	85.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	27625	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	91.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	92.0	92.0	95	33865	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	85.0	1.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	82	1	0
HP 9000/715	1	77.7	77.7	96	9025	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	[illegible]	77.7	96	10600	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	[illegible]	97.1	96	10725	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	11250	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	11525	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	12050	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	12300	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	12680	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	12950	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13025	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mhz/node	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (yrs)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adaptrs	Bus Expansion Slots	Comp Rmnts	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	77.7	77.7	96	13025	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13100	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	13225	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13330	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13480	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13550	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13550	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	13750	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	13750	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14130	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	14380	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	14380	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14525	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14600	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14600	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	14725	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	14725	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	14800	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	14885	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14980	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	14980	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	15025	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15030	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15050	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15180	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15180	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15250	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15250	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15250	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15250	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	15305	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15450	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15630	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15630	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	15830	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	15830	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16025	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16100	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16225	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16300	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16300	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	16460	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16480	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16550	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	16600	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16680	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16680	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16680	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16680	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Proj	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	77.7	77.7	96	16750	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16750	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	16805	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	16805	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	16840	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	16880	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16880	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16950	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	16950	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17130	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	17260	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17330	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17330	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	17330	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	17330	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17490	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	17525	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	17530	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17600	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17640	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	17725	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	17800	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	17980	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	18180	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18180	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	18250	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18250	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	51.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	18290	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18305	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18380	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18380	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18380	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18380	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18450	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18540	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	18630	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18680	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18760	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18760	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	18830	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	18830	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	18960	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19025	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19025	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19030	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19030	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19100	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19140	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19140	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Mag tape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapt/s	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	97.1	97.1	98	19190	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19300	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19340	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	[illegible]					1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19340	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19480	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19680	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19680	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19790	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19790	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19805	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	19880	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19880	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19950	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	51.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	19990	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	19990	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20260	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	[illegible]	[illegible]	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	20330	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	20330	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	47.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20460	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20460	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20525	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	20530	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20600	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20600	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20620	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	20640	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	20840	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	20840	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	20840	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	20840	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20980	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	20980	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	21040	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	21180	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	21290	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	21380	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	21380	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	21420	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	21490	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	21490	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	21490	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	21490	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	21690	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	21760	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	21960	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22025	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	22030	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	47.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22100	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	22140	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	77.7	77.7	96	22340	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	22340	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22480	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	22540	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	22540	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22680	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22680	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	22790	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22840	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22920	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	22920	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	22990	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	22990	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	23120	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	23190	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	23190	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	23460	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	23600	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	93.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	23640	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	23840	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	23840	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	23980	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	24040	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	24180	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	24420	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	24490	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	24490	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	45.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	24620	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	24620	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	24690	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	25140	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	25140	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	25160	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	25340	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	25540	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	25680	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	89.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	25810	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	25920	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	25960	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	26120	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	26190	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	45.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	26610	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	26840	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	26840	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	26840	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	26860	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	27460	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	27460	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	27510	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	121.8	121.8	96	27620	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	27660	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	27660	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	28110	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	28110	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	28140	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	28310	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	28310	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	28340	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	28940	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	28960	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	29160	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	29160	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	29160	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	29160	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	29360	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	29610	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	29740	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	29810	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	29810	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	29810	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	29810	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	29840	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	30010	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	30460	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	30660	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	30660	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	30860	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	30960	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	31110	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	31160	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	31240	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	31240	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	31310	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	31310	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	31440	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	31510	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	31510	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	31960	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	32160	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	32160	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	32360	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	32740	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	77.7	77.7	96	32810	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	32810	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	256	44.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	32940	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	32940	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	33010	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	33460	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	256	84	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MHPS	CompMHPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mptools	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/715	1	121.8	121.8	96	33480	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	C	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	33660	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	33860	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	34240	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	34440	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	97.1	97.1	96	34510	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	256	44.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	34960	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	35160	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	35160	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	35940	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	36460	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	36660	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/715	1	121.8	121.8	96	38160	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	128	87.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	256	84	1	0
HP 9000/720	1	57.9	57.9	91	15650	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	16	160.4	0.42	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	128	64	1	0
HP 9000/720	1	57.9	57.9	91	22450	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	16	160.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	128	64	1	0
HP 9000/720	1	57.9	57.9	91	25390	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	16	160.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	128	64	1	0
HP 9000/720	1	57.9	57.9	91	30390	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	16	160.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	128	64	1	0
HP 9000/725	1	62.0	62.0	92	17790	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	32	468.8	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	62.0	62.0	92	20390	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	468.8	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	62.0	62.0	92	24390	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	250.8	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	62.0	62.0	92	29390	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	250.8	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	62.0	62.0	92	34390	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	250.8	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	63.0	63.0	93	13310	PA	0	1	0	1.31	1	0	0	0	0	0	0	0	32	468.8	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	63.0	63.0	93	15405	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	468.8	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	63.0	63.0	93	19905	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	251.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	63.0	63.0	93	22905	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	251.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	63.0	63.0	93	29905	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	251.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	1	256	240	1	0
HP 9000/725	1	188.5	188.5	96	18425	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	325.0	1.00	17	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	1	512	308	1	0
HP 9000/730	1	76.7	76.7	91	24450	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	157.4	0.42	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	128	64	1	0
HP 9000/730	1	76.7	76.7	91	31300	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	157.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	128	64	1	0
HP 9000/730	1	76.7	76.7	91	33790	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	157.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	128	64	1	0
HP 9000/730	1	76.7	76.7	91	38790	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	157.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	128	64	1	0
HP 9000/730	1	76.7	76.7	91	106900	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	157.4	0.42	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	128	64	1	0
HP 9000/735	1	124.0	124.0	92	34690	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	253.5	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	36340	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	139.5	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	37290	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	253.5	0.53	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	38940	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	139.5	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	42940	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	139.5	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	47940	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	139.5	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	92	52940	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	139.5	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	126	1	0
HP 9000/735	1	124.0	124.0	93	28300	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	310.6	0.53	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	28800	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	169.5	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	30395	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	310.6	0.53	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	30895	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	34895	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	39895	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.0	124.0	93	44895	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	154.0	154.0	94	51395	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	163.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0
HP 9000/735	1	124.8	124.8	95	28800	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	169.5	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	400	156	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3DVis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP 9000/735	1	124.8	124.8	95	30895	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	32	189.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	400	158	1	0
HP 9000/735	1	124.8	124.8	95	31920	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	80	162.0	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	34015	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	80	162.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	34895	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	37895	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	38015	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	80	162.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	41015	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	80	162.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	44580	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	144	159.8	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	44790	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	80	162.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	124.8	124.8	95	44895	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	169.5	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	45280	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	144	81.8	2.00	19	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	46675	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	144	159.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	47375	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	144	81.8	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	50675	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	144	159.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	51375	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	144	81.8	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	53675	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	144	159.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	54375	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	144	81.8	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	60675	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	144	159.8	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/735	1	154.0	154.0	95	61375	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	144	81.8	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	400	156	1	0
HP 9000/750	1	76.7	76.7	91	52890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	192.5	1.30	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	384	236	1	0
HP 9000/750	1	76.7	76.7	91	56890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	192.5	1.30	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	384	236	1	0
HP 9000/750	1	76.7	76.7	91	61890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	192.5	1.30	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	384	236	1	0
HP 9000/750	1	76.7	76.7	91	124890	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	192.5	1.30	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	384	236	1	0
HP 9000/755	1	124.0	124.0	92	58890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	165.5	2.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	297	1	0
HP 9000/755	1	124.0	124.0	92	62890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	165.5	2.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	297	1	0
HP 9000/755	1	124.0	124.0	92	67890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	165.5	2.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	297	1	0
HP 9000/755	1	124.0	124.0	92	72890	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	165.5	2.00	19	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	297	1	0
HP 9000/755	1	124.0	124.0	93	40995	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.0	124.0	93	44995	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.0	124.0	93	49995	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.0	124.0	93	54995	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.8	124.8	95	40890	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.8	124.8	95	44890	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.8	124.8	95	47890	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	50900	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	51555	PA	0	1	0	1.31	0	1	0	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	1	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	124.8	124.8	95	54890	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	54900	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	55425	PA	0	1	0	1.31	0	0	1	0	0	0	0	0	64	207.0	2.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	57900	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	60400	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	64900	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	207.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	380	1	0
HP 9000/755	1	154.0	154.0	95	66150	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	64	112.0	4.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	1	0	0	0	768	390	1	0
HP C100	1	146.0	146.0	95	19715	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	97.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	146.0	146.0	95	21415	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	176.0	176.0	95	25715	PA	0	1	0	1.31	0	0	0	0	0	0	0	0	32	97.0	2.00	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	146.0	146.0	95	25920	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	176.0	176.0	95	27415	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	146.0	146.0	95	27420	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0

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Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Viz	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
HP C100	1	176.0	176.0	95	31920	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	176.0	176.0	95	33420	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	146.0	146.0	95	36420	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	146.0	146.0	95	37920	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	1	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	176.0	176.0	95	42420	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	1	0	512	156	1	0
HP C100	1	176.0	176.0	95	43920	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	97.0	2.00	20	1	1	0	1	0	0	0	0	0	1	0	1	1	3	0	0	0	0	1	0	512	156	1	0
HP J200	1	146.0	146.0	95	28720	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	29420	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	33225	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	33925	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	34720	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	34725	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	35420	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	35425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	39225	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	2	146.0	146.0	95	39420	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	1	176.0	176.0	95	39925	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	40725	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	41425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	146.0	146.0	95	43725	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	2	146.0	146.0	95	43925	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	1	146.0	146.0	95	44425	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	2	146.0	146.0	95	45425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	2	176.0	176.0	95	48420	PA	0	1	0	1.31	0	0	0	1	0	0	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	1	176.0	176.0	95	49725	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	413.3	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	1	176.0	176.0	95	50425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	225.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	1
HP J200	2	176.0	176.0	95	52925	PA	0	1	0	1.31	0	0	0	0	1	0	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	2	146.0	146.0	95	54425	PA	0	1	0	1.31	0	0	0	0	0	0	1	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	2	176.0	176.0	95	54425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
HP J200	2	176.0	176.0	95	63425	PA	0	1	0	1.31	0	0	0	0	0	1	0	0	32	224.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	1	0	0	0	0	1000	376	1	0
Manner 4i	1	16.0	16.0	91	5795	SP	0	0	1	0.00	0	0	0	0	0	0	0	0	8	45.0	0.00	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Manner 4i	1	16.0	16.0	91	7795	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	8	54.0	0.18	17	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Manner 4i	1	16.0	16.0	91	8995	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	8	49.9	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Manner 4i	1	16.0	16.0	91	9995	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	8	54.0	0.18	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Muse/iX3000	1	28.5	28.5	92	10075	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	26.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
Opus 5020	1	17.0	17.0	91	9380	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	16	43.0	0.20	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Opus 5120	1	17.0	17.0	91	7995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	49.0	0.00	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Opus 5124	1	29.0	29.0	92	7205	SP	0	1	0	0.00	0	0	0	0	0	0	0	0	16	45.0	0.00	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
Opus 5124	1	29.0	29.0	92	7965	SP	0	1	0	0.00	0	0	0	1	0	0	0	0	16	45.0	0.00	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
Opus 5124	1	29.0	29.0	92	9725	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	41.0	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	0	0
Orange 2000	1	16.0	16.0	91	6995	SP	0	0	1	0.00	0	0	0	0	0	0	0	0	8	45.0	0.00	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
PM381-AG	1	42.9	42.9	93	12790	MIP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	70.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	480	28.9	1	0
Sanar Model 10/40	1	109.5	109.5	95	10000	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	16	68.5	0.85	0	0	1	0	1	0	0	0	1	0	1	0	0	1	4	0	0	0	0	1	0	512	25	1	3
Solid 25	1	17.0	17.0	92	7590	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	49.9	0.21	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Solid 40	1	28.5	28.5	92	10590	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	8	55.0	0.21	17	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
SPARCclassic	1	59.1	59.1	93	3995	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	111.4	0.21	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	93	4695	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	111.4	0.21	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	3995	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	111.4	0.21	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	4420	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	48.0	0.54	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0

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Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mphoto	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3DVis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCclassic	1	59.1	59.1	94	4695	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	111.4	0.21	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	5120	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	48.0	0.54	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	5120	mSP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	48.0	0.54	20	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	5295	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	111.4	0.21	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	6520	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	45.0	0.54	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	6820	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	48.0	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	7370	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	45.0	0.54	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	94	8220	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	45.0	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	2995	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	111.4	0.21	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	3845	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	48.0	0.54	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	4250	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	16	48.0	0.54	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	4250	mSP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	48.0	0.54	20	0	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	4995	mSP	0	1	0	0.79	0	1	0	0	0	0	0	0	16	48.0	0.54	15	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	5895	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	45.0	0.54	16	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCclassic	1	59.1	59.1	95	6955	mSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	45.0	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation 1	1	12.5	12.5	90	8995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.0	0.00	17	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	9995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	10495	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	19.6	0.10	17	0	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	0	0
SPARCstation 1	1	12.5	12.5	90	11495	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	19.6	0.10	19	0	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	0	0
SPARCstation 1	1	12.5	12.5	90	12495	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	13995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	19.6	0.10	16	1	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	0	0
SPARCstation 1	1	12.5	12.5	90	14495	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	14995	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	20.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	15995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	19.6	0.10	19	1	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	0	0
SPARCstation 1	1	12.5	12.5	90	16495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	19.6	0.10	16	1	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	16995	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	20.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1	1	12.5	12.5	90	18495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	19.6	0.10	19	1	1	0	0	0	0	1	0	0	1	0	0	0	3	0	0	0	0	1	0	16	1.52	1	0
SPARCstation 1+	1	15.8	15.8	91	8795	SP	0	0	1	0.00	0	0	0	0	0	0	0	0	8	35.0	0.00	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	8995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	35.0	0.00	17	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	9995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	35.0	0.00	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	10495	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	35.0	0.10	17	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	11495	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	35.0	0.10	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	12495	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	35.0	0.00	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	13995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	35.0	0.10	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	14495	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	35.0	0.00	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	0	0
SPARCstation 1+	1	15.8	15.8	91	14995	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	35.0	0.00	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	1	0
SPARCstation 1+	1	15.8	15.8	91	15995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	35.0	0.10	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	1	0
SPARCstation 1+	1	15.8	15.8	91	16495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	35.0	0.10	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	1	0
SPARCstation 1+	1	15.8	15.8	91	16995	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	35.0	0.00	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	1	0
SPARCstation 1+	1	15.8	15.8	91	18495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	35.0	0.10	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	40	2.81	1	0
SPARCstation 10	1	86.5	86.5	93	18495	SSP	0	1	0	1.04	1	0	0	0	0	0	0	0	32	119.7	0.42	19	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	86.5	86.5	93	19495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	119.7	0.42	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	86.5	86.5	93	20495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	86.5	86.5	93	22495	SSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	86.5	86.5	93	23495	SSP	0	1	0	1.04	0	0	0	0	0	1	0	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	110.0	116.6	93	24995	SSP	1	1	0	1.04	1	0	0	0	0	0	0	0	32	119.7	0.42	19	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	110.0	116.6	93	25995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	119.7	0.42	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	110.0	116.6	93	26995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	110.0	116.6	93	28995	SSP	1	1	0	1.31	0	0	0	1	0	0	0	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	Comp/MIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Mag/tape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation 10	1	110.0	116.6	93	29995	SSP	1	1	0	1.04	0	0	0	0	0	0	1	0	32	119.7	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	86.5	86.5	93	37495	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	119.7	0.42	21	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	2	135.5	215.4	93	39995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	53.0	1.05	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	2
SPARCstation 10	1	110.0	116.6	93	43995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	119.7	0.42	21	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	4	135.5	376.3	93	57995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	51.0	1.05	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	0
SPARCstation 10	1	109.5	109.5	94	9995	SSP	0	1	0	1.04	1	0	0	0	0	0	0	0	32	119.7	0.42	19	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	14495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	15495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	15745	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	99.6	0.54	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	16495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	16745	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	17095	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	17495	SSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	17495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	94	17495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	61.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	94	17745	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	99.6	0.54	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	18495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	94	18495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	61.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	94	18495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	94	18495	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	19495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	94	19495	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	94	19495	SSP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	94	19745	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	99.6	0.54	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	135.5	143.6	94	20495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	94	20495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	94	20495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	94	20495	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	20495	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	135.5	143.6	94	21495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	94	21495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	109.5	164.3	94	21495	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	2
SPARCstation 10	1	109.5	109.5	94	22245	SSP	0	1	0	1.04	0	0	0	0	0	0	1	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	135.5	143.6	94	22495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	94	22495	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	2	135.5	215.4	94	23995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	61.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	135.5	215.4	94	25995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	135.5	143.6	94	26495	SSP	1	1	0	1.04	0	0	0	0	0	0	1	0	64	54.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	94	27495	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	135.5	215.4	94	27995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	135.5	215.4	94	27995	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	2
SPARCstation 10	2	109.5	164.3	94	28495	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	135.5	143.6	94	29495	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	135.5	215.4	94	34995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	94	37745	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	4	135.5	376.3	94	39995	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	51.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	0
SPARCstation 10	4	135.5	376.3	94	41995	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	51.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	0
SPARCstation 10	1	135.5	143.6	94	44745	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	54.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	14495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel Hi Res Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/VRs	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Mag tape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation 10	1	109.5	109.5	95	15495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	15745	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	99.6	0.54	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	16495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	16745	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	99.6	0.54	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	17495	SSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	17495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	95	17495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	61.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	95	17745	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	99.6	0.54	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	18495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	95	18495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	61.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	135.5	143.6	95	18495	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	18495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	19495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	95	19495	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	95	19495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	95	19745	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	99.6	0.54	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	135.5	143.6	95	20495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	16	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	95	20495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	109.5	109.5	95	20495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	95	20495	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	20495	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	1	135.5	143.6	95	21495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	109.5	164.3	95	21495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	109.5	164.3	95	21495	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	2
SPARCstation 10	1	109.5	109.5	95	22245	SSP	0	1	0	1.04	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	95	22495	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	135.5	143.6	95	22495	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	3
SPARCstation 10	2	135.5	215.4	95	23995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	61.0	1.05	20	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	135.5	215.4	95	25995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	1	135.5	143.6	95	26495	SSP	1	1	0	1.04	0	0	0	0	0	0	1	0	64	54.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	1	109.5	109.5	95	27495	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	62.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	3
SPARCstation 10	2	135.5	215.4	95	27995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	1	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	135.5	215.4	95	27995	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	2
SPARCstation 10	2	109.5	164.3	95	28495	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	2	135.5	215.4	95	34995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	61.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	2
SPARCstation 10	4	135.5	376.3	95	39995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	64	51.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	1	0
SPARCstation 10	4	135.5	376.3	95	41995	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	51.0	1.05	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512	41	0	0
SPARCstation 1000	2	135.5	215.4	94	52400	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	90.0	2.14	19	1	1	0	1	0	0	0	0	1	1	0	0	0	6	0	0	0	0	1	0	2000	100	1	6
SPARCstation 1000	4	135.5	376.3	94	81400	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	88.0	2.14	19	1	1	0	1	0	0	0	0	1	1	0	0	0	3	0	0	0	0	1	0	2000	100	1	4
SPARCstation 2	1	28.5	28.5	91	14995	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	23.6	0.21	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	1	0
SPARCstation 2	1	28.5	28.5	91	17995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	23.6	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	1	0
SPARCstation 2	1	28.5	28.5	91	19995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	23.6	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	1	0
SPARCstation 2	1	28.5	28.5	91	26995	SP	0	1	0	1.04	0	0	0	0	0	0	1	0	16	23.6	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	91	49995	SP	0	1	0	1.30	0	0	0	0	0	0	1	0	16	23.6	0.21	21	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	92	15495	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	32	13.1	0.42	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	1	0
SPARCstation 2	1	28.5	28.5	92	18495	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	13.1	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	92	20495	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	92	22495	SP	0	1	0	1.30	0	0	0	0	1	0	0	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	92	26995	SP	0	1	0	1.04	0	0	0	0	0	0	1	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Unaccel Color	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (yn)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation 2	1	28.5	28.5	92	49995	SP	0	1	0	1.30	0	0	0	0	0	0	0	1	0	32	13.1	0.42	21	1	1	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	93	14295	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	0	32	13.1	0.42	19	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	1	0
SPARCstation 2	1	28.5	28.5	93	15295	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	0	32	13.1	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	93	16295	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	93	18295	SP	0	1	0	1.30	0	0	0	0	1	0	0	0	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	93	22495	SP	0	1	0	1.04	0	0	0	0	0	0	1	0	0	32	13.1	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 2	1	28.5	28.5	93	36495	SP	0	1	0	1.30	0	0	0	0	0	0	0	1	0	32	13.1	0.42	21	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	2.6	0	0
SPARCstation 20	1	137.0	137.0	95	11995	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	682.8	0.54	20	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	12195	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	682.8	0.54	17	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	12195	SSP	0	1	0	1.04	0	0	0	0	0	1	0	0	0	32	682.8	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	12495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	359.2	1.05	20	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	12695	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	12695	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	359.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	13995	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	682.8	0.54	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	13995	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	682.8	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	2	137.0	205.5	95	14195	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	358.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	1	135.5	143.6	95	14195	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	359.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	14495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	14495	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	14950	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	2	137.0	205.5	95	15995	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	358.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	2	137.0	205.5	95	15995	SSP	0	1	0	1.04	0	0	0	0	1	0	0	0	0	32	358.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	1	135.5	143.6	95	15995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	162.6	172.4	95	16195	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	357.2	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	137.0	137.0	95	16495	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	137.0	137.0	95	16495	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	162.6	172.4	95	17995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	357.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	137.0	205.5	95	17995	SSP	0	1	0	1.31	0	0	0	0	0	1	0	0	0	32	358.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	1	135.5	143.6	95	17995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	162.6	172.4	95	17995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	357.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	137.0	205.5	95	17995	SSP	0	1	0	1.31	0	0	0	0	1	0	0	0	0	32	358.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	1	135.5	143.6	95	17995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	162.6	172.4	95	19995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	357.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	162.6	172.4	95	19995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	32	357.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	162.6	258.5	95	22495	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	1	137.0	137.0	95	23495	SSP	0	1	0	1.31	0	0	0	0	0	0	0	1	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	2	162.6	258.5	95	24495	SSP	1	1	0	1.31	0	0	0	0	0	0	0	1	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	162.6	258.5	95	24495	SSP	1	1	0	1.31	0	0	0	0	1	0	0	0	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	137.0	205.5	95	24995	SSP	0	1	0	1.31	0	0	0	0	0	0	1	0	0	32	358.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
SPARCstation 20	1	135.5	143.6	95	24995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	32	359.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
SPARCstation 20	1	162.6	172.4	95	26995	SSP	1	1	0	1.31	0	0	0	0	0	0	0	1	0	32	357.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	4	162.6	451.6	95	29995	SSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	162.6	258.5	95	31495	SSP	1	1	0	1.31	0	0	0	0	0	0	0	1	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	4	135.5	376.3	95	31995	SSP	1	1	0	1.31	0	0	0	0	0	0	1	0	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	4	135.5	376.3	95	31995	SSP	1	1	0	1.31	0	0	0	0	0	1	0	0	0	64	348.2	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	1	204.7	217.0	96	15495	SS2	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	189.1	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	204.7	217.0	96	17495	SS2	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	306.0	486.5	96	18495	HSP	1	1	0	1.04	0	0	0	0	1	0	0	0	0	32	189.1	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	204.7	217.0	96	18495	SS2	1	1	0	1.31	0	0	0	0	1	0	0	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/VIs	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation 20	1	306.0	324.4	96	19495	HSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	204.7	217.0	96	19495	SS2	1	1	0	1.31	0	0	0	0	0	1	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	306.0	324.4	96	19495	HSP	1	1	0	1.04	0	0	0	0	1	0	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	306.0	324.4	96	20495	HSP	1	1	0	1.31	0	0	0	0	1	0	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	1	306.0	324.4	96	21495	HSP	1	1	0	1.31	0	0	0	0	0	1	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	204.7	325.5	96	21995	SS2	1	1	0	1.04	0	0	0	0	1	0	0	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	1	204.7	217.0	96	22495	SS2	1	1	0	1.31	0	0	0	0	0	1	0	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	204.7	325.5	96	22995	SS2	1	1	0	1.31	0	0	0	0	1	0	0	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	204.7	325.5	96	23995	SS2	1	1	0	1.31	0	0	0	0	0	1	0	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	1	306.0	324.4	96	24495	HSP	1	1	0	1.31	0	0	0	0	0	0	1	0	32	189.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	1
SPARCstation 20	2	306.0	486.5	96	25995	HSP	1	1	0	1.04	0	0	0	0	1	0	0	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	306.0	486.5	96	26995	HSP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	204.7	325.5	96	26995	SS2	1	1	0	1.31	0	0	0	0	0	0	1	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	306.0	486.5	96	27995	HSP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 20	2	306.0	486.5	96	30995	HSP	1	1	0	1.31	0	0	0	0	0	0	1	0	64	180.1	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	0
SPARCstation 330	1	16.0	16.0	90	29900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	13.0	0.33	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	35900	SP	0	0	1	1.04	0	0	1	0	0	0	0	0	8	13.0	0.33	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	37900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	13.0	0.33	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	38900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	8	13.0	0.33	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	39900	SP	0	0	1	1.04	0	0	0	0	0	0	1	0	8	13.0	0.33	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	43900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	24	8.7	0.65	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	51900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	24	8.7	0.65	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	52900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	24	8.7	0.65	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	90	53900	SP	0	0	1	1.04	0	0	0	0	0	0	1	0	24	8.7	0.65	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	0.65	1	0
SPARCstation 330	1	16.0	16.0	91	29900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.7	0.67	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	91	34900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	20.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	91	37900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	20.7	0.67	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	91	55900	SP	0	0	1	1.31	0	0	0	0	0	1	0	0	8	20.7	0.67	21	1	1	0	0	0	0	0	1	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	92	29900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.7	0.67	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	92	37900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	20.7	0.67	19	1	1	0	0	0	0	0	0	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 330	1	16.0	16.0	92	55900	SP	0	0	1	1.31	0	0	0	0	0	1	0	0	8	20.7	0.67	21	1	1	0	0	0	0	0	1	0	1	0	0	0	5	0	0	1	0	0	0	40	6.5	1	0
SPARCstation 370	1	16.0	16.0	90	40900	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	33.2	0.33	19	0	1	0	0	0	0	0	1	0	0	0	0	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	48900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	33.2	0.33	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	72900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	32	18.4	0.98	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	73900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	32	18.4	0.98	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	75900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	32	19.0	0.69	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	76900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	32	19.0	0.69	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	77900	SP	0	0	1	1.04	0	0	0	0	0	0	1	0	32	19.0	0.69	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	87900	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	32	18.0	1.38	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	88900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	32	18.0	1.38	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 370	1	16.0	16.0	90	69900	SP	0	0	1	1.04	0	0	0	0	0	0	1	0	32	18.0	1.38	19	1	1	0	0	0	0	1	0	0	0	0	1	0	12	0	1	0	0	0	0	128	1.38	1	0
SPARCstation 4	1	135.5	135.5	96	4295	mS2	0	1	0	0.79	0	1	0	0	0	0	0	0	32	59.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	160	56	1	0
SPARCstation 4	1	135.5	135.5	96	5295	mS2	0	1	0	1.31	0	1	0	0	0	0	0	0	32	59.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	160	56	1	0
SPARCstation 4	1	135.5	135.5	96	6295	mS2	0	1	0	1.31	0	1	0	0	0	0	0	0	32	59.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	160	56	1	0
SPARCstation 470	1	22.0	22.0	91	69900	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	49.0	0.67	19	1	1	0	0	0	0	0	1	0	1	0	0	0	12	0	1	0	0	0	0	768	8	1	0
SPARCstation 470	1	22.0	22.0	91	86900	SP	0	1	0	1.30	0	0	0	0	0	1	0	0	32	49.0	0.67	21	1	1	0	0	0	0	0	1	0	1	0	0	0	12	0	1	0	0	0	0	768	8	0	0
SPARCstation 470	1	22.0	22.0	92	59000	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	32	49.0	0.67	21	1	1	0	0	0	0	0	1	0	1	0	0	0	12	0	1	0	0	0	0	768	8	0	0
SPARCstation 470	1	22.0	22.0	92	76000	SP	0	1	0	1.30	0	0	0	0	0	1	0	0	32	49.0	0.67	21	1	1	0	0	0	0	0	1	0	1	0	0	0	12	0	1	0	0	0	0	768	8	0	0
SPARCstation 5	1	86.0	86.0	95	3995	mS2	0	1	0	0.79	0	1	0	0	0	0	0	0	16	123.7	0.54	15	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0

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Specific Product Pkg	# Processors	MIPS	Comp/MIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation 5	1	86.0	86.0	95	6395	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	16	123.7	0.54	20	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	6595	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	16	123.7	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	7745	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	115.7	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	8395	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	16	123.7	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	8595	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	16	123.7	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	9545	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	115.7	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	104.0	104.0	95	9595	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	9745	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	115.7	0.54	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	10395	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	16	123.7	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	104.0	104.0	95	11395	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	86.0	86.0	95	11545	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	115.7	0.54	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	104.0	104.0	95	11595	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	104.0	104.0	95	13395	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	104.0	104.0	95	19995	mS2	0	1	0	1.31	0	0	0	0	0	1	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	0	0
SPARCstation 5	1	135.5	135.5	96	7995	mS2	0	1	0	1.04	0	0	1	0	0	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	7995	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	8995	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	8995	mS2	0	1	0	1.04	0	0	1	0	0	0	0	0	32	64.3	1.05	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	8995	mS2	0	1	0	1.04	0	0	0	0	1	0	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	9995	mS2	0	1	0	1.31	0	0	0	0	1	0	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	135.5	135.5	96	13995	mS2	0	1	0	1.31	0	0	0	0	0	1	0	0	32	64.3	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	0	0
SPARCstation 5	1	210.0	210.0	97	5695	Tsp	0	1	0	1.04	0	0	1	0	0	0	0	0	32	37.7	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	210.0	210.0	97	5695	Tsp	0	1	0	1.04	0	0	0	0	1	0	0	0	32	37.7	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	210.0	210.0	97	6695	Tsp	0	1	0	1.31	0	0	0	0	1	0	0	0	32	37.7	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	210.0	210.0	97	6695	Tsp	0	1	0	1.04	0	0	1	0	0	0	0	0	32	37.7	2.10	17	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	210.0	210.0	97	6695	Tsp	0	1	0	1.04	0	0	0	0	1	0	0	0	32	37.7	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 5	1	210.0	210.0	97	7695	Tsp	0	1	0	1.31	0	0	0	0	1	0	0	0	32	37.7	2.10	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	256	56	1	0
SPARCstation 6x0	2	28.5	42.8	93	46700	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	64	42.4	1.30	19	1	1	0	1	0	0	0	0	1	1	0	0	0	6	0	0	1	0	0	0	512	33	1	2
SPARCstation 6x0	1	110.0	116.6	93	52700	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	43.4	1.30	19	1	1	0	1	0	0	0	0	1	1	0	0	0	6	0	0	1	0	0	0	512	33	1	3
SPARCstation 6x0	4	28.5	74.7	93	56700	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	64	40.4	1.30	19	1	1	0	1	0	0	0	0	1	1	0	0	0	6	0	0	1	0	0	0	512	33	1	0
SPARCstation 6x0	1	110.0	116.6	93	61700	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	50.4	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	0	3
SPARCstation 6x0	2	135.5	215.4	93	75200	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	128	41.6	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	0	2
SPARCstation 6x0	1	135.5	135.5	93	97200	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	128	39.6	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	0	0
SPARCstation 6x0	1	110.0	116.6	94	52700	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	43.4	1.30	19	1	1	0	1	0	0	0	0	1	1	0	0	0	6	0	0	1	0	0	0	512	33	1	3
SPARCstation 6x0	1	110.0	116.6	94	61700	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	50.4	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	1	3
SPARCstation 6x0	2	135.5	215.4	94	75200	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	128	41.6	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	1	2
SPARCstation 6x0	4	135.5	376.3	94	97200	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	128	39.6	2.60	19	1	1	0	1	0	0	0	0	1	1	0	0	0	15	0	1	0	0	0	0	1000	41	1	0
SPARCstation ELC	1	22.0	22.0	92	4995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	33.0	0.00	17	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	64	5.2	1	0
SPARCstation ELC	1	22.0	22.0	92	6295	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	33.1	0.21	17	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	64	5.2	1	0
SPARCstation ELC	1	22.0	22.0	93	3995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.0	0.00	17	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	64	5.2	1	0
SPARCstation IPC	1	15.8	15.8	91	7995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	31.7	0.21	17	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	0	0
SPARCstation IPC	1	15.8	15.8	91	8995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.0	0.00	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	91	8995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	31.7	0.21	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	91	9995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	91	11995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	91	12495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	31.7	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	91	14495	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	31.7	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	0	0
SPARCstation IPC	1	15.8	15.8	92	7995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	31.7	0.21	17	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	92	8995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	31.7	0.21	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0

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Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Mouse/pc	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Desktop/s	Mod Desktop/s	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCstation IPC	1	15.8	15.8	92	9995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	16	1	1	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	92	11995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	19	1	1	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	93	5995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	16	1	1	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	93	6995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	31.7	0.21	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	93	7995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPC	1	15.8	15.8	93	8995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	31.7	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	48	4.9	1	0
SPARCstation IPX	1	28.5	28.5	92	11995	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	81.4	0.21	17	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	92	12795	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	81.4	0.21	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	92	13495	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	81.4	0.21	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	0	0
SPARCstation IPX	1	28.5	28.5	92	15495	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	81.4	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	0	0
SPARCstation IPX	1	28.5	28.5	93	8995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	0	0
SPARCstation IPX	1	28.5	28.5	93	8995	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	42.8	0.42	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	93	9995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	0	0
SPARCstation IPX	1	28.5	28.5	93	10995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	0	0
SPARCstation IPX	1	28.5	28.5	94	8995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	94	8995	SP	0	1	0	1.04	1	0	0	0	0	0	0	0	16	42.8	0.42	19	0	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	94	9995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	16	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation IPX	1	28.5	28.5	94	10995	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	16	42.8	0.42	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	64	15.6	1	0
SPARCstation LX	1	59.1	59.1	93	7995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	58.5	0.42	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	93	7995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	58.5	0.42	19	0	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	93	8995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	58.5	0.42	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	93	9995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	58.5	0.42	19	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	7995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	48.0	0.54	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	7995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	48.0	0.54	20	0	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	8995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	48.0	0.54	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	9995	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	16	48.0	0.54	20	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	10145	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.4	1.05	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	10145	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.4	1.05	20	0	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	11145	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.4	1.05	16	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	12145	mSP	0	1	0	1.31	0	0	0	1	0	0	0	0	32	25.4	1.05	20	1	1	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	1	0
SPARCstation LX	1	59.1	59.1	94	19995	mSP	0	1	0	1.31	0	0	0	0	0	0	0	1	32	25.4	1.05	20	1	1	0	1	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	96	21.4	0	0
SPARCstation SLC	1	12.5	12.5	91	4995	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.0	0.00	17	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	16	2.68	1	0
SPARCultra	1	291.0	308.5	97	7995	USP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	174.9	2.10	17	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	8995	USP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	174.9	2.10	17	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	9995	USP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	174.9	2.10	20	1	1	0	1	0	0	0	0	0	1	0	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	11995	USP	1	1	0	1.31	0	0	0	0	1	0	0	0	64	174.9	2.10	17	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	12995	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	64	174.9	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	13995	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	64	174.9	2.10	17	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	291.0	308.5	97	14995	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	64	174.9	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	341.0	361.5	97	18495	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	167.1	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	341.0	361.5	97	20495	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	128	167.1	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	2	341.0	542.2	97	21995	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	149.6	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0
SPARCultra	1	414.0	438.8	97	22495	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	167.1	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	414.0	438.8	97	24495	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	128	167.1	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	1	414.0	438.8	97	26495	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	128	84.6	4.20	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0
SPARCultra	1	414.0	438.8	97	28495	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	128	84.6	4.20	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0
SPARCultra	2	414.0	658.3	97	33995	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	256	76.8	4.20	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0
SPARCultra	1	414.0	438.8	97	34495	USP	1	1	0	1.31	0	0	0	0	0	1	0	0	512	161.2	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	2	414.0	658.3	97	35995	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	256	76.8	4.20	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mphists	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Basic Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (yrs)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CDROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
SPARCultra	1	414 0	438 8	97	36495	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	512	161.2	2.10	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1000	324	1	1
SPARCultra	2	414 0	658 3	97	59995	USP	1	1	0	1.31	0	0	0	0	0	0	0	1	1000	71.0	4.20	20	1	1	0	1	0	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	2000	273	1	0
Sun 1	1	1.0	1.0	82	8900	m00	0	0	0	0.80	1	0	0	0	0	0	0	0	0.512	10.9	0.02	17	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	2	0.05	0	0
Sun 1	1	1.0	1.0	82	9900	m00	0	0	0	0.80	1	0	0	0	0	0	0	0	0.512	10.9	0.02	17	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	2	0.05	0	0
Sun 2	1	1.5	1.5	83	14000	m10	0	0	0	0.79	1	0	0	0	0	0	0	0	2	11.8	0.03	13	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	4	0.12	0	0
Sun 2	1	1.7	1.7	83	41000	m10	0	0	0	1.05	0	1	0	0	0	0	0	0	4	10.0	0.04	19	1	1	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	4	0.12	0	0
Sun 2	1	1.5	1.5	83	41000	m10	0	0	0	1.31	0	1	0	0	0	0	0	0	2	11.8	0.03	19	1	1	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	4	0.12	0	0
Sun 2/160	1	1.5	1.5	85	32000	68K	0	0	1	1.04	0	0	0	1	0	0	0	0	1	7.0	0.00	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	8	0.12	0	0
Sun 2/50	1	1.0	1.0	85	9900	68K	0	0	0	0.31	1	0	0	0	0	0	0	0	1	7.0	0.00	13	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	4	0.12	0	0
Sun 3/110	1	1.2	1.2	87	15900	68K	0	0	1	1.04	1	0	0	0	0	0	0	0	4	7.0	0.00	19	0	1	0	0	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	12	0.16	1	0
Sun 3/140	1	1.5	1.5	88	12900	68K	0	0	0	1.04	1	0	0	0	0	0	0	0	4	7.0	0.00	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	12	0.16	0	0
Sun 3/150	1	2.0	2.0	88	21900	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	4	7.0	0.00	15	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	12	1.4	1	0
Sun 3/150	1	2.0	2.0	88	28900	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	4	7.3	0.33	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	12	1.4	1	0
Sun 3/150	1	2.0	2.0	88	29900	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	4	7.0	0.00	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	12	1.4	1	0
Sun 3/150	1	2.0	2.0	88	36900	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	4	7.0	0.33	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	12	1.4	1	0
Sun 3/160	1	2.0	2.0	88	25400	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	4	7.0	0.00	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	16	1.4	1	0
Sun 3/160	1	2.0	2.0	88	33400	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	4	7.0	0.00	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	16	1.4	1	0
Sun 3/160	1	2.0	2.0	88	36400	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	4	8.3	0.33	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	16	1.4	1	0
Sun 3/160	1	2.0	2.0	88	44400	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	4	8.3	0.33	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	16	1.4	1	0
Sun 3/260	1	4.0	4.0	90	36480	m20	0	0	1	2.05	1	0	0	0	0	0	0	0	8	22.0	0.00	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	42880	m20	0	0	1	2.05	1	0	0	0	0	0	0	0	8	24.3	0.33	19	0	1	0	0	0	0	0	1	0	0	0	1	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	44480	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	8	24.0	0.00	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	47380	m20	0	0	1	2.05	1	0	0	0	0	0	0	0	8	22.1	0.65	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	50880	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	8	24.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	54980	m20	0	0	1	2.05	1	0	0	0	0	0	0	0	8	22.0	0.69	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	55380	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	8	22.1	0.65	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	55980	m20	0	0	1	1.04	0	0	0	0	0	1	0	0	8	22.0	0.00	19	1	1	0	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	64	1.4	1	0
Sun 3/260	1	4.0	4.0	90	62380	m20	0	0	1	1.04	0	0	0	0	0	1	0	0	8	24.3	0.33	19	1	1	0	0	0	1	0	0	0	0	1	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	62980	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	8	22.0	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	65980	m20	0	0	1	2.05	1	0	0	0	0	0	0	0	8	21.0	1.38	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	66880	m20	0	0	1	1.04	0	0	0	0	0	1	0	0	8	22.1	0.65	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	73980	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	8	21.0	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	74480	m20	0	0	1	1.04	0	0	0	0	0	1	0	0	9	22.0	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/260	1	4.0	4.0	90	85480	m20	0	0	1	1.04	0	0	0	0	0	1	0	0	8	21.0	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	0	0	0	1	0	64	1.4	0	0
Sun 3/470	1	7.0	7.0	90	34900	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	8	48.6	0.33	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	42900	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	8	48.6	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	47900	m30	0	1	0	1.04	0	0	0	0	0	1	0	0	8	48.6	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	48900	m30	0	1	0	1.04	0	0	0	0	0	0	1	0	8	48.6	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	62900	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	16	30.3	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	65900	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	32	26.3	0.69	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	73900	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	32	26.3	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	74900	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	16	25.7	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	77900	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	32	21.7	1.38	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	78900	m30	0	1	0	1.04	0	0	0	0	0	1	0	0	32	26.3	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	79900	m30	0	1	0	1.04	0	0	0	0	0	1	0	0	32	26.3	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	85900	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	32	21.7	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	90900	m30	0	1	0	1.04	0	0	0	0	0	1	0	0	32	21.7	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/470	1	7.0	7.0	90	91900	m30	0	1	0	1.04	0	0	0	0	0	0	1	0	32	21.7	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	12	0	1	0	0	0	0	128	6.4	1	0
Sun 3/50	1	1.5	1.5	88	5495	m20	0	0	0	1.04	1	0	0	0	0	0	0	0	4	12.0	0.00	19	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	8	1.4	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Unaccel Color	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
Sun 3/50	1	1.5	1.5	88	5895	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	12.0	0.00	19	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	1.4	1	0
Sun 3/50	1	1.5	1.5	88	10895	m20	0	0	0	1.04	1	0	0	0	0	0	0	0	0	4	12.0	0.14	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	8	1.4	1	0
Sun 3/50	1	1.5	1.5	88	11295	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	12.0	0.14	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	8	1.4	1	0
Sun 3/60	1	3.0	3.0	88	9450	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	15.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	11700	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	15.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	14200	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	14450	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	12.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	14850	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	15.9	0.14	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	16450	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	10.3	0.33	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	16950	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	17100	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	15.9	0.14	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	18700	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	10.3	0.33	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	19600	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.9	0.14	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	19850	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	15.9	0.14	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	21200	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	10.3	0.33	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	21450	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	10.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	22350	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.9	0.14	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	88	23950	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	10.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	10940	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	12.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	13190	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	12.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	1	0
Sun 3/60	1	3.0	3.0	90	15690	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	12.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	1	0
Sun 3/60	1	3.0	3.0	90	15940	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	12.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	1	0
Sun 3/60	1	3.0	3.0	90	16340	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	15.9	0.14	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	17940	m20	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	10.3	0.33	19	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	18440	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	12.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	1	0
Sun 3/60	1	3.0	3.0	90	18590	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	15.9	0.14	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	20190	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	10.3	0.33	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	21090	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.9	0.14	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	21340	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	15.9	0.14	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	22690	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	10.3	0.33	16	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	22940	m20	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	10.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	23840	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	15.9	0.14	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/60	1	3.0	3.0	90	25440	m20	0	0	1	1.04	0	0	0	1	0	0	0	0	0	4	10.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	24	1.4	0	0
Sun 3/80	1	3.0	3.0	90	5995	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	7.0	0.00	17	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	6995	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	7.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	9495	m30	0	0	1	1.04	0	1	0	0	0	0	0	0	0	4	7.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	10495	m30	0	0	1	1.04	1	0	0	0	0	0	0	0	0	8	7.2	0.10	19	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	12995	m30	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	7.2	0.10	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	13495	m30	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	7.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	13995	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	7.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	15495	m30	0	0	1	1.04	0	0	1	0	0	0	0	0	0	8	7.0	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	15995	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	7.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 3/80	1	3.0	3.0	90	17495	m30	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	7.2	0.10	19	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	16	0.54	1	0
Sun 386i	1	3.0	3.0	89	8990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	15.0	0.00	14	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	8990	386	0	0	1	0.79	1	0	0	0	0	0	0	0	0	4	21.4	0.09	15	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	9490	386	0	0	1	0.79	1	0	0	0	0	0	0	0	0	8	10.0	0.00	15	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	9990	386	0	0	1	1.04	1	0	0	0	0	0	0	0	0	4	21.4	0.09	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	9990	386	0	0	1	0.79	1	0	0	0	0	0	0	0	0	4	15.0	0.16	15	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	10490	386	0	0	1	1.04	1	0	0	0	0	0	0	0	0	8	10.0	0.00	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/VIs	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10/4B Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
Sun 386i	1	3.0	3.0	90	10490	386	0	0	1	0.79	0	1	0	0	0	0	0	0	4	21.4	0.09	14	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	10990	386	0	0	1	1.04	1	0	0	0	0	0	0	0	4	15.0	0.16	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	10990	386	0	0	1	0.79	0	1	0	0	0	0	0	0	8	10.0	0.00	14	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	11490	386	0	0	1	0.79	0	1	0	0	0	0	0	0	4	15.0	0.16	14	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	12490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	4	21.4	0.09	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	12990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	10.0	0.00	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	13490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	4	15.0	0.16	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	13490	386	0	0	1	1.04	1	0	0	0	0	0	0	0	8	14.0	0.00	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	13990	386	0	0	1	1.04	0	0	0	1	0	0	0	0	4	21.4	0.09	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	14490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	4	21.4	0.09	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	14490	386	0	0	1	0.79	1	0	0	0	0	0	0	0	8	9.3	0.33	15	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	14990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	10.0	0.00	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	14990	386	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.4	0.09	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	15490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	4	15.0	0.16	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	15490	386	0	0	1	1.04	1	0	0	0	0	0	0	0	8	9.3	0.33	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	15990	386	0	0	1	0.79	0	1	0	0	0	0	0	0	8	9.3	0.33	14	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	15990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	10.0	0.00	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	15990	386	0	0	1	1.04	1	0	0	0	0	0	0	0	8	14.0	0.16	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	16990	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	14.0	0.16	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	17490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.4	0.09	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	17990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	9.3	0.33	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	17990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	10.0	0.00	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	18490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	14.0	0.16	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	18490	386	0	0	1	1.04	1	0	0	0	0	0	0	0	8	9.3	0.33	19	0	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	3.0	3.0	90	19490	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	9.3	0.33	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	19490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	20.4	0.09	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	3.0	3.0	90	19990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	9.3	0.33	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	1	0
Sun 386i	1	5.0	5.0	90	19990	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	14.0	0.16	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	20490	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	14.0	0.16	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	20990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	9.3	0.33	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	21990	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	14.0	0.16	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	22490	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	9.3	0.33	16	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	22990	386	0	0	1	1.04	0	1	0	0	0	0	0	0	8	9.3	0.33	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 386i	1	5.0	5.0	90	24490	386	0	0	1	1.04	0	0	0	1	0	0	0	0	8	9.3	0.33	19	1	0	1	1	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	8	1.4	0	0
Sun 4/110	1	7.0	7.0	88	19950	SP	0	0	0	1.04	1	0	0	0	0	0	0	0	8	11.3	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	22200	SP	0	0	0	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	22600	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	11.3	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	24850	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	24950	SP	0	0	0	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	27350	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	11.3	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	27500	SP	0	0	0	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	27600	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	29600	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	11.3	0.33	19	0	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	0	0
Sun 4/110	1	7.0	7.0	88	30100	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	11.3	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	0	0
Sun 4/110	1	7.0	7.0	88	30150	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	16	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	31250	SP	0	0	0	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	33900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	11.3	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/110	1	7.0	7.0	88	34600	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	8	11.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	0	0
Sun 4/110	1	7.0	7.0	88	37100	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	8	11.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Unaccel Color	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
Sun 4/110	1	7.0	7.0	88	40900	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	11.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/150	1	7.0	7.0	88	44900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	8	11.3	0.00	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/150	1	7.0	7.0	88	51900	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	8	11.3	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/150	1	7.0	7.0	88	63400	SP	0	0	1	1.04	0	0	0	0	0	0	1	0	0	8	11.3	0.00	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3	0	0	0	0	1	0	32	1.4	1	0
Sun 4/260	1	10.0	10.0	90	42800	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	8	37.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	49200	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	8	37.6	0.33	19	0	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	50800	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	37.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	53700	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	8	33.3	0.65	19	0	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	57200	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	37.6	0.33	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	59600	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	32	37.0	0.00	19	0	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	61300	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	8	33.1	0.69	19	0	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	61700	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	33.3	0.65	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	62300	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	8	37.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	67600	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	32	37.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	69300	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	8	33.1	0.69	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	79100	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	32	37.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	80800	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	8	33.3	0.65	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Sun 4/260	1	10.0	10.0	90	89100	SP	0	0	1	2.05	1	0	0	0	0	0	0	0	0	32	19.0	1.38	19	0	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	97100	SP	0	0	1	1.04	0	0	0	1	0	0	0	0	0	32	19.0	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	0	0
Sun 4/260	1	10.0	10.0	90	108600	SP	0	0	1	1.04	0	0	0	0	0	1	0	0	0	32	19.0	1.38	19	1	1	0	0	0	1	0	0	0	1	0	0	0	12	0	1	0	0	0	0	128	2.81	1	0
Tatung 5020	1	17.0	17.0	91	6995	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	0	8	45.0	0.00	16	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Tatung COMPstation 20	1	12.5	12.5	91	10000	SP	0	0	1	1.31	0	0	0	0	1	0	0	0	0	8	49.6	[illegible]1	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	91	4290	SP	0	0	1	1.31	0	1	0	0	0	0	0	0	0	8	49.0	0.00	15	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	91	4990	SP	0	0	1	1.31	0	1	0	0	0	0	0	0	0	8	49.6	0.21	15	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	91	5290	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	50.0	0.00	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	91	5990	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	49.6	0.21	19	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	91	6995	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	49.6	0.21	20	1	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	64	8	1	0
Tatung COMPstation 20(tt&st)	1	12.5	12.5	92	4290	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	0	8	49.0	0.00	17	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	1	0	768	8	1	0
Tatung COMPstation 25(tt&st)	1	17.0	17.0	91	5290	SP	0	0	1	1.31	0	1	0	0	0	0	0	0	0	8	49.0	0.00	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Tatung COMPstation 25(tt&st)	1	17.0	17.0	91	5990	SP	0	0	1	1.31	0	1	0	0	0	0	0	0	0	8	49.9	0.21	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Tatung COMPstation 25(tt&st)	1	17.0	17.0	92	4490	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	49.0	0.00	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Tatung COMPstation 25(tt&st)	1	17.0	17.0	92	5190	SP	0	0	1	1.04	0	1	0	0	0	0	0	0	0	8	49.9	0.21	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128	6.4	1	0
Tatung COMPstation 40(tt&st)	1	28.5	28.5	92	5990	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	0	8	55.0	0.00	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
Tatung COMPstation 40(tt&st)	1	28.5	28.5	92	6990	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	0	8	55.0	0.21	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
Tatung COMPstation 40(tt&st)	1	28.5	28.5	92	8990	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	0	8	55.0	0.00	15	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
Tatung COMPstation 40(tt&st)	1	28.5	28.5	92	9990	SP	0	1	0	1.04	0	0	0	1	0	0	0	0	0	8	55.0	0.21	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
Tatung COMPstation 40(tt&st)	1	28.5	28.5	92	10890	SP	0	1	0	1.04	0	1	0	0	0	0	0	0	0	32	55.0	0.52	19	1	1	0	0	0	0	1	0	0	1	0	0	1	3	0	0	0	0	1	0	128		0	0
Tatung COMPstation 5/170	1	210.0	210.0	97	5400	Tsp	0	1	0	1.04	0	0	0	1	0	0	0	0	0	32	39.5	2.00	20	0	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	512	41	1	0
Tatung COMPstation II-385(tt&st)	1	28.5	28.5	94	4570	Msp	0	0	1	0.79	0	1	0	0	0	0	0	0	0	16	12.7	0.52	14	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung COMPstation II (tt&st)	1	28.5	28.5	94	5000	Msp	0	0	1	0.79	0	1	0	0	0	0	0	0	0	16	17.0	0.20	14	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung COMPstation(tt&st)	1	17.0	17.0	92	3990	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	0	8	24.0	0.00	14	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung COMPstation(tt&st)	1	17.0	17.0	92	4690	SP	0	0	1	0.79	0	1	0	0	0	0	0	0	0	8	24.8	0.21	14	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung COMPstation(tt&st)	1	17.0	17.0	92	6980	SP	0	0	1	1.31	0	1	0	0	0	0	0	0	0	8	30.0	0.00	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung COMPstation(tt&st)	1	17.0	17.0	92	7980	SP	0	0	1	1.31	0	0	0	1	0	0	0	0	0	8	30.0	0.00	19	1	1	0	0	0	0	1	0	0	1	0	0	1	2	0	0	0	0	0	1	128	1.4	1	0
Tatung MicroCOMPstation 5/11	1	135.5	135.5	95	7265	mS2	0	1	0	1.04	0	0	0	1	0	0	0	0	0	32	63.0	1.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	512	41	1	3
Tatung MicroCOMPstation 5/85	1	104.0	104.0	95	3995	mS2	0	1	0	0.79	0	1	0	0	0	0	0	0	0	32	100.8	0.52	14	1	1	0	1	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	512	41	1	3
Tatung SuperCOMPstation 10/30	1	101.6	101.6	94	13040	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/30	1	86.0	86.0	95	13040	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/40	1	104.2	104.2	94	14240	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MHPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/VIs	Base Memory	System Expansion	Base Storage	Monitor Size	CAD Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
Tatung SuperCOMPstation 10/40	1	109.5	109.5	95	14240	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/40	2	109.5	109.5	95	14340	SSP	0	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	2
Tatung SuperCOMPstation 10/41	1	109.5	116.1	94	16640	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/41	1	109.5	116.1	95	16640	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/51	1	132.0	139.9	94	16305	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	62.0	2.00	20	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/51	1	137.0	145.2	94	17280	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/51	1	132.0	139.9	94	17640	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/51	1	137.0	145.2	95	17640	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	3
Tatung SuperCOMPstation 10/51	2	137.0	230.9	94	25265	SSP	1	1	0	1.04	0	0	0	1	0	0	0	0	64	62.0	1.00	19	1	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	2
Tatung SuperCOMPstation 10/51	2	137.0	145.2	95	17740	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	2
Tatung SuperCOMPstation 10/54	4	137.0	145.2	95	15299	SSP	1	1	0	0.00	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	1	0	0	1	0	0	1	4	0	0	0	0	1	0	512		1	0
Tatung SuperCOMPstation 20A/5	1	137.0	137.0	94	12100	SSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
Tatung SuperCOMPstation 20A/5	1	137.0	137.0	95	10110	SSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	62.0	0.00	0	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
Tatung SuperCOMPstation 20A/5	2	137.0	137.0	95	13110	SSP	0	1	0	1.04	0	1	0	0	0	0	0	0	32	375.0	1.00	0	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
Tatung SuperCOMPstation 20A/6	1	162.6	172.4	95	14610	SSP	1	1	0	1.04	0	1	0	0	0	0	0	0	32	376.0	1.00	0	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	3
Tatung SuperCOMPstation 20A/6	2	162.6	172.4	95	16190	SSP	1	1	0	1.04	0	1	0	0	0	0	0	0	32	376.0	0.00	0	0	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	512	353	1	2
Tatung Ultra	1	291.0	308.5	96	15444	USP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	198.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	1000	324	1	1
Tatung Ultra	1	341.0	361.5	96	17980	USP	1	1	0	1.04	0	0	0	1	0	0	0	0	32	198.3	2.00	20	1	1	0	1	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	1000	324	1	1
Tatung Ultra	1	414.0	438.8	97	17130	USP	1	1	0	1.31	0	0	0	1	0	0	0	0	127	157.2	2.00	20	1	1	0	1	0	0	0	0	0	0	1	0	1	4	0	0	0	0	1	0	2000	273	1	1
Tatung Ultra	1	414.0	438.8	97	17530	USP	1	1	0	1.31	0	0	0	1	0	0	0	0	64	172.8	2.00	20	1	1	0	1	0	0	0	0	0	0	1	0	1	4	0	0	0	0	1	0	2000	273	1	1
Tatung Ultra	1	414.0	438.8	97	19430	USP	1	1	0	1.31	0	0	0	1	0	0	0	0	127	157.2	2.00	20	1	1	0	1	0	0	0	0	0	0	1	0	1	4	0	0	0	0	1	0	2000	273	1	1
Tatung Ultra	2	414.0	438.8	97	20730	USP	1	1	0	1.31	0	0	0	1	0	0	0	0	127	157.2	2.00	20	1	1	0	1	0	0	0	0	0	0	1	0	1	4	0	0	0	0	1	0	2000	273	1	1
Tatung Ultra	2	658.0	697.5	97	24830	USP	1	1	0	1.31	0	0	0	1	0	0	0	0	127	157.2	2.00	20	1	1	0	1	0	0	0	0	0	0	1	0	1	4	0	0	0	0	1	0	2000	273	1	1
Tatung VARstation 1	1	15.0	15.0	90	7000	SP	0	0	1	1.04	1	0	0	0	0	0	0	0	8	20.0	0.67	19	0	1	0	0	0	0	1	0	0	1	0	0	0	6	0	0	1	0	0	0	32	6	1	0
Tatung VARstation 1	1	15.0	15.0	90	22425	SP	0	0	1	1.31	0	0	0	1	0	0	0	0	8	20.0	0.67	19	1	1	0	0	0	0	1	0	0	1	0	0	0	6	0	0	1	0	0	0	32	6	1	0
VAXstation 2000	1	0.9	0.9	88	5238	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.0	0.00	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	6038	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.0	0.00	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	7538	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	8.0	0.00	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	8038	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.2	0.07	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	8338	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	8.0	0.00	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	8538	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.0	0.00	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	8838	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	8.2	0.07	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	10238	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	4.5	0.16	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	10338	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	7.7	0.07	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	10838	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	8.0	0.00	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	11038	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	4	4.5	0.16	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	11138	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	7.7	0.07	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	11338	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.2	0.07	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	12438	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	4.0	0.16	19	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	12538	VAX	0	0	1	0.79	1	0	0	0	0	0	0	0	6	4.0	0.16	15	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	12538	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.0	0.00	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	13538	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	4.5	0.16	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	13638	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	7.7	0.07	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	14838	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	8.0	0.00	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	15338	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	8.2	0.07	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	15838	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	4.0	0.16	15	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	17538	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	4	4.5	0.16	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	17638	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	7.7	0.07	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0
VAXstation 2000	1	0.9	0.9	88	19838	VAX	0	0	1	0.79	0	1	0	0	0	0	0	0	6	4.0	0.16	19	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	6	0.48	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unscreel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
VAXstation 3000	1	2.7	2.7	88	21138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	18	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	21138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	28188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	28188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	29138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	29138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	36188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	36188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	52818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	52818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	60818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	88	60818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	21138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	21138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	26138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	15	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	26138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	15	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	28188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.15	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	28188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	29138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	29138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.0	0.00	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	33138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	15	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	33138	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	15	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	36188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	36188	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.4	0.16	19	1	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	16	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	46818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	46818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	52818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	52818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	0	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	54818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	54818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	15.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	60818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3000	1	2.7	2.7	89	60818	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	16	13.9	0.28	19	1	0	1	0	0	0	0	0	0	1	0	0	5	0	0	0	1	0	0	32	1.65	1	0
VAXstation 3100	1	2.8	2.8	89	7714	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	7950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	8290	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	8930	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	10300	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	29.0	0.05	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	10950	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	13100	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.3	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	13114	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	10.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	13300	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	29.0	0.05	15	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	13450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	13690	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	10.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	14100	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.3	0.21	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	14330	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	10.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	14514	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	29.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	14700	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	10.3	0.21	19	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	14914	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	20	10.0	0.00	15	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	15090	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	29.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	32	1.3	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
VAXstation 3100	1	2.8	2.8	89	15490	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	20	10.0	0.00	15	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	15730	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	10.0	0.00	15	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	15800	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	29.0	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	16100	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.3	0.21	15	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	16130	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	20	10.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	16914	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	20	29.0	0.00	15	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	17490	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	20	29.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	17700	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.3	0.21	15	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	18130	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	20	10.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	18600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.3	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	20200	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	10.3	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	24600	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	6.2	0.31	19	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	27600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	6.2	0.31	15	1	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	89	30100	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	6.2	0.31	19	1	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	32	1.3	0	0
VAXstation 3100	1	2.8	2.8	90	5950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	6950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	7950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	8300	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	48.2	0.05	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	8950	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	15	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	8950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	15.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	8990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	9450	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	24.8	0.10	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	9990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	10100	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.1	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	10550	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	48.2	0.05	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	10990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	11100	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	13.7	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	11349	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	48.2	0.05	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	11450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	11450	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	24.8	0.10	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	11700	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.1	0.21	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	11965	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	48.2	0.05	15	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	11990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	12350	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.1	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	12450	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	12450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	12490	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	24.8	0.10	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	12900	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	13.7	0.21	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	13100	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	15	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	13140	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	13140	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	9.5	0.42	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	13350	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	13.7	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	13450	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	13450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	13590	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	48.2	0.05	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	13800	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	48.2	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	13950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	15.1	0.21	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	14140	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	14450	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32	2.3	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mpixels	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
VAXstation 3100	1	3.8	3.8	90	14490	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	24.8	0.10	16	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	14700	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	15	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	14740	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	14950	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	24.8	0.10	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	14950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	13.7	0.21	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	15050	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	15.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	15390	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	15390	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	15600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	15600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	9.5	0.42	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	15940	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16050	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	48.2	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16050	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	48.2	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16400	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	16600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	16700	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16950	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	24.8	0.10	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16950	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	24.8	0.10	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	16990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	17200	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	17600	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	9.4	0.31	19	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	17850	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	17850	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	17850	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	17990	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	18400	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	18850	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	18850	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	18850	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	19450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	15.1	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	19600	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	9.4	0.31	19	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	20450	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	13.7	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	20600	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	9.4	0.31	15	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	21700	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	9.4	0.31	16	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	2.8	2.8	90	23100	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	9.4	0.31	19	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	23700	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	9.4	0.31	16	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	90	25100	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	9.4	0.31	19	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	2.3	0	0
VAXstation 3100	1	3.8	3.8	91	5327	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	35.0	0.00	19	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	5997	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	35.0	0.00	19	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	7069	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	130.9	0.05	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	7672	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	57.7	0.12	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	8133	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	35.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	8300	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	31.5	0.24	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	8873	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	35.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	8945	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	30.2	0.24	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	8950	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	35.6	0.21	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	9347	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	8	31.5	0.24	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	10057	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	130.9	0.05	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.6	91	10357	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	35.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	CompMIPS	Year	Package $$	Processor Type	Lrg ExtCache	FP Accelerator	FP Co-processor	Mphints	Unaccel Mono	Dumb Color	True Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Bus Expansion Slots	Comp Room	Lg Deskside	Med Deskside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
VAXstation 3100	1	3.8	3.8	91	10723	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	57.7	0.12	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	11340	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	31.5	0.24	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	11389	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	35.6	0.21	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	11416	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	35.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	11512	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	12	30.2	0.24	19	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	11589	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	35.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	12136	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	30.2	0.24	16	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	12351	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	31.5	0.24	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	12359	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	130.9	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	12680	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	130.9	0.05	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	13052	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	57.7	0.12	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	13391	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	57.7	0.12	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	13650	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	13650	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	13745	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	35.6	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	13800	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	31.5	0.24	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	13852	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	30.2	0.24	16	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14050	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	31.5	0.24	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14504	VAX	0	1	0	0.79	1	0	0	0	0	0	0	0	16	20.3	0.36	19	0	1	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14515	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	30.2	0.24	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	14850	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14892	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	30.2	0.24	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14892	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	14977	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	8	31.5	0.24	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	16050	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	16050	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	34.2	0.21	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	16156	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	30.2	0.24	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	17250	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	12	34.2	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	7.6	7.6	91	17250	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	12	34.2	0.21	19	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	18249	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	20.3	0.36	16	1	1	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	6.6	0	0
VAXstation 3100	1	3.8	3.8	91	19829	VAX	0	1	0	0.79	0	1	0	0	0	0	0	0	16	20.3	0.36	19	1	1	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	32	6.6	0	0
VAXstation 35x0	1	5.0	5.0	89	32363	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.4	0.30	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	5.0	5.0	89	32363	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.4	0.30	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	5.0	5.0	89	40363	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	13.2	0.60	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	10.0	10.0	89	40363	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	13.2	0.60	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	10.0	10.0	89	52363	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	16	9.4	0.30	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	0
VAXstation 35x0	1	10.0	10.0	89	60363	VAX	0	1	0	1.31	0	0	0	0	0	1	0	0	16	7.2	0.60	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	0
VAXstation 35x0	1	5.0	5.0	90	25560	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	5.0	5.0	90	25560	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	10.0	10.0	90	46560	VAX	0	1	0	1.31	0	0	0	0	0	1	0	0	16	9.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	0
VAXstation 35x0	1	5.0	5.0	91	25560	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	5.0	5.0	91	25560	VAX	0	1	0	1.31	0	0	0	0	1	0	0	0	8	15.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	2
VAXstation 35x0	1	10.0	10.0	91	46560	VAX	0	1	0	1.31	0	0	0	0	0	1	0	0	16	9.7	0.28	19	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	64	1.33	0	0
VAXstation 4000	1	8.4	8.4	92	3450	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	17	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	8.4	8.4	92	3525	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	13	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	8.4	8.4	92	4750	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	8.4	8.4	92	4950	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	20.0	0.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	18.4	18.4	92	5995	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	8.4	8.4	92	6750	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	20.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	8.7	1	0

Workstation Industry Product Offerings 1983-1996

Specific Product Pkg	# Processors	MIPS	Compl MIPS	Year	Package $$	Processor Type	Lg ExtCache	FP Accelerator	I/F Co-processor	Nghnets	Unaccel Mono	Unaccel Color	Trms Color	Accelerated 2D	Accel/Hi Res/Hi Perf 2D	Accel 3D	High End 3D	Extreme 3D/Vis	Base Memory	System Expansion	Base Storage	Monitor Size	Color Monitor (y/n)	2 Serial	1 Serial	Parallel	Magtape	Cartridge Tape	Floppy	Floppy & CDROM	CD-ROM	10MB Ethernet	100MB Ethernet	Video Adapt/Accel	Audio Adapters	Gui Expansion Slots	Comp Room	Lg Desktside	Mon Desktside	Tower	Desktop	Sm. Desktop	Max Memory	Max Storage	Proc Upgrade	Proc Expansion
VAXstation 4000	1	18.4	18.4	92	10495	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	16	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	18.4	18.4	92	11495	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	18.4	18.4	92	11995	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	20.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	24.0	24.0	92	14400	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	16	28.4	0.43	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	24.0	24.0	92	16100	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	16	16.7	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	24.0	24.0	92	20000	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	32	24.4	0.43	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	18.4	18.4	92	21895	VAX	0	1	0	1.31	0	0	0		0	1	0	0	8	20.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	24.0	24.0	92	27595	VAX	0	1	0	1.31	0	0	0	0	0	1	0	0	32	12.7	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	24.0	24.0	92	37115	VAX	0	1	0	1.31	0	0	0	0	0	1	0	0	64	12.2	0.85	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	8.4	8.4	93	3950	VAX	0	1	0	0.79	0	0	0	1	0	0	0	0	8	27.0	0.00	17	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	8.4	8.4	93	5450	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	27.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	24	8.7	1	0
VAXstation 4000	1	18.4	18.4	93	6895	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	27.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	18.4	18.4	93	8195	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	8	27.0	0.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	104	8.7	1	0
VAXstation 4000	1	24.0	24.0	93	13995	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	16	16.7	1.00	19	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	24.0	24.0	93	16895	VAX	0	1	0	1.31	0	0	0	1	0	0	0	0	16	16.7	1.00	19	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	128	8.7	1	0
VAXstation 4000	1	24.0	25.4	95	17525	AXP	1	1	0	1.31	0	0	0	0	0	1	0	0	16	58.0	0.00	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	128	50	0	0
VAXstation 4000	1	24.0	25.4	95	24405	VAX	1	1	0	1.31	0	0	0	0	0	1	0	0	64	58.0	1.00	21	1	1	0	1	0	0	0	0	0	1	0	0	1	6	0	0	0	0	1	0	128	50	0	0
VAXstation 8000	1	1.1	1.1	88	80214	VAX	0	1	0	0.79	0	0	0	0	0	1	0	0	16	72.5	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	8	0	1	0	0	0	0	9	10	1	0
VAXstation 8000	1	1.1	1.1	88	80214	VAX	0	1	0	0.79	0	0	0	0	0	1	0	0	16	72.5	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	8	0	1	0	0	0	0	9	10	1	0
VAXstation 8000	1	1.1	1.1	88	80214	VAX	0	1	0	0.79	0	0	0	0	0	1	0	0	16	72.5	0.16	19	1	0	1	0	0	1	0	0	0	1	0	0	0	8	0	1	0	0	0	0	9	10	1	0