WHITE PAPER

March 1999

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Workstation Marketing

Compaq Computer Corporation

Contents

Compaq Professional Workstation SP700 Key Technologies White Paper

The purpose of this paper is to provide an overview of the Key Technologies incorporated into the Compaq Professional Workstation SP700. This paper concentrates on covering those features and technologies that have unique customer benefits. The objective is to provide the technical information and benefits of these features.

New enhancements made to the Compaq Professional Workstation SP700 include: Intel Pentium III Xeon 550-MHz and 500-MHz processors, PowerStorm 600 Enhanced-3D graphics, Mylex AcceleRAID 150 Array Controller, and Wide Ultra2 SCSI controllers and hard drives.

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Compaq Professional Workstation SP700 Key Technologies White Paper

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Document ECG022/0399

COMPAQ PROFESSIONAL WORKSTATION SP700

The Compaq Professional Workstation SP700 is a Windows NT-based system that is founded upon industry standards and designed specifically for users requiring scalability, expandability, and optimal performance. The SP700 keeps pace with today's most demanding applications by delivering uncompromising power and challenging UNIX-based system performance. Incorporating the second generation Highly Parallel System Architecture design, Intel Pentium® III Xeon™ processors, new high-performance 3D graphics, IEEE 1394, and the latest component technologies, the Compaq Professional Workstation SP700 delivers industry-leading performance coupled with unprecedented reliability.

The SP700 is ideal for any professional specializing in compute-intensive applications. Users who have made the strategic architectural decision to move from RISC-based UNIX systems to Intel workstations running Windows NT will experience comparable, if not higher, performance levels at a substantially lower total cost of ownership. The SP700 combines a robust industry standard platform, testing and certification of leading high-end software applications, and traditional Compaq quality to provide optimal performance and compatibility.

Target markets for the Professional Workstation SP700 include:

- **Mechanical CAD and CAM** designers performing functional, tool and fixture, conceptual and plant design. Example applications include: Parametric Technology Corporation's Pro/ENGINEER and DesignWave; SDRC's I-DEAS Master Series and Metaphase Series 2; EDS Unigraphics' Unigraphics and SolidEdge; and Dassault Systemes' CATIA and CADAM.
- **CAE** professionals utilizing design and simulation analysis to predict fluid flow, statics and dynamics, heat and mass transfer, chemical reaction, and related phenomena. Example applications include: MARC Analysis Research Corporation's MARC and Menat; Fluent, Inc.'s FLUENT, FIDAP, and POLYFLOW; and ANSYS, Inc.'s ANSYS Family of Products.
- **Digital Content Creators (DCC)** performing design tasks, such as animation frame rendering, 3D imaging, and video editing. Example applications include: Softimage's Digital Studio and Softimage 3D; Alias|Wavefront's Maya, Studio, and PowerAnimator 8.0; Kinetix's 3D StudioMAX, Character Studio, and Viz; Avid's Symphony and Media Composer; and Pinnacle Systems' Reeltime.
- **Electronic Design Automation (EDA)** engineers involved in simulation, synthesis, verification, and automated place and route. Example applications include: Cadence's Verilog XL Turbo and SPECCTRAquest; Mentor Graphics' Boardstation, Calibre, xCalibre, and Interconnectix; Synopsys' Design Compiler, VCS, and XTK for Windows; Avant!'s HSPICE and Hercules; OrCAD's PSPICE; Silvaco's SmartSPICE; and Ambit's BuildGates.

- **Financial Analysis and Risk Management** professionals performing real-time financial analysis and portfolio risk management. Example applications include: NeoVision Hypersystems, Inc.'s Heatmaps and RiskMaps; Decisioneering, Inc.'s Crystal Ball and Analytica; TIBCO's TIB and MarketSheet; and Reuters' Reuters RTW and KOBRA.
- **Geographic Information Systems (GIS)** professionals who manage, manipulate, analyze, and display geographic data and attribute data. Example applications include: Earth Resource Mapping's ER Mapper V5.5, ERDAS'IMAGINE VirtualGIS V8.3,

INTEL PENTIUM III XEON PROCESSORS

Select models of the Compaq Professional Workstation SP700 incorporate Intel's new 550-MHz and 500-MHz Pentium III Xeon processors. The Pentium III Xeon is Intel's most advanced and powerful processor. The processor features the key attributes of the P6 microarchitecture, such as Dynamic Execution, a multi-transactional system bus, and Intel MMX media enhancements. In addition to these features, the Pentium III Xeon introduces new Streaming SIMD Extensions. Streaming SIMD Extensions consist of 70 new instructions enabling advanced imaging, 3D, streaming audio and video, and speech recognition applications. The Pentium III Xeon can reach a 550-MHz clock speed compared to the Pentium II Xeon at 450 MHz maximum. The new Intel Pentium III Xeon processor is fully compatible with existing Intel architecture-based software.

New Streaming SIMD Extension features include:

- Higher resolution and higher quality images can be viewed and manipulated than previously possible
- High quality audio, MPEG2 video and simultaneous MPEG2 encoding and decoding
- Reduced CPU utilization for speech recognition, as well as higher accuracy and faster response times

In addition to the new Streaming SIMD Extension features, Intel Pentium III Xeon processors retain the valuable features Intel Pentium II Xeon offered, such as:

- 100-MHz Front Side Bus
- Full-speed Level 2 cache
- Dynamic execution micro-architecture technology
- Seamless multiprocessing with built-in cache coherency
- Multi-transaction system bus
- 512 KB or 1MB of integrated non-blocking L2 cache
- Dedicated 64-bit cache bus
- High performance Dual Independent Bus architecture (system bus and cache bus)

The Professional Workstation SP700 can support up to two Intel Pentium III Xeon processors running up to 550 MHz. Pentium II Xeon and Pentium III Xeon processors cannot be mixed. For dual-capable workstations to function properly, they must contain either two Pentium III Xeon or two Pentium II Xeon processors of the same clock speed.

To take full advantage of the Streaming SIMD Extensions performance gains, either the driver for OpenGL-capable graphics controllers or ISV applications need to include instructions to take advantage of these new extensions. Compaq will provide Streaming SIMD Extensions enabling graphics drivers on our web site when they are available.

The Pentium III processors also have a processor serial number feature. The Intel processor serial number (PSN) feature consists of silicon devices in Intel's Pentium III processor that are programmed to a specific number during manufacturing. PSN serves as an identifier similar to the serial numbers on other electronic devices or products, except the processor's serial number is implemented electronically, rather than being placed on the exterior of the product.

Compaq will ship Compaq Professional Workstations with the processor serial number disabled in BIOS as the default setting prior to shipment. Compaq believes the control of the processor serial number feature should remain in the hands of the users, thus providing the ability to choose whether or not to release personal information. Compaq Professional Workstation customers can enable the processor serial number feature by running Computer Setup - F10.

In response to privacy concerns, Intel developed a control utility application that can be installed in the Windows "Start" folder. The control utility is used by some manufacturers or users to disable or enable PSN. The control utility's default setting will be in the "OFF" position, which is designed so the system will remember the most recent selection and set the processor number correctly to "ON" or "OFF" each time the computer is reset. If customers want to turn the processor serial number "ON," they must change the default setting in the utility to "ON" and reset the processor. The Intel software control utility can be used with Compaq Professional Workstations. However, upon running the utility, the user must still access Computer Setup to enable the PSN feature since BIOS instruction overrides software.

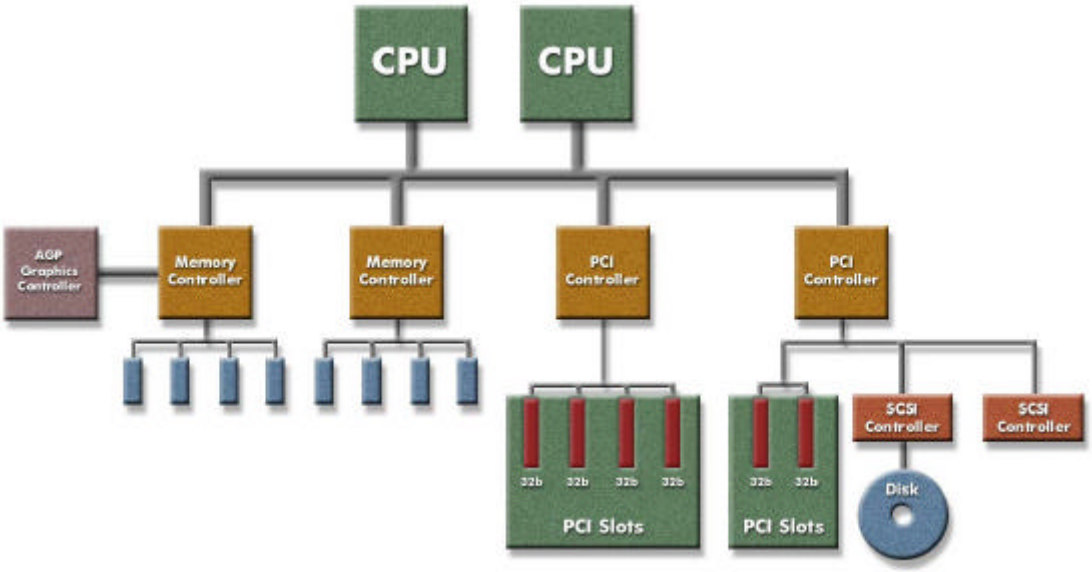
> *NOTE: Compaq Professional Workstation customers can "enable "PSN through Computer Setup –F10 without the assistance of Intel's software Control Utility. Intel will make the control utility available on its Web site at www.intel.com.*

For more information about the Pentium III Xeon processor, visit Intel's web site at: http://www.intel.com/

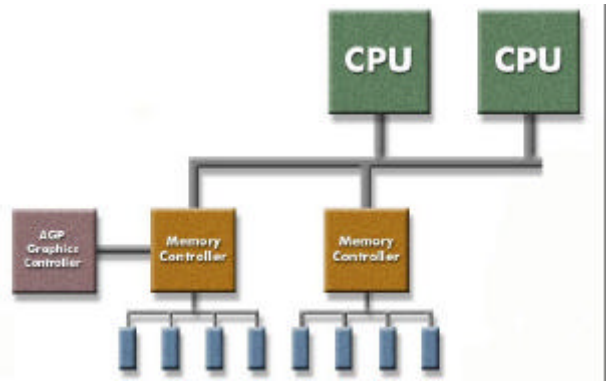
HIGHLY PARALLEL SYSTEM ARCHITECTURE

Compaq Workstation engineers conducted extensive application profiling to understand the nature of the bottlenecks inherent when running complex, resource-intensive applications, such as those found in CAD/CAE, EDA, DCC, and financial analysis environments. The Compaq Professional Workstation SP700 is designed with a standards-based Highly Parallel System Architecture that maximizes system bandwidth to improve performance in demanding, resource-intensive applications. Most workstations in the NT/X86 market support two CPUs to process instructions concurrently. However, overall system bandwidth is limited since each CPU must compete for access to critical subsystems, such as memory and I/O, for which the bandwidth has not been correspondingly increased.

The Highly Parallel System Architecture used with the Compaq Professional Workstation SP700 addresses the need for greater overall system bandwidth by using dual memory controllers, dual-peer PCI buses, dual channel SCSI buses, AGP 2X support, and optimized multiprocessing support.

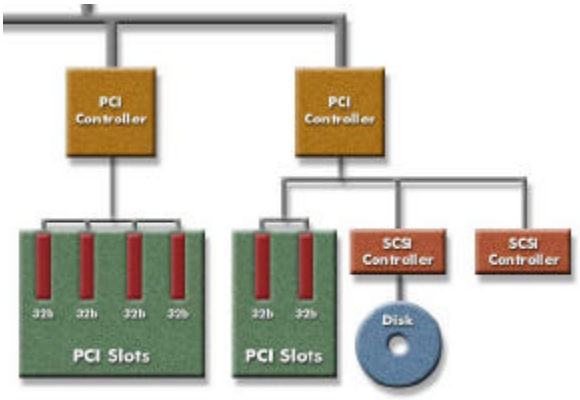


Dual Memory Controllers



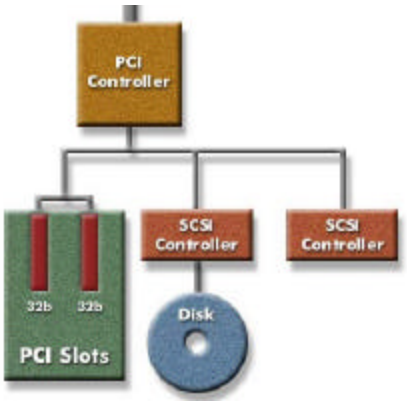
The Compaq Professional Workstation SP700 uses dual memory controllers that can process memory requests in parallel, significantly increasing overall memory bandwidth. Other workstations in the Intel-based Windows NT market that use a single memory controller, such as the 440BX/GX AGPset, offer memory bandwidth of up to 800 MB/s. The Compaq Professional Workstation SP700 uses two memory controllers, each with a bandwidth of 800 MB/s. Therefore, total memory bandwidth increases to 1.6 GB/s, two times that of other systems. The SP700 can support up to 4 GB of system memory (using eight 512-MB DIMMs), more than any other Intel-based Windows NT workstation. Larger memory expandability gives the Compaq Professional Workstation SP700 greater ability to run memory-intensive applications with large data sets, such as NASTRAN and VCS.

Dual-Peer PCI Buses



The Compaq Professional Workstation SP700 uses dual-peer PCI buses to increase system I/O bandwidth. A single PCI bus provides I/O bandwidth of 133 MB/s, which must be shared by many key peripherals, such as the SCSI controllers, array controllers, and NIC. With dual-peer PCI buses, each bus can provide peek bandwidth in parallel with the other controller, allowing an aggregate I/O bandwidth of 267 MB/s. Also, the dual PCI buses allow key peripherals to be connected to separate buses to balance system throughput.

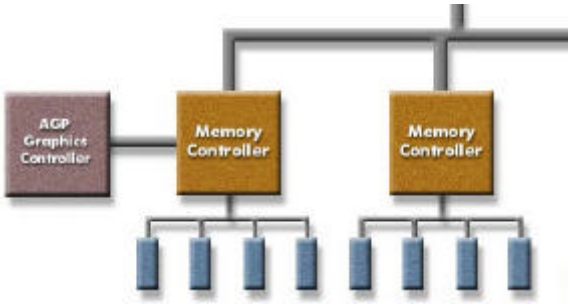
Dual Channel SCSI Buses



The Compaq Professional Workstation SP700 uses dual, independent channel Wide-Ultra SCSI controllers, which balance the disk subsystem work load and performance by placing high-performance peripherals on separate buses. Using dual SCSI buses provides the capability of separating lower performance SCSI devices, such as tape backup devices, from high performance devices, such as 10,000 rpm hard drives and RAID arrays. The dual Wide-Ultra SCSI implementation also doubles the bandwidth to the disk subsystem, providing an aggregate bandwidth of 80 MB/s (40 MB/s per controller) when compared to single SCSI bus systems.

Select models of the SP700 include the Symbios Wide Ultra2 SCSI PCI controller and Wide Ultra2 hard drives. This offers the customer improved transfer rates of up to 80 MB/s per channel as compared to 40 MB/s as found on Wide Ultra devices.

AGP 2X Support



The AGP bus is an I/O port that directly links the graphics controller to system memory. By providing a dedicated path to system memory, AGP provides faster graphics performance when 3D applications use texture mapping or extensive command lists that require more data support than is available in local memory on the graphics subsystem. The Compaq Professional Workstation SP700 fully supports the Accelerated Graphics Port (AGP) 2X specification.

Optimized Multiprocessing Support

Finally, the SP700 delivers optimized multiprocessing performance by combining the Intel Pentium III Xeon or Pentium II Xeon processors with the Compaq Highly Parallel System Architecture. Some manufacturers have added multiple processors to a typical desktop system design and called the end result a "workstation." In contrast, Compaq engineers have designed a standards-based architecture that increases the bandwidth of critical subsystems to complement the multiprocessing capabilities of the system. This balanced approach to system design ensures maximum performance in applications that stress more than just the processor.

WIDE ULTRA2 SCSI NEW!

- *Available as a standard configuration on select models of the Compaq Professional Workstation SP700. Wide Ultra2 SCSI controllers and hard drives are also available as an option or flexible configuration (flexible configuration available in North America only)*

Wide Ultra2 SCSI utilizes LVD (low voltage differential) signaling and a 40 MHz clock rate to allow maximum burst rates on the Ultra2 SCSI bus of 80 MB/s, which doubles the maximum burst rate of Wide Ultra SCSI. This higher data burst throughput rate provides superior performance in large data transfers, such as streaming video, loading large CAD models, and in configurations with several high-speed disks on a single controller. The Ultra2 controller offers more bandwidth headroom for these demanding applications than is available on the Ultra-Wide SCSI controller and is therefore more impervious to performance degradation due to the saturation of the SCSI bus. LVD uses differential signaling technology, which has lower voltage swings and is less susceptible to noise than Ultra SCSI technology.

Select models of the Compaq Professional Workstation SP700 come standard with a one-inch 9.1-GB Wide Ultra2 10,000 rpm SCSI hard drive, as well as a Symbios Wide Ultra2 SCSI PCI controller.

Ultra2 SCSI LVD is backward-compatible with all previous versions of SCSI. When an Ultra2 drive is installed on a previous-version SCSI bus, performance defaults to the specifications of that bus.

CUSTOMER BENEFIT

Maximum burst rate doubled. Wide Ultra2 SCSI features an 80 MB per second burst rate compared to Wide-Ultra SCSI's 40 MB per second. This saves time through faster performance in some applications where the SCSI bus is the bottleneck. In multiple disk configurations, significant performance gains are evident where large blocks of data are sequentially accessed.

RAID CONTROLLERS NEW!

- *Available on the Compaq Professional Workstation SP700 as an option*

Although there are numerous variations of RAID (Redundant Array of Independent Disks) solutions available, there are two fundamental approaches to providing disk fault-tolerance, data integrity, and performance. The first approach, hardware RAID, uses a dedicated hardware array controller with its own microprocessor, memory, and embedded SCSI controller. The second approach, software RAID, uses Windows NT 4.0 to handle the data striping across multiple drives.

The Compaq Professional Workstation SP700 offers two hardware array controllers: Compaq SMART Array 221 Controller and the Mylex AcceleRAID 150 Array Controller. Both the Compaq SMART Array 221 and Mylex AcceleRAID 150 are excellent solutions when RAID 1 and 5 are required for fault-tolerance and data integrity. The SMART Array 221 is a single channel Wide Ultra2 SCSI array controller and provides excellent RAID 0, 1, and 5 performance while offering the same reliability and integrity customers have come to expect from Compaq. The Mylex AcceleRAID 150 is a low cost, high performance single channel Wide Ultra2 array controller that provides full RAID 0, 1, 0+1, 3, 5, 10, 30, 50, and JBOD level configuration capabilities.

The choice of RAID level and RAID type (software or hardware) is dependant on the individual needs of the customer. Customers using video editing software, for instance, may want the highest performance disk subsystem possible through the use of software RAID 0. For customers performing mission critical applications that require the highest fault-tolerance and data integrity, such as financial analysis, the SMART 221 and Mylex AcceleRAID 150 hardware array controllers provide excellent RAID 1and 5 performance.

Compaq SMART Array 221 Controller features include:

- Wide Ultra2 SCSI support
- External ProLiant Storage System support
- Seamless upgrade from the last generation array controller (SMART-2SL)
- Hardware based XOR engine and array processor for increased performance
- Easy to use wizard based configuration utility
- Auto-rebuild and recovery from failed drive (supports Online Spare Drives)

Mylex AcceleRAID 150 Array Controller features include:

- RAID expansion – allows users to add drives to existing arrays and re-stripe data across all the drives
- RAID migration – allows easy online reconstruction of data from one RAID configuration to another
- Support for copy-drive groups – a method of transferring the contents of one logical drive to another in a single step
- BIOS configuration utility – enables automatic configuration of the system independent of the operating system and without requiring the use of extra software utilities
- Global Array Manager (GAM) –enables the RAID system to be configured, maintained and monitored over the Internet or corporate Intranet. GAM support available 2Q99.
- Parity cache memory, automatic and transparent rebuild of failed drives, On-line RAID capacity expansion, hot spare drive support, RAID configuration stored on both disk and in non-volatile RAM

CUSTOMER BENEFITS

- **Ease of set up, flexibility and management.** Easy to use GUI setup enables the array to be used as soon as it is configured. Most other RAID controllers require administrators to wait up to several hours as the initialization tasks are completed.
- **Fault tolerance features.** Features such as automatic detection of failed drives and automatic and transparent re-build of replacement drive provide high security for important data.
- **Industry standard PCI for low cost RAID.** Compaq Professional Workstations support industry standard PCI for low cost RAID while other vendors have opted to use proprietary PCI derivatives such as RAIDport.

100-MB ATAPI ZIP DRIVE NEW!

➢ Available on the Compaq Professional Workstation SP700 as an option or flexible configuration (flexible configuration available in North America only)

The 100-MB ATAPI ZIP Drive is a removeable storage device that utilizes 100-MB ZIP disks to store data. The ATAPI ZIP connects internally through an IDE/ATAPI interface. ZIP disks are slightly larger than conventional floppy disks, and about twice as thick. They can hold 100 MB of data. The drive fits 3.5" or 5.25" standard bays and uses an internal power supply. The 100-MB ATAPI ZIP drive provides flexibility because it assists employees in sharing their work and moving large files between home and office.

CUSTOMER BENEFITS

- **Improved value.** The ATAPI ZIP drive adds life to your system by adding 100 MB capacity with each ZIP disk
- **Increased flexibility and convenience.** Workers can share work by transporting information on ZIP disks and users can move large data files between home and office

MEMORY

The Compaq Professional Workstation SP700 uses 100-MHz Registered ECC Synchronous DRAM (SDRAM) and can support up to 4 GB of memory (using eight 512-MB DIMMs), which is up to twice the amount of other competitive Intel-based Windows NT workstations. The memory architecture used on the Compaq Professional Workstation SP700 also allows for added flexibility when configuring memory by providing 8 DIMM slots. This allows users to reach larger memory capacities without having to use newer, more expensive memory technologies. For example, the Compaq Professional Workstation SP700 can be configured with 2 GB of RAM by using eight 256-MB DIMMs instead of four 512-MB DIMMs. Currently, one 512-MB DIMM costs 50% more than two 256-MB DIMMs. So, using smaller capacity DIMMs is cost effective and delivers the best performance when the DIMMs are split between the two memory controllers. SDRAM is designed to accommodate higher processor speeds and provides faster memory operation with burst data rates of up to four times that of standard page-mode DRAMs.

CUSTOMER BENEFITS

There are clear benefits to the memory architecture used on the Compaq Professional Workstation SP700. Key benefits include*:*

- **Increased performance**. Customers will experience greater CPU responsiveness with SDRAM technology. The SP700 uses industry standard, 100MHz Registered ECC SDRAM to support the latest Intel Pentium III Xeon processors.
- **Greater memory expandability**. The SP700 can support up to 4 GB of system memory, more than any other Intel-based Windows NT workstation. Larger memory expandability gives the Compaq Professional Workstation SP700 greater ability to run memory-intensive applications with large data sets, such as NASTRAN and VCS.
- **Memory upgrade flexibility**. The SP700 features 8 DIMM slots, allowing users to reach larger memory capacities without having to use newer, more expensive memory.

CHASSIS FEATURES

The Compaq Professional Workstation SP700 chassis has been designed for ease of service and expandability

SP700 Chassis

- Open using thumbscrews (no tools are required)
- Single side panel
- Most components are visible after side panel is removed, providing easy access to processors and memory
- Removable expansion board assembly allows for easy PCI and ISA board upgrades
- The system board is attached to a tray and slides out for easy removal or replacement
- The internal drive cage is also removable and makes adding additional hard drives easier.
- The Compaq Professional Workstation SP700 chassis has also been designed to be rack mounted, using an optional rack conversion kit.

The Compaq Professional Workstation SP700 chassis expandability:

Nine expansion slots:	**Seven drive bays:**
• Five PCI • Two ISA • One shared PCI/ISA • One AGP (populated by graphics controller)	• Three internal 3.5 ”(one populated by hard drive) • Three 5.25 ”user-accessible drive bays (one populated by the CD-ROM drive) • One 3.5 ”diskette drive.

ACCELERATED GRAPHICS PORT (AGP)

The Compaq Professional Workstation SP700 features Accelerated Graphics Port (AGP) capability. AGP support provides faster graphics performance when an application requires more textures and command lists than can be supported by the local memory of a graphics subsystem. If data from an application overflows from the local graphics memory, the graphics engine can benefit by having a direct path to the system memory.

AGP is an extension of the PCI bus that addresses the limitations of PCI for handling large amounts of graphical data. AGP is effectively a dedicated port that directly links the system graphics to the system memory. AGP runs at 66 MHz, twice the speed of the PCI bus. Because data is sampled on both the rising and falling edge of the 66-MHz clock, it can have an effective data transfer rate of 533 MB/s. The deployment of a high-bandwidth AGP solution for graphic subsystems frees the PCI bus so that it can better support existing and new peripheral functions migrating to the PCI bus.

CUSTOMER BENEFITS

Some specific applications that can benefit from AGP include:

- Video applications, like conferencing or DVD playback, where a steady stream of images must be sent from system memory to the graphics frame-buffer for display.
- Graphics command lists, such as lengthy data sets defining vertices for 3D objects.
- Texture memory for 3D rendering, where textures are overlaid on 3D objects for realistic effects. To improve realism, texture sizes will grow to 32 MB and beyond in 1999.

GRAPHICS

Three graphics solutions are available for the Compaq Professional Workstation SP700. Two are AGP controllers, which take advantage of main memory for texture mapping operations, while the other is a combination AGP and PCI solution. All controllers have been tested to ensure optimum compatibility and reliability.

- For 2D and entry 3D applications, the Compaq Professional Workstation SP700 includes the ELSA GLoria Synergy+ (AGP). The ELSA GLoria Synergy+ comes standard with 8 MB of SGRAM. It provides fast 2D windowing and is a great low-cost 3D solution for CAD and DCC applications.
- For mid-range 3D graphics needs, the Compaq Professional Workstation SP700 includes models with the Compaq PowerStorm 300 (AGP) graphics controller. The Compaq PowerStorm 300 is a high-performance, 3D graphics solution for users working in demanding, true color environments. It uses the high-performance REALimage 2100 rendering engine from Evans & Sutherland, provides true color resolution (16 million colors) at up to 1280 x 1024 resolution, and is ideal for higher-end 3D graphic requirements, such as Pro/ENGINEER. This controller comes standard with 15-MB 3D-RAM for frame and Z-buffer memory and 16 MB of Cache DRAM (CDRAM) for texture memory.

- For Enhanced 3D graphic needs, the Compaq Professional SP700 includes a model with the Compaq PowerStorm 600. The Compaq PowerStorm 600 is a two-slot solution that uses 1 AGP slot and 1 PCI slot. The Compaq PowerStorm 600 includes features for mid-range 3D, such as support for 1280 x 1024 true color resolution, and adds dedicated AGP-based geometry acceleration and 64 MB of texture memory for powerful enhanced 3D. The PowerStorm 600 is an ideal solution for technical professionals running high-end 2D/3D animation (3D StudioMAX, Softimage, Maya) and CAD/CAE applications (Pro/E, UG, CATIA, I-DEAS, Hypermesh,)

For more information about our graphics offering refer to:
http://www.compaq.com/products/workstations/graphics

Compaq Graphics Driver Compatibility

All controllers are high-performance graphics solutions, optimized for Windows NT applications that require up to 16.7 million color processing and high resolutions. The drivers for each are developed by their respective manufacturers and have been thoroughly tested by Compaq to ensure compatibility with existing applications.

ELSA GLoria Synergy+ (AGP) Graphics Controller

The ELSA GLoria Synergy+ (AGP) graphics controller in the Compaq Professional Workstation SP700 comes standard with 8 MB of SGRAM to provide greater color depth in higher resolution modes. The GLoria Synergy+ is the perfect low-cost solution for mainstream CAD, web authoring, pre-print, Financial analysis and trading, and 2D/3D animation applications that do not require greater than 1024x768 resolution for true-color rendering. This combination is important for mainstream CAD applications, such as AutoCAD, Microstation, and SolidWorks, which have recently integrated 3D techniques into their environment. It is also useful in DCC where 2D and 3D animation applications are used in the same environment. Financial analysis and trading environments can benefit from the 2D performance provided by these solutions.

ELSA GLoria Synergy+ Color and Resolution Support

Resolution	8-MB SGRAM	Maximum Refresh Rate
1920x1200	32,768	75 Hz
1920x1080	32,768	80 Hz
1600x1280	32,768	85 Hz
1600x1200	32,768	85 Hz
1600x1000	32,768	100 Hz
1536x1152	32,768	85 Hz
1280x1024	16.7 million*	80 Hz
1152x864	16.7 million	100 Hz
1024x768	16.7 million	100 Hz
800x600	16.7 million	100 Hz
640x480	16.7 million	100 Hz

* 1280 x 1024 can run in a double-buffered visual if it is reduced to 32,768 colors

Features and Technical Specifications

- Provides 2D windowing performance equivalent to the Matrox Millennium II
- A low-cost solution for professional 3D applications, such as AutoCAD, Microstation, SolidWorks, and 3D StudioMAX
- Supports a wide range of resolutions and color depths for flexibility and performance in a variety of 3D graphics environments
- Supports up to 4 displays using additional GLoria Synergy controllers (PCI)
- Uses 3Dlabs Permedia-2A processor for highly integrated 2D and robust 3D rendering requirements
- Comes standard with 8 MB of SGRAM
- Supports up to 1920x1200 resolution at 16 bbp

- Provides a 24-bit double buffered environment at 1024x768 resolution (16-bit/single buffer at 1280x1024 including a 16-bit Z-buffer)
- Optimized graphics drivers for OpenGL and Heidi under Windows NT 4.0 and 3.51, display list drivers for AutoCAD, Direct3D driver for Windows 95

Features	Technical Specifications
Controller	3Dlabs Permedia-2A
Bus Type	AGP
RAMDAC	Integrated 250 MHz
Memory Type	SGRAM
Memory Amount	8 MB standard
Memory Speed	8 ns
Data Path	64-bit
Controller Clock Speed	90 MHz
Maximum Vertical Refresh Rate	219 Hz
Maximum Horizontal Scan Rate	281 kHz
Maximum Pixel Clock	250 MHz at 8 bpp and 16 bpp/5:5:5 145 MHz at 32 bpp/8:8:8
3D Graphics Features:	VGA
• Integrated geometry pipeline setup processor	Yes
• True-color 3D graphics	Yes
• Polygon based with Z-buffer	Yes
• Texture decompression	Yes
• Full scene anti-aliasing	Yes
• Enhanced GUI	Yes
Acceleration:	
• Ultra-fast BLT engine and 2D rasterizer	Yes
• Stretch BLTs, mono/color expansion and logic ops	Yes
• Fast on-chip SVGA	Yes
• AutoDesk Display list driver	Yes
• Heidi drivers support for 3D StudioMAX	Yes
Operating Systems	Windows 95 Windows 98 Windows NT 3.51/4.0

Compaq PowerStorm 300 (AGP)

Professionals that use high-end applications require the performance of mid-range 3D graphics solutions. CAD and CAE applications, such as Pro/E, Unigraphics, I-DEAS, CATIA, NASTRAN, and Hypermesh, take advantage of this graphics controller to provide a high performance rendering solution for solids modeling and visual data analysis. The PowerStorm 300 also provides superior performance and visual quality for DCC applications, such as Softimage, 3D StudioMAX, and Maya. System performance is key for these applications where the graphics controller must not be perceived as a bottleneck.

The PowerStorm 300 is an optimized, high-performance solution for 3D graphics requirements in this segment. Based on the REALimage 2100 architecture from Evans & Sutherland, it provides the fastest 3D-application performance in its class.

Compaq PowerStorm 300 Color and Resolution Support

Resolution	3D Acceleration with Double Buffering, Colors Supported	Texture Memory	Maximum Refresh Rate
1280x1024	16.7 million	16 MB	85 Hz
1024x768	16.7 million	16 MB	85 Hz
800x600	16.7 million	16 MB	72 Hz

Features and Technical Specifications

- Optimized solution at 1280x1024, true-color double buffered for demanding solids modeling, animation, and visualization applications
- Next-generation, high-performance rendering engine based on the Evans & Sutherland REALimage 2100 architecture
- 15-MB 3D-RAM for frame buffer and Z-buffer, 16-MB CDRAM (cache DRAM) for fast texture buffering

Features	Technical Specifications
Controller	Evans & Sutherland REALimage 2100
Bus Type	AGP
RAMDAC	IBM RGB 640
Memory Type	3D RAM and CDRAM
Memory Amount	15-MB 3D RAM, 16-MB CDRAM
Memory Speed	10-ns 3D RAM, 15-ns CDRAM
Data Path	128-bit
Controller Clock Speed	100 MHz
Maximum Vertical Refresh Rate	85 Hz
Maximum Pixel Clock	157 MHz
Hardware Accelerated 3D:	
• 24-bit Z-buffering	Yes
• Gouraud Shading	Yes
• Stencils	Yes
• Texture Mapping (bilinear and trilinear)	Yes
Performance:	
• Random 10-Pixel Solid Lines	4 million/s
• Filled 25-Pixel Triangles	4 million/s
Pixel Fill Rates:	
• Bilinear	90 million/s
• Trilinear	45 million/s
Operating System	Windows NT 4.0

Compaq PowerStorm 600

The Compaq PowerStorm 600 graphics controller delivers superior OpenGL 3D graphics performance for the most demanding professional applications. The PowerStorm 600 is based on the Wildcat 4000 graphics controller from Intense3D™. It provides best-in-class graphics features and performance for demanding CAD, CAE, DCC and visual data analysis. The Compaq PowerStorm 600 supports 1280 x 1024 true color resolution and includes 64 MB of texture memory to support complex true-color textures. Full OpenGL quad buffered stereo is supported for the highest 3D visual quality when using head mounted displays and shutter glasses.

Color and Resolution Support

Resolution	3D Acceleration with Double Buffering, Colors Supported	Texture Memory	Maximum Refresh Rate
640 x 480	16.7 Million	64 MB	60, 75, 85 Hz
800 x 600	16.7 Million	64 MB	60, 75, 85 Hz
1024 x 768	16.7 Million	64 MB	60, 75, 85 Hz
1152 x 864	16.7 Million	64 MB	60, 75, 85 Hz
1280 x 960	16.7 Million	64 MB	60, 75, 85 Hz
1280 x 1024	16.7 Million	64 MB	60, 75, 85 Hz

Features and Technical Specifications

- Geometry processing offloaded from the host by geometry accelerator.
- Resolution support up to 1280x1024 true color
- 16-MB frame buffer, 64-MB texture memory
- Stereographics support
- Optimized solution at 1280x1024, true-color for demanding MDA/MCAE (3D modeling, Finite Element Analysis, Computational Fluid Dynamics), Geographic Information Systems (GIS), High Performance Computing, animation, and simulation.

Features	Technical Specifications
Rendering Engine	
Controller	Intense3D Pro 3600
Dimensions	12.25 inch x 3.875 inch
Bus Type	PCI
RAMDAC	IBM RGB640
Memory Type	SDRAM
Memory Amount	16-MB frame buffer and 64-MB texture memory
Memory Speed	143 MHz frame buffer and 147 MHz texture memory
Data Path	112 bit
Controller Clock Speed	170 MHz
Maximum Vertical Refresh Rate	85 Hz
Maximum Pixel Clock	157 MHz
Geometry Engine	
Controller	Intense3D Wildcat
Dimensions	12.25 inch x 3.875 inch
Bus Type	AGP

Features	Technical Specifications
Performance	
Hardware Accelerated 3D:	
• Geometry acceleration 3 GFLOPS	Yes
• 2D and 3D Vectors & Triangles	Yes
• Rectangle fills	Yes
• Clipping	Yes
• Anti-aliased vectors	Yes
• Alpha blending	Yes
• Masking	Yes
• Fog	Yes
• Z-buffering	Yes
• Gouraud Shading	Yes
• Stencils	Yes
• Texture Mapping (bilinear and trilinear)	Yes
3D Performance:	
• Gouraud-shaded Triangles 25-pixel (tri/sec)	3.4 M
• Gouraud-shaded triangles 50-pixel (tri/sec)	1.9 M
• Textured Gouraud-shaded fill 32-bit (RGBA) texels trilinear interpolated (pixels/sec)	68 M
• Vectors 10-pixel solid-color (vec/sec)	7.3 M
• Gouraud-shaded vectors 10-pixel (vec/sec)	6.4 M
• Anti-aliased vectors 10-pixel (vec/sec)	3 M
Operating System	Windows NT 4.0

IEEE 1394

1394 is an IEEE standard for a high-speed, low cost serial bus that has been developed by an IEEE committee. Among other things, 1394 is designed to be a global interconnect, which eliminates the need for many different I/O interconnects. The net result is port integration, board space consolidation, and system-level cost reduction.

The Compaq Professional Workstation SP700 includes two IEEE 1394 connections. The IEEE 1394 standard describes a flexible, high-speed, serial bus that allow multi-media and peripheral devices, such as digital camcorders, video recorders, still cameras, scanners, and storage media, to share real-time information. To use the IEEE 1394 connections, Windows 98 or Windows 2000 Professional (when available) must be installed on the SP700. Both Windows 98 and Windows 2000 Professional have been designed to take full advantage of the capabilities of the IEEE 1394 standard features listed below.

- **High speed:** 100/200/400 Megabits per second
- **Real-time data transmission:** Bandwidth for time-sensitive applications, such as audio and video
- **Universal I/O interconnect:** Global interconnect for a variety of devices
- **Superior cabling:** Uses small, flexible, and inexpensive cables
- **Flexible topology:** Easily expandable to support up to 63 devices by "daisy
- **Plug and Play:** Automatically reconfigures itself, no termination needed
- **"Live" insertion and removals:** Hot plug capability built-in

WORKSTATION SOFTWARE PLATFORM

Interoperability

Customers who have already made the move to Windows NT, or are planning to, can be assured that Compaq provides seamless interoperability with applications and information on existing networks. Compaq has partnered with the best integration ISVs in the industry to deliver a broad range of high-performance interoperability solutions for Windows NT, UNIX, and Macintosh systems. Compaq and its partners perform joint testing to ensure ease and compatibility for a wide variety of operations, such as sharing of files and printers, access to legacy applications running on UNIX or mainframe systems, use of existing UNIX utilities and scripts, running existing UNIX applications on a Windows NT workstation, and system administration. Compaq and its partners allow customers to maximize the benefits of their new Windows NT workstation while continuing to be able to utilize existing UNIX and Macintosh assets.

Unattended Network Installation Toolkit (UNIT)

Compaq provides an open, customizable, free toolkit called UNIT that allows customers to distribute unique software solutions across hundreds of systems in as little as an hour. UNIT simplifies and automates deployment of applications, drivers, upgrades, etc., over the network to help save time and money for customers and resellers. Designed to work with Compaq Software Support CD (SSD), which comes standard with all Compaq Professional Workstations, UNIT is available for free download from the Compaq Web site at http://www.compaq.com/products/workstations/software-platform/unattend.html.

Intelligent Manageability

Intelligent Manageability is Compaq's industry-leading, award-winning client management solution that helps lower the total cost of ownership by making personal computers more manageable from a single point on the network. It is available on all commercial products from Compaq including desktops, portables, and workstations. Intelligent Manageability supports a variety of the leading third-party management solutions, such as Unicenter TNG, HP OpenView, Microsoft SMS, Intel LANDesk Management Suite, Novell ManageWise, and BMC Patrol.

Initial Configuration and Deployment Features

- Remote ROM Flash - secure, fail-safe flashing of ROMs over the network
- Remote Wakeup and Shutdown - allows a system administrator to power on/power off a computer from a remote location; enables distribution of software or management of inventories at any time
- Remote System Installation - can download and install ROM images, operating systems, and applications over the network
- SmartStart CD - allows you to restore the factory image in the event the original configuration becomes damaged or in the event of a hard drive failure
- Wired for Management - Intel-led industry initiative to make Intel architecture-based systems universally manageable and universally managed; includes asset management, network boot, power management

Fault Notification and Recovery Features

- ECC Memory – check and corrects 1 bit errors, detects and reports 2 bit errors
- Pre-failure Warranty – alerts user before component fails; covers hard drives and memory
- SMART II hard drives – (Self Monitoring Analysis and Reporting Technology) drives constantly monitor their activity and predict failures before they occur
- Thermal Sensor – monitors temperature within the chassis
- Surge Tolerant Power Supply – withstands power surges up to 2000V

Asset Tracking and Security Features

- AssetControl – provides the capability to track items such as: serial number, model, manufacturer for system, hard drives and monitors, ROM versions
- Remote Security Management – allows the ability to control security settings over the network
- DMI 2.0 compliant – industry standard for managing computer components, when used with DMI complaint management applications; components can be managed over the network

Software Updating and Management Features

- Restore CD – allows user to restore original image
- Support Software CD – contains latest drivers, flashable ROM images, and utilities
- Website updates – easy access to the latest drivers and ROMPAQs