Sun Ultra^{TM} 40 M2 Workstation

Just the Facts

SunWIN Token # 460387

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Please send all corrections to lisa.clark@sun.com

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1.0 Sun Ultra 40 M2 Workstation

Introduction

The Sun Ultra™ 40 M2 Workstation is the more powerful and more expandable follow-on to the previously announced Sun Ultra 40 Workstation. This machine supports the latest in AMD processor technology, the latest memory, twice the storage capacity of its predecessor, high performance SAS technology, and double the graphics card and display support..

As did the Sun Ultra 40 Workstation, the Sun Ultra 40 M2 Workstations come with a free Sun N1™ Grid Engine software license to boost ROI by leveraging unused compute cycles for power hungry applications. The ability to incorporate thousands of workstations with N1 Grid Engine software enables enterprises to significantly increase the management and utilization of compute resources for enhanced productivity and faster time-to-market, and to save money by stretching existing IT assets.

Figure 1-1: The Sun Ultra 40 M2 Workstation

This is a high-performance workstation. The Sun Ultra 40 M2 Workstation offers fast and efficient processing of large and complex datasets through its combination of the fastest multi-core AMD Opteron™ processors, large memory capacity, and multiple 8GB/second HyperTransport™ interconnects. The Sun Ultra 40 M2 Workstation also delivers industry leading visualization capabilities and unmatched price performance to professional designers, researchers and analysts through dual PCI Express x16 graphics interfaces and the latest graphics technology from NVIDIA.

Made for the desktop, the Sun Ultra 40 M2 Workstation creates a whisper quiet desktop environment through Sun's customer design that includes cooling systems to minimize fan noise, and optimized airflow to reduce duty cycle.

Product Family Placement

The Sun Ultra 40 M2 Workstation complements and broadens Sun's workstation portfolio beyond the traditional RISC/Unix

workstation space. Sun's SPARC®-based workstations, the Sun Ultra 45 and Ultra 25 workstations offer the latest SPARC© processors running with the proven and robust Solaris™ Operating System for customers who have standardized on SPARC-based systems and applications and demand binary compatibility from 1-way to 106-way systems in their IT deployment. The Sun Ultra 40 M2 Workstation offers the best performance for x64 applications in a mini-tower workstation form factor and addresses customer needs for compatibility of x64 32-bit applications with the seamless ability to move into the future of 64-bit computing.

Comparison: Sun Ultra 40 M2 Workstation versus Sun Ultra 45 Workstation

The Sun Ultra 40 M2 Workstation will enable customers to:
- Run both 32-bit and 64-bit x64 applications
- Get more performance/$
- Run more applications (Solaris OS, Linux, and Windows)

The Sun Ultra 45 Workstation is ideal for customers who:
- Want to protect their investments in the SPARC/Solaris knowledge base
- Require binary compatibility with Sun SPARC processors
- Want to run particular applications available only on SPARC/Solaris

Table 1-1 shows a comparison of the Sun Ultra 40 M2 Workstation versus the Sun Ultra 45 Workstation.

Table 1-1: Sun Ultra 40 M2 Workstation and Sun Ultra 45 Workstation Feature Comparison

Features	Sun Ultra 40 M2 Workstation	Sun Ultra 45 Workstation
Maximum Number of Processors	2	2
Processor Type	AMD Opteron 2000 series processor	Sun UltraSPARC© IIIi processor
Processor Speed	Model 2220 SE (2.8GHz) Dual Core Model 2218 (2.6GHz) Dual Core Model 2214 (2.2GHz) Dual Core Model 2210 (1.8GHz) Dual Core	1.6 GHz
Level 2 cache	1 MB	1 MB
CPU interconnect	Three HyperTransport links per CPU	J-Bus (128-bit @ 167MHz)
Maximum memory	32 GB DDR2-667 (4 DIMMS per CPU)	16 GB DDR-333 (4 DIMMS per CPU)
Graphics Cards	NVIDIA Quadro NVS 285 (128MB DDR-2, x16 PCI Express) NVIDIA Quadro FX 560 NVIDIA Quadro FX 1500 NVIDIA Quadro FX 3500 NVIDIA Quadro FX 5500 NVIDIA G-Sync card	Sun XVR-2500 Sun XVR-300
Graphics Connectors	NVIDIA SLI Graphics Connector	N/A
Networking	2 X 10/100/1000 Base-T Gigabit Ethernet ports	2 X 10/100/1000 Base-T Gigabit Ethernet ports
Optical	DVD Dual (DVD-RW/CD-RW Combo) DVD-ROM	DVD Dual (DVD-RW/CD-RW Combo)
Hard disk drives	Up to 8 x 7200rpm SATA drives (160GB, 250GB, or 500GB) or Up to 8 x 15,000rpm 146GB SAS drives	Up to 4 x 7200 rpm SATA drives (250 GB) or 4 15K rpm SAS drives (146 GB)
FireWire/USB Ports	2 IEEE1394a / 8 USB 2.0	None / 6 USB 2.0
Audio	High Definition Audio (HDA) 10 ports	
Parallel/Serial	0 / 0	0/2
PCI Express slots	2 PCI Express x16 graphics slots 2 PCI Express x8 expansion slots (mechanically x16)	2 PCI Express x16 graphics slots (x8 electrically) 1 PCI Express x4 slot
PCI-X slots	None	2 PCI-X slots

Features	Sun Ultra 40 M2 Workstation	Sun Ultra 45 Workstation
64-bit PCI slots	None	None
32-bit PCI slots	1 @ 33MHz	None
O/S Supported by Sun	Solaris 10 x86 6/06 OS (Pre-installed) Red Hat Enterprise Linux 3, U8 AS/ES/WS Edition (32/64-bit) or later Red Hat Enterprise Linux 4, U4 AS/ES/WS Edition (32/64-bit) or later SuSE Linux Enterprise Desktop 10 (64-bit) Microsoft Windows XP Professional (32-bit) Microsoft Windows XP Professional x64 Edition	Solaris 10 HW 5/03 OS Pre-installed Solaris 9 HW 9/05
Height	445 mm (17.5 inches)	445 mm (17.5 inches)
Width	205 mm (8.1 inches)	205 mm (8.1 inches)
Depth	569 mm (22.4 inches)	569 mm (22.4 inches)
Weight	26.31 kg (58 lbs) fully configured	26.31 kg (58 lbs) fully configured
Power supply	1000W	1000W
Price Range (U.S. List Price)	$2,795 - $14,195	$3,695 - $6,795

Comparison: Sun Ultra 40 M2 Workstation versus Sun Ultra 40 Workstation

Table 1-2: Sun Ultra 40 M2 Workstation and Sun Ultra 40 Workstation Feature Comparison

Features	Sun Ultra 40 M2 Workstation	Sun Ultra 40 Workstation
Pre-Installed Software	Solaris 10 6/06 OS Sun Java™ Studio Creator 2 Sun™ Studio 11 Sun Java Studio Enterprise 8 NetBeans™ 5.0	Solaris 10 1/06 OS Sun Java™ Studio Creator 2004Q2 Sun™ Studio 11 Sun Java Studio Enterprise 8 NetBeans™ 4.1
Processor Type	AMD Opteron 2000-series Processor (Dual Core only)	AMD Opteron 200-series Processor (Single and Dual Core)
Maximum Number of Processors	Two	Two
Processor Speed Grades	Model 2220 SE (2.8GHz) Dual Core Model 2218 (2.6GHz) Dual Core Model 2214 (2.2GHz) Dual Core Model 2210 (1.8GHz) Dual Core	Model 285 (2.6 GHz) Dual Core Model 280 (2.4GHz) Dual Core Model 275 (2.2GHz) Dual Core Model 256 (3.0 GHz) Single Core Model 254 (2.8GHz) Single Core Model 256 (3.0GHz) Single Core Model 250 (2.4 GHz) Single Core Model 248 (2.2 GHz) Single Core
Level 2 cache	1 MB	1 MB
Front Side Bus	Three HyperTransport™ links per CPU (8 GB/s per link)	Three HyperTransport™ links per CPU (8 GB/s per link)
Memory	32GB @ DDR2-667 ECC 4 DIMM slots per CPU	32GB @ DDR-400 ECC 4 DIMM slots per CPU
Graphics Cards	NVIDIA Quadro NVS 285 (128MB DDR-2, x16 PCI Express) NVIDIA Quadro FX 560 NVIDIA Quadro FX 1500 NVIDIA Quadro FX 3500 (4 cards/8 displays max, all above) NVIDIA Quadro FX 5500 (2 cards/4 displays max) G-Sync card	NVIDIA Quadro NVS 285 (128MB DDR-2, x16 PCI Express) NVIDIA Quadro FX 560 NVIDIA Quadro FX 1500s NVIDIA Quadro FX 3500 (2 cards/4 displays max, all above) NVIDIA Quadro FX 5500 (2 cards/4displays max) G-Sync card
Graphics Connectors	NVIDIA SLI Graphics Connector	NVIDIA SLI Graphics Connector
Networking	Onboard 2 x 10/100/1000 Base T Gigabit Ethernet ports	Onboard 2 x 10/100/1000 Base T Gigabit Ethernet ports

Features	Sun Ultra 40 M2 Workstation	Sun Ultra 40 Workstation
Optical Drives	DVD Dual (DVD-RW/CD-RW Combo) DVD-ROM	DVD Dual (DVD-RW/CD-RW Combo) DVD-ROM
Floppy Disk Drive	None	None
Onboard Smart Card Reader	None	None
Hard disk drives	Up to eight 7200rpm SATA drives, 4 TB maximum (160GB, 250GB, 500GB) or Up to eight 15,000rpm SAS drives, 1168MB maximum (146 GB)	Up to four 7200rpm SATA drives, 2 TB maximum (80GB, 250GB, 500GB) or Up to four 15,000rpm SAS drives, 584 MB maximum, (146 GB)
RAID 0/1	Yes	Yes
FireWire/USB Ports	Two / Eight	Two / Eight
Audio	High Definition Audio (HDA) 10 ports	High Definition Audio (HDA) 10 ports
Parallel/Serial	0 / 0	0 / 0
PCI Express slots	2 PCI Express x16 2 PCI Express x8 (mechanically x16)	2 PCI Express x16 2 PCI Express x4 (mechanically x8)
PCI-X 1.0 slots (100 or 133MHz)	None	None
64-bit PCI slots (66 or 33MHz)	None	None
32-bit PCI slots (33MHz)	One	Two
O/S Supported by Sun	Solaris 10 6/06 OS (Pre-installed) Red Hat Enterprise Linux 3, U8 AS/ES/WS Edition (32/64-bit) or later Red Hat Enterprise Linux 4, U4 AS/ES/WS Edition (32/64-bit) or later SuSE Linux Enterprise Desktop 10 (64-bit) Microsoft Windows XP Professional (32-bit) Microsoft Windows XP Professional x64 Edition	Solaris 10 1/06 OS (Pre-installed) Red Hat Enterprise Linux 3, U6 AS/ES/WS Edition (32/64-bit) or later Red Hat Enterprise Linux 4, U2 AS/ES/WS Edition (32/64-bit) or later SuSE Linux Enterprise Server 9, SP3 (32/64-bit) or later Microsoft Windows XP SP2 Professional, (32-bit) or later Microsoft Windows XP Professional , x64 Edition or later
Height	445 mm (17.5 inches)	445 mm (17.5 inches)
Width	205 mm (8.1 inches)	205 mm (8.1 inches)
Depth	569 mm (22.4 inches)	569 mm (22.4 inches)
Weight	26.31 kg (58 lbs) fully configured	26.31 kg (58 lbs) fully configured
Power supply	1000W	1000W
Price Range (U.S. List Price)	$2,795 - $14,195	$2,295 - $6,995

2.0 Key Highlights

With the introduction of the Sun Ultra 40 M2 Workstation, Sun offers one of the most compelling 2-socket workstations available. The Sun Ultra 40 M2 Workstation provides world record performance with new 64-bit applications and with existing 32-bit x64 applications. With support for multiple 32-bit and 64-bit operating systems, the Sun Ultra 40 M2 Workstation offers the flexibility customers need in order to run their choice of applications using the same hardware architecture, while minimizing hardware support costs and reducing IT training costs. Coupled with competitive pricing, a free N1 Grid Engine software license, and pre-installed Solaris OS plus a full suite of developer tools, a one-year base warranty with an option to upgrade to 3-years support at no additional charge, next-business-day support, the Sun Ultra 40 M2 Workstation offers among the best total costs of ownership (TCO) on workstations.

Performance

- **PCI Express Graphics.** The Sun Ultra 40 M2 Workstation utilizes the latest technology with PCI Express graphics. PCI Express is the best input/output implementation update in a decade. Effectively replacing PCI, PCI-X and AGP, this third-generation I/O interconnect standard doubles the bandwidth of AGP 8x.
- **High-Density, High-Performance, Reliable Internal Storage.** Utilizing Serial ATA for density, the Sun Ultra 40 M2 Workstation can accommodate up to eight internal 500GB drives for a capacity of 4 terabytes. The Sun Ultra 40 M2 Workstation also supports up to eight internal 146GB 15,000 rpm high performance SAS drives. Utilizing RAID 0 for high-performance, the Sun Ultra 40 M2 Workstation delivers very high transfer rate. Utilizing RAID 1 for redundancy, the Sun Ultra 40 M2 Workstation safeguards data for mission-critical applications.
- **High-performance, high-throughput dual-processor workstation.** The Sun Ultra 40 M2 Workstation is among the highest-performance 2-socket workstations for both 64-bit and 32-bit x86 applications. To provide such high levels of performance, the Sun Ultra 40 M2 Workstation is built with a robust set of workstation features, including:
    - Support for up to 2 dual core AMD Opteron processors with AMD HyperTransport technology and an integrated dual-channel memory controller
    - Support for up to 32 GB of DDR2-667 registered ECC-protected memory
    - Wide range of visualization-class graphics cards
    - High bandwidth memory subsystem with error correction
    - Onboard Gigabit Ethernet
    - Two PCI Express x16 slots
    - Two PCI Express x8 (x16 mechanically) expansion slots that enable high-speed system interconnect
    - One PCI legacy slot
    - Expandable, high-performance storage options
- **World-class benchmarks.** The Sun Ultra 40 M2 Workstation sets four new world record benchmarks demonstrating industry leading performance!

* **World Record! Vivid Execution on SPECapc Unigraphics NX 3 Benchmark***
The Sun Ultra 40 M2 Workstation, equipped with two AMD Opteron Model 2220SE processors and running Windows XP Professional operating system, topped the performance charts, outrunning all competing workstations including those that were equipped with the fastest Intel Xeon 5160 processor. The Sun Ultra 40 M2 Workstation utilized two nVidia Quadro FX 5500 graphic cards interconnected using NVIDIA SLI technology which allows you to scale graphics performance by combining multiple cards in a single system, and achieved SPECapc UGS NX 3 overall composite score of 7.19.

Stunning x86 performance with two new SPEC floating point World Records
The Sun Ultra 40 M2 Workstation, driven by the next-generation of the AMD Opteron processors, in combination with Solaris 10 OS, the most advanced operating system on the planet, and advanced features of Sun Studio 11 software, trumps the competition with SPECfp2000 score of 3545 and SPECfp_rate2000 result of 121, setting two x86 world records.
These results easily transcend the IBM Power5+-based IntelliStation POWER 285 workstation SPECfp_2000 score of 3100 by 16.5% and 49% better than the Intel "Woodcrest"-based Dell Precision 690 workstation SPECfp_rate2000 score of 81.3.

* Best x86 Integer Score on SPEC CPU2006 Benchmark *

The Sun Ultra 40 M2 Workstation, with two Dual-Core AMD Opteron model 2220SE processors, has established a new high watermark on the SPECint_rate2006 suite of the SPEC CPU2006 benchmark, by utilizing the most advanced features of Sun Studio 11 software and Solaris 10 OS. Leading the x86 segment and surpassing competing workstations, the next-generation Sun Ultra 40 M2 Workstation, produced a SPECint_rate2006 result of 48.8, demonstrating Sun's relentless commitment to innovation.

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SPEC, SPECint are registered trademarks of the Standard Performance Evaluation Corporation. Competitive benchmark results reflect data published as of 11/10/06. For the latest benchmark results visit http://www.spec.org. A socket can accommodate one chip.

For more information on the Sun Ultra 40 M2 Workstation World Record benchmarks please see http://www.sun.com/desktop/workstation/ultra40/benchmarks.jsp or download the Sun Ultra 40 M2 Workstation customer presentation from SunWIN. The complete list of 130+ record-breaking performance results achieved by Sun's x64 platforms can be found at: http://www.sun.com/x64/benchmarks/

Value

- **Pre-Installed Operating Systems and Development Tools:** Every Sun Ultra 40 M2 Workstation is shipped with the Solaris 10 6/06 Operating System and a full suite of development tools. Developers can conveniently start a software project immediately by utilizing Sun Java Studio Creator 2, Sun Studio 11, Sun Java Studio Enterprise 8, and NetBeans 5.0 software. With a competitive value of nearly $5,000, these tools will help developers create and deploy Solaris and Java applications in less time.
- **Free Grid Software License:** Every Sun Ultra 40 M2 Workstation is shipped with a free N1 Grid Engine software license, allowing customers to conveniently and quickly deploy their new workstation in their grid environment to harness the power of unused compute cycles, finish large jobs more quickly and have an overall faster time-to-market.
- **Whisper Quiet Chassis.** The Sun Ultra 40 M2 Workstation is one of the industry's quietest workstations – up to 55% quieter than the HP xw9300. The Sun Ultra 40 M2 is believed to be in the same position, being up to 13% quieter than the Dell Precision 690. Lack of published acoustic information on the HP xw9400 prevents further competitive noise statements. The Sun Ultra 40 and Sun Ultra 40 M2 Workstations feature a Sun custom design which includes cooling systems to minimize fan noise, and optimized airflow to reduce duty cycles.
- **Sun Custom Design.** The Sun Ultra 40 M2 Workstation is not just another PC. Like the Ultra brand name, the Sun Ultra 40 M2 Workstation brings us back to our workstations roots – providing the expertise to deliver the highest quality, "ultra" reliable workstations that Sun has been known for in the past. These are the workstations that remain at the heart of the most demanding customer workloads today. The Sun custom designed motherboard form factor allows component placement for optimized airflow to ensure low component temperatures for high-reliability, low acoustic noise, usability and ruggedness.
- **Serviceability.** The Sun Ultra 40 M2 chassis provides access to configurable and upgradable components such as CPUs, memory, PCI card and disk drives via a side panel, and installation and replacement of these components is simple and reliable.
- **Competitive pricing.** The Sun Ultra 40 M2 Workstation competes head-to-head with any x86 workstation (Xeon, Itanium, Opteron, or any other processor). With price points similar to the mini-tower Xeon or AMD Opteron processor-based workstations, as well as high performance 32-bit x86 capability, the Sun Ultra 40 M2 Workstation is a remarkable replacement for any such Xeon or AMD Opteron processor-based workstations.

For more information on the Sun Ultra 40 M2 Workstation pricing versus the competition please see SunWIN Token #466887

- **Compatibility/ISV Certification.** Sun maintains strategic partnerships with leading workstation Independent Software Vendors (ISVs) to certify the Sun Ultra 40 M2 Workstation for compatibility. Through rigorous validation, Sun helps ensure

flawless compatibility in the most complex and technically demanding computing environments. The Ultra 40 M2 Workstation has been tuned for optimal performance with each application and deliver a best-in-class price-performance ratio for 64-bit workstations in its class.

- **Investment protection.** By using the same architecture to run 32-bit and 64-bit operating systems and applications, the Sun Ultra 40 M2 Workstation helps customers protect their investments in 32-bit operating systems/applications, while giving them a simplified migration path to 64-bit operating systems/applications. With the Sun Ultra 40 M2 Workstation, customers can take advantage of today's improved 32-bit performance enhancements and protect their 32-bit investments while retaining the ability to upgrade to 64-bit operating systems and applications as needed.

- **World-Class Services.** The Sun Ultra 40 M2 Workstation is supported by the world-class Sun Services organization, which provides a wide range of services to help customers reduce cost and complexity, accelerate network deployment, and deliver mobility with security—all from a single source.

Flexibility

- **Support for multiple operating systems.** The Sun Ultra 40 M2 Workstation proves its high flexibility by providing support for multiple operating systems, including Solaris 10, Red Hat Enterprise Linux WS versions 3 and 4, SuSE Linux Enterprise Desktop 10 and Windows XP Professional. Customers can purchase either Solaris or Linux operating systems from Sun and obtain complete system support from Sun. For customers who deploy 32-bit Windows XP Professional, the Sun Ultra 40 M2 Workstation has been Windows Catalog certified by Microsoft and Sun does provide support for Windows XP Professional operating system on the Sun Ultra 40 M2 Workstation. The Sun Ultra 40 M2 Workstation has also been SuSE Linux Enterprise Desktop certified.

- **Multiple graphics options.** The Sun Ultra 40 M2 Workstation supports a wide variety of workstation-class graphics cards. The multiple graphics options of the Sun Ultra 40 M2 Workstation allows customers to achieve the next level of creativity with OpenGL high-performance graphics and support for multiple displays and visualization software. The Sun Ultra 40 M2 workstation is NVIDIA SLI ready in addition to supporting the standard graphic card options.

- **Can be placed on a shelf.** The Sun Ultra 40 M2 Workstation can be used as a tower or horizontally in a 19" rack on an industry standard shelf. The Sun Ultra 40 M2 Workstation does not have slide rails for mounting.

Innovation

- **Latest processor technology.** The Sun Ultra 40 M2 Workstation features dual-core AMD Opteron processors with HyperTransport technology and an integrated memory controller, enabling true 64-bit computing on an x64 architecture. HyperTransport technology delivers exceptional bandwidth, alleviating the constraints that typically limit performance.

- **Robust and Compact Design.** The Sun Ultra 40 M2 Workstation features a custom Sun mini-tower form factor along with eight USB 2.0 ports, two IEEE 1394a (FireWire) ports, 2 built-in Gigabit Ethernet ports, 1 legacy PCI slot and 4 PCI Express slots.

- **ECC and chipkill technologies.** The Sun Ultra 40 M2 Workstation utilizes ECC memory and chipkill technologies. ECC detects errors and corrects memory errors before they spread, helping to ensure the integrity of the data stored in memory. Chipkill technology allows a single DRAM chip to fail (not the DIMM, just a single chip on the DIMM) without causing an entire system failure.

3.0 Target Markets and Customers

The Sun Ultra 40 M2 Workstation is targeted at enterprise customers who:
- Are evaluating Xeon-based workstations for memory-intensive, I/O-bound applications or performance-bound applications or
- Are looking for an easy migration to 64-bit computing or
-
- Require visualization class graphics or
- Are open to the best solution (not bounded by Intel solutions)

With respect to workloads, the Sun Ultra 40 M2 Workstation is targeted at users who:
- Need to visualize large datasets (Oil & Gas and Digital Content Creation)
- Design automobiles, aircraft, and other mechanical structures (MCAD/MCAE)
- Design, simulate and verify ASICs or microprocessors (EDA)

Tables 3-1 shows the target markets, target customers, and target customer needs for the Sun Ultra 40 M2 Workstation.

Table 3-1: Target Markets and Customers of the Sun Ultra 40 M2 Workstation

Sun Ultra 40 M2 Workstation Target Markets	Sun Ultra 40 M2 Workstation Target Customers	Sun Ultra 40 M2 Workstation Target Customer Needs
• Energy	• Geophysicists who want high-end graphics for compute-intensive applications such as seismic data visualization and interpretation, terrain visualization, and reservoir engineering	• Highest possible performance in CPU • Highest possible performance in 3D graphics
• Semiconductor manufacturers • Motherboard manufacturers • PCB manufacturers	• Electronic engineers who design and layout PCBs • Electronic engineers who design and verify complex ASICs	• High-performance CPUs • Entry-level professional 3D graphics • Large memory capacity • Low cost
• Automobile • Aerospace • Heavy machinery	• Mechanical engineers who design automobiles and aircraft and simulate crash tests of automobiles and aircraft	• Large amounts a memory • Increased I/O bandwidth
• Government	• Defense electronics researchers who want mission-critical workstations to perform combat simulations	• Large memory capacity • High-quality 3-D graphics • Ability to manage large textures
• Higher Education • Government • Healthcare	• Scientific computing researchers who need to manipulate large datasets	• High-performance CPUs • High-quality 3-D graphics

4.0 Sun Ultra 40 M2 Workstation Features

Features, Functions, and Benefits

Table 4-2 describes the main features, functions, and benefits offered by the Sun Ultra 40 M2 Workstation.

Table 4-2: Features, Functions, and Benefits of the Sun Ultra 40 M2 Workstation.

Feature	Function	Benefit
Up to two dual-core AMD Opteron 2000-series processors	Delivers simultaneous 32-bit and 64-bit enterprise-class computing for increased scalability of systems and applications without requiring dramatic instruction-set changes and recompilation. Dual processor provides the ability to handle heavy duty tasks, such as manipulation of large datasets.	Provides high performance while ensuring investment protection.
AMD HyperTransport technology and 128-bit wide DDR2 memory controller.	Three 8GB/second HyperTransport interconnects provide high-speed connections between processors and core logic while the integrated memory controller reduces latency by pooling memory resources into a single coherent space, alleviating CPU bandwidth constraints that typically limit performance in other x64 architectures.	Increases performance and productivity.
Embedded dual channel memory controller per processor.	Enables a high-speed, bi-directional communications link between the CPU and main memory at a bandwidth of 6.4 GB/sec.	Increases productivity and reduces time to market.
Support for up to 32 GB of DDR2-667 (PC5300) registered ECC memory in 8 slots (4 slots per CPU).	Provides flexible memory configuration to support a variety of applications and computing tasks.	Increases performance and productivity.
Chipkill memory support.	Allows a single DRAM chip to fail (not the DIMM just a chip on the DIMM) and the system will continue to run.	Increases memory reliability, reduces downtime, and allows DIMM replacement to occur at regularly-scheduled service intervals.
Two PCI Express x16 graphics slots, two PCI Express x8 (mechanically x16) slots and 1 legacy PCI slot	Allows customers to install up to four NVIDIA Quadro graphics cards and still have one PCI slots remaining for legacy cards.	Provides ultimate visualization capabilities as well as offering efficient I/O utilization for I/O bound applications. Provides scalability and increased graphics performance.
Supports NVIDIA SLI technology	Allows customers to connect two high-end NVIDIA Quadro graphics cards (NVIDIA Quadro FX 3500 or NVIDIA Quadro FX 5500) for maximum visualization capabilities.	Provides scalability and increased graphics performance
Flexible graphics card options.	Gives customers a choice of five graphics cards ranging from 2D to high-performance 3D, and provides the capability to visualize, analyze, and solve the most complex data sets.	Enables customers to choose the graphics card that suits their needs.
Support for up to eight SATA-II disk drives	Enables fast access to internal storage.	Increased application performance and disk swapping flexibility.
Rich connectivity suite.	Offers eight USB 2.0 ports, 2 FireWire ports, and 2 Gigabit Ethernet ports that enable convenient connections to peripheral devices.	Provides a flexible platform to meet changing business requirements.
Support for up to 8 SAS storage	Enables fast access to internal storage.	Increased disk performance and reliability at the expense of capacity and

Feature	Function	Benefit
		cost
Support for RAID 0,1,0+1, and 5 (on Windows XP Professional and Windows XP Professional x64 only)	Mission critical datasets are stored twice on a mirror disk.	System uses mirror drive for data recovery and continues operation, even if the disk fails
Solaris 10 Update 2 Operating System	Runs Solaris x64 applications	Enables customers to run popular applications on one of the most robust, reliable operating systems available.
Rich suite of pre-installed Sun Software Development Tools	Sun Studio Sun Java Studio Creator Java Studio Enterprise NetBeans	Enables SW developers to start programming right out of the box
Sun N1 Grid Engine software license	Allows customers to leverage unused compute cycles for power hungry applications and incorporate thousands of workstations in a grid environment.	Increases the management and utilization of compute resources, enhances productivity, saves money and stretches IT assets.
Qualification to run 32-bit and 64-bit standard Linux distributions.	Enables the Sun Ultra 40 M2 Workstation to run popular, off-the-shelf, standard Linux distributions and Linux packages from the top Linux vendors and Linux ISVs.	Gives customers the flexibility to choose which operating system best suits their needs.
Windows XP Professional certified.	Enables the Sun Ultra 40 M2 Workstation to run Windows operating systems and applications.	Gives customers the flexibility to choose which operating system best suits their needs.
Same business day and 7x24 hardware support options.	Competitively priced, industry-standard hardware service and support options to meet the customer's service and system availability requirements.	Allows customers to choose which option best suits their needs and helps protect their investments in Sun hardware.
Sun custom motherboard form factor	Allows component placement for optimized airflow	Ensures low component temperatures for high-reliability and whisper quiet chassis

5.0 System Architecture

External Connectivity Ports

The Sun Ultra 40 M2 Workstation contains a rich suite of connectivity ports, as shown in Table 5-1. Most ports are conveniently located in the front and the back, providing easy access to peripherals, connectors, and visual indicators. The Sun Ultra 40 workstation is a legacy-free design that does not include PS2 keyboard/mouse or parallel ports. A serial header is provided on the motherboard for debug/repair purposes, but no serial connector is externally accessible.

Table 5-1: Sun Ultra 40 M2 workstation I/O ports

Port Type	Front	Back
USB 2.0	2	6
FireWire (IEEE 1394a)	2	0
Gigabit Ethernet	0	2
High Definition Audio (HDA)	2	8

Figure 5-1 shows the front view of the Sun Ultra 40 M2 Workstation. The slot-loading DVD Dual (DVD-RW/CD-RW combo) drive occupies a dedicated slot in the front of the chassis. Rounding out the front panel, the Sun Ultra 40 M2 Workstation provides convenient attachment to external portable hard drives or digital cameras via two USB 2.0 connectors and two IEEE 1394a (FireWire) connectors. Additionally, an input for a microphone and an output for headphones are also included.

Figure 5-1: Sun Ultra 40 M2 Workstation —Front View

Figure 5-2 shows the rear view of the Sun Ultra 40 M2 Workstation. It contains the remaining USB 2.0 ports and the audio ports mentioned earlier. Starting from the top of the chassis, there are six analog audio ports followed by two digital audio (SPDIF) ports, two gigabit Ethernet ports, and six USB 2.0 ports.

Figure 5-2: Sun Ultra 40 M2 Workstation—Rear View

Expansion Slots

The Sun Ultra 40 M2 Workstation has five expansion slots:
- Two PCI Express x16 graphics slots, 150 watts (double wide) standard/full (9.5", 241.3mm)
- Two PCI Express x8 (x16 mechanically) expansion slots, standard/full (9.5", 241.3mm)
- One PCI v2.3 33MHz, 32-bit (5V) slot with board clearance for a 64-bit/66MHz long card, standard/long (12.283", 312mm)

Four PCI Express slots can be used for up to four graphics cards. If only one graphics card is required, the extra x16 PCI Express slot can be used by another PCI Express card. The two PCI Express x8 slots are fitted with x16 (mechanical) connectors. One PCI slot can be used for optional cards such as Gigabit Ethernet. Table 5-2 explains the layout of the expansion slots.

Table 5-2: Sun Ultra 40 M2 Workstation Expansion Slot Layout (In order from top to bottom of the chassis)

Type	Description
PCI Express x16	secondary graphics slot
PCI Express x8	can accept a x16 card, but is electrically an x8
PCI Express x16	primary graphics slot
PCI 33MHz/32-bit	legacy PCI slot
PCI Express x8	can accept a x16 card, but is electrically an x8

The AMD Opteron Processor

The Sun Ultra 40 M2 Workstation is powered by the dual-core AMD Opteron 2000-series processor, which enables simultaneous 32-bit and 64-bit computing. The Sun Ultra 40 M2 Workstation can be configured with either one processor or two. If a customer configures the Sun Ultra 40 M2 Workstation with one processor and wants to add a second processor later, they can do so by ordering the processor x-option part. The Sun Ultra 40 M2 Workstation does not support mixed CPU speeds, so the second processor must always be the same speed as the first processor in the machine. The AMD Opteron processor is designed to run existing 32-bit applications with outstanding performance and offers customers a simplified migration path to 64-bit computing. This revolutionary processor provides a dramatic increase in compatibility, performance, and investment protection.

Table 5-3: AMD Opteron Processor Features and Benefits

Feature	Benefit
Simultaneous 32-bit and 64-bit computing capabilities.	Allows users to run 32-bit and/or 64-bit applications and operating systems without sacrificing performance.
Support for up to three coherent HyperTransport links, with up to 8GB/s peak bandwidth per processor.	Provides substantial I/O bandwidth for current and future application needs.
256 Terabytes of memory address space.	Creates a significant performance benefit for applications in which large (or multiple) datasets are held in memory.
Integrated 128-bit memory controller	Yields fast computational processing for increased performance and productivity.
Scales from 1-way to 8-way processing across entire data or compute centers utilizing the same hardware and software infrastructure.	Allows for maximum flexibility in IT infrastructure, helping contribute to bottom line success.

Chipsets

The NVIDIA nForce Professional -3600 and 3050 I/O companion MCPs connect to the system CPU via HyperTransport. The NVIDIA MCPs deliver the following functionality:

- 44 lanes (x16, x8, x16, x8) of PCI Expressconnectivity
- 2x10/100/1000BASE-T Ethernet
- Serial ATA 1.5/3.0 Gbps controller
- High Definition Audio (HDA)
- USB 2.0
- Legacy I/O buses: PCI, LPC, SMbus, and APIC

Memory

Previously available only in high-performance 64-bit processors such as the Sun UltraSPARC IIIi, the AMD Opteron processor incorporates an integrated memory controller and improves the way typical x86 processors access main memory, resulting in increased bandwidth, reduced memory latencies, and increased processor performance.

The 128-bit wide integrated DDR DRAM memory controller is capable of yielding a memory bandwidth of 10.7 GB/s and supports up to four ECC registered DDR2-667 DIMMs. The Sun Ultra 40 M2 Workstation can reach up to a maximum of 32GB   (using 4-GB DIMMs in 8 DIMM slots) in a dual processor configuration and supports only industry-standard registered ECC PC5300 DIMMs in 1-GB, 2-GB and 4-GB configurations. A single processor configuration only has 4 available DIMM slots, and can reach a maximum of 16 GB (using 4-GB DIMMs in 4 DIMM slots).   All DIMMs are available only in pairs from Sun and must only be installed in pairs. Table 5-4 explains the paths for upgrading memory on the Sun Ultra 40 M2 Workstation.

Table 5-4: Memory Upgrade Paths for the Sun Ultra 40 M2 Workstation

From	To	Actions	Remaining DIMM Sockets
Sun Ultra 40 M2 Workstation w/ 16 GB (4 x 4 GB DIMM)	32 GB	• Leave in existing four 4 GB DIMMs • Install four 4 GB DIMMs	• Zero DIMM sockets remaining
Sun Ultra 40 M2 Workstation w/ 8GB (4 x 2 GB DIMMs)	12 GB	• Leave in existing four 2 GB DIMMs • Install two 2 GB DIMMs	• Two DIMM sockets remaining
	16 GB	• Leave in existing four 2 GB DIMMs • Install four 2 GB DIMMs	• Zero DIMM sockets remaining
	16 GB	• Remove existing four 2 GB DIMMs • Install four 4 GB DIMMs	• Four DIMM sockets remaining
	32 GB	• Remove existing four 2 GB DIMMs • Install eight 4 GB DIMMs	• Zero DIMM sockets remaining
Sun Ultra 40 M2 Workstation w/ 2GB (2x1-GB DIMMs)	4 GB	• Leave in existing two 1 GB DIMMs • Install two 1 GB DIMMs	• Four DIMM sockets remaining
	4 GB	• Remove existing two 1GB DIMMs • Install two 2 GB DIMMs	• Six DIMM sockets remaining
	6 GB	• Leave in existing two 1GB DIMMs • Install four 1GB DIMMs	• Two DIMM sockets remaining
	6 GB	• Leave in existing two 1GB DIMMs • Install two 2 GB DIMMs	• Four DIMM sockets remaining
	8 GB	• Leave in existing two 1GB DIMMs • Install six 1 GB DIMMs	• Zero DIMM sockets remaining
	8 GB	• Remove existing two 1GB DIMMs • Intstall four 2 GB DIMMs	• Four DIMM sockets remaining
	8 GB	• Remove existing two 1 GB DIMMs • Install two 4 GB DIMMs	• Six DIMM sockets remaining
	16 GB	• Remove existing two 1 GB DIMMs	• Zero DIMM sockets remaining

From	To	Actions	Remaining DIMM Sockets
		• Install eight 2 GB DIMMs	
	16 GB	• Remove existing two 1 GB DIMMs • Install four 4 GB DIMMs	• Four DIMM sockets remaining
	32GB	• Remove existing two 1 GB DIMMs • Install eight 4 GB DIMMs	• Zero DIMM sockets remaining

NOTE: The DIMMs used in the Sun Ultra 40 M2 Workstation have gone through extensive testing and qualification before being added to Sun's approved vendor list. Note that not all vendors perform equally, and some third-party memory vendors do not provide the reliability and quality Sun customers expect. Sun recommends that customers use only Sun-qualified memory for maximum reliability.

Expansion Bays

The Sun Ultra 40 M2 Workstation supports eight expansion bays. Table 5-6 describes the different expansion bays.

Note: The Sun Ultra 40 M2 Workstation will support a maximum of eight internal hard drives. For more than four internal drives, an additional hard disk drive cage is available and required.

Table 5-6: Sun Ultra 40 M2 Workstation Expansion Bays
Cage 1:

Bay	Type	Description
Bay 0	Internal	Occupied by hard disk drive
Bay 1	Internal	Occupied by hard disk drive
Bay 2	Internal	Occupied by hard disk drive
Bay 3	Internal	Occupied by hard disk drive

Cage 2:

Bay	Type	Description
Bay 4	Internal	Occupied by hard disk drive
Bay 5	Internal	Occupied by hard disk drive
Bay 6	Internal	Occupied by hard disk drive
Bay 7	Internal	Occupied by hard disk drive

Storage

Serial ATA is the primary method of storage for the Sun Ultra 40 M2 Workstation. The Sun Ultra 40 M2 Workstation is available in standard configurations with one SATA drive included, and the option to add up to seven additional SATA drives for a maximum of eight drives. The Sun Ultra 40 M2 workstation supports industry-standard 3.5-inch SATA hard drives with the Sun "SPUD" brackets which allows for tool-less insertion.

The Sun Ultra 40 M2 Workstation also supports SAS drives, available through ATO configurations. X-Options are available only for customers who already have SAS and want to expand their storage with more SAS drives. Eight SAS drives are supported in the Sun Ultra 40 M2 Workstation.

Sun Ultra 40 M2 Workstation will be available with SATA RAID 0, 1, 0+1 and 5 at RR under Windows only.
Sun Ultra 40 M2 Workstation will be available with SAS RAID 0, 1, and 1E at GA.

Optical Disk Drives

The Sun Ultra 40 M2 Workstation standard configurations include a slot-load DVD Dual (DVD-RW/CD-Combo) drive with ATAPI interface. Systems which ship without an optical disk drive require an optical disk drive blank bezel to cover the slot opening. A DVD-ROM drive is available as an ATO Option and as an X-Option upgrade.

The Sun Ultra 40 M2 Workstation DVD-Dual drive supports the following optical modes:

CD Support (Read)	DVD Support (Read)	CD Support (Write)	DVD Support (Write)
CD Audio	DVD-5	CD-R	DVD-ROM
CD-ROM (Mode 1 & 2)	DVD-9	CD-RW	DVD-RAM
CD-ROM XA (Mode 1, Form 1& 2)	DVD-10		DVD-R (v2.0 general)

CD Support (Read)	DVD Support (Read)	CD Support (Write)	DVD Support (Write)
CD-I Ready	DVD-18		DVD-RW (v1.1)
CD-I Bridge	DVD-R (2.95Gb/4.7Gb)		DVD+R
CD-R	DVD-RW		DVD+RW
CD-RW	DVD-RAM (4.7Gb)		
Photo CD	DVD+R		
VCD	DVD+RW		
Enhanced Music CD			
CD-Text			

6.0 Operating Systems

Sun Ultra 40 M2 Workstation Operating Systems Support

The Sun Ultra 40 M2 Workstation is a 64-bit workstation that offers the widest available range of operating systems support —more than other workstations offered by Sun's competitors. The Sun Ultra 40 M2 Workstation supports multiple 32-bit and 64-bit operating systems, including Linux and Solaris. Sun Ultra 40 M2 Workstation will also be listed in the Windows Catalog as being fully certified for the Windows XP Professional and Windows XP Professional x64. Table 6-1 shows the different operating systems supported on the Sun Ultra 40 M2 Workstation.

Table 6-1: Supported Operating Systems on the Sun Ultra 40 M2 Workstation

Operating System	Certified	Pre-installed Option at the Factory?	Sold by Sun?	Supported by Sun
Solaris 10 x86 (6/06) OS	Yes	Yes	Yes	Yes
Red Hat Enterprise Linux 3, U8 AS/ES/WS Edition (32/64-bit) or later	Yes	No	Yes	Yes
Red Hat Enterprise Linux 4, U4 AS/ES/WS Edition (32/64-bit) or later	Yes	No	Yes	Yes
SuSE Linux Enterprise Desktop 10 (64-bit)	Yes	No	No	Yes
MS Windows XP Professional (32-bit)	Yes	No	No	Yes
MS Windows XP Professional x64 Edition	Yes	No	No	Yes

All Red Hat Enterprise Linux OS's, SuSE Linux Enterprise Desktop operating systems, and Solaris 10 can be ordered from Sun. Support contracts are available for these operating systems as well as for Microsoft Windows.

*** The Sun Ultra 40 M2 Workstation is also listed in the Windows Catalog as being fully certified for the Windows XP Professional and Windows XP Professional x64. It has earned the "Compatible with Windows" designation as a certified platform to run the Microsoft Windows XP Professional and Windows XP Professional x64 Operating system. Sun Ultra 40 M2 Workstation is listed on the Microsoft Hardware Compatibility List (HCL) which can be seen by visiting the Microsoft Windows Hardware and Driver Central (WHDC) at http://www.microsoft.com/whdc/hcl/search.mspx. While qualified to run the Microsoft Windows XP Professional operating systems, these operating systems are not available from Sun for either purchase. However, Sun does support the Windows XP Professional operating systems.

7.0 Supported Graphics Cards

The Sun Ultra 40 M2 provides support for twice the number of graphics cards and twice the number of displays as compared to the Ultra 40 Workstation. The Sun Ultra 40 M2 Workstation supports the following five graphics cards:
* NVIDIA Quadro NVS 285 (128 MB DDR-2, x16 PCI Express)
* NVIDIA Quadro FX 560
* NVIDIA Quadro FX 1500
* NVIDIA Quadro FX 3500
* NVIDIA Quadro FX 5500

The Sun Ultra 40 M2 Workstation supports dual high-end graphics cards and NVIDIA SLI technology. For more information on NVIDIA SLI technology, see http://www.slizone.com/page/slizone_learn.html

NVIDIA Quadro NVS 285 DDR-2 PCI Express Graphics Card

The NVIDIA Quadro NVS 285 128 MB DDR-2 (PCI Express) Graphics card is a professional 2D graphics card with dual-display capabilities. The Sun Ultra 40 M2 Workstation supports up to four NVIDIA Quadro NVS 285 DDR2 graphics cards and can drive up to eight displays, two per board. This card ships with 128MB of DDR memory and can drive up to two Sun 17-inch LCD monitors, two Sun 20.1-inch LCDs, two Sun 19-inch TFT LCD monitors, or two Sun 24.1-inch LCD.

Table 7-1: Key Specifications and features of the NVIDIA Quadro NVS 285 DDR-2 graphics card

Form Factor	Half-height
Bus Type	PCI Express x16
Memory	128MB of DDR SDRAM (64-bit interface)
Connector	One high-density connector (DMS-59) to support dual DVI-I
Single DVI Support	Yes
Dual DVI Support	Yes
Maximum Resolution	Sun 24-inch TFT LCD: 1920 × 1200 Sun 20-inch TFT LCD: 1600 x 1200 Sun 19-inch TFT LCD: 1280 × 1024 Sun 17-inch TFT LCD: 1280 x 1024
Max Display Supported	Two per board
Max Displays Per Sun Ultra 40 M2 Workstation	Eight
Standard Configuration	Yes
ATO	Yes
X-Option	Yes

Form Factor	Half-height
Available Drivers	Solaris 10, Windows XP Professional, Windows XP Professional x64, Red Hat Enterprise Linux WS v3 (32-bit and 64-bit), Red Hat Enterprise Linux WS v4 (32-bit and 64-bit), SuSE Linux Enterprise Desktop 10

NVIDIA Quadro FX 560 PCI Express Graphics Card

The NVIDIA® Quadro FX 560 graphics card provides Sun customers an entry-level 3D performance workstation graphics solution for SW development or everyday MCAD applications. This card ships with 128MB of DDR memory and can drive two Sun LCD displays .

Table 7-3 summarizes key specifications and features of the NVIDIA Quadro FX 560.

Form Factor	Full-height
Bus Type	PCI Express x16
Memory	128MB of DDR SDRAM (128-bit interface)
Connector	DVI-I Single Link DVI-I Dual Link HDTV out 7-pin mini-DIN
Single DVI Support	Yes
Dual DVI Support	Yes
Maximum Resolution	Sun 24-inch TFT LCD: 1920 × 1200 Sun 20-inch TFT LCD: 1600 x 1200 Sun 19-inch TFT LCD: 1280 × 1024 Sun 17-inch TFT LCD: 1280 x 1024
Max Display Supported	Two per board
Max Displays Per Sun Ultra 40 M2 Workstation	Eight
Standard Configuration	No
ATO	Yes
X-Option	Yes
Available Drivers	Solaris 10, Windows XP Professional, Windows XP Professional x64, Red Hat Enterprise Linux WS v3 (32-bit and 64-bit), Red Hat Enterprise Linux WS v4 (32-bit and 64-bit), SuSE Linux Enterprise Desktop 10

NVIDIA Quadro FX 1500 PCI Express Graphics Card

The NVIDIA® Quadro" FX 1500 graphics card provides Sun customers a mid-range 3D performance workstation graphics solution for professional MCAD applications. The Sun Ultra 40 M2 Workstation supports up to four NVIDIA Quadro FX 1500 graphics cards. This card ships with 256MB of DDR memory and can drive any two Sun displays, including two 24.1-inch LCD monitors.

Table 7-3 summarizes key specifications and features of the NVIDIA Quadro FX 1500.

Form Factor	Full-height
Bus Type	PCI Express x16
Memory	256MB of DDR SDRAM (256-bit interface)
Connector	DVI-I Dual Link DVI-I Dual Link 7-pin mini-din HDTV-out connector
Single DVI Support	Yes
Dual DVI Support	Yes
Maximum Resolution	Sun 24-inch TFT LCD: 1920 × 1200 Sun 20-inch TFT LCD: 1600 x 1200 Sun 19-inch TFT LCD: 1280 × 1024 Sun 17-inch TFT LCD: 1280 x 1024
Max Display Supported	Two per board
Max Displays Per Sun Ultra 40 M2 Workstation	Eight
Standard Configuration	Yes
ATO	Yes
X-Option	Yes
Available Drivers	Solaris 10, Windows XP Professional, Windows XP Professional x64, Red Hat Enterprise Linux WS v3 (32-bit and 64-bit), Red Hat Enterprise Linux WS v4 (32-bit and 64-bit), SuSE Linux Enterprise Desktop 10

NVIDIA Quadro FX 3500 PCI Express Graphics Card

The NVIDIA Quadro FX 3500 graphics card provides Sun customers a high-end 3D performance workstation graphics solution for professional MCAD. The Sun Ultra 40 M2 Workstation supports up to four NVIDIA Quadro FX 3500 graphics cards with NVIDIA SLI technology. This card ships with 256MB of DDR memory and can drive any two Sun displays, including two 24.1-inch LCD monitors.

Table 7-4 summarizes key specifications and features of the NVIDIA Quadro FX 3500.

Form Factor	Full-height
Bus Type	PCI Express x16
Memory	256MB of DDR SDRAM (256-bit interface)
Connector	DVI-I Dual Link Connector
	DVI-I Dual Link Connector
	3-pin mini-DIN stereo connector
Single DVI Support	Yes
Dual DVI Support	Yes
Maximum Resolution	Sun 24-inch TFT LCD: 1920 × 1200
	Sun 20-inch TFT LCD: 1600 x 1200
	Sun 19-inch TFT LCD: 1280 × 1024
	Sun 17-inch TFT LCD: 1280 x 1024
Max Display Supported	Two per board
Max Displays Per Sun Ultra 40 M2 Workstation	Eight
Standard Configuration	Yes
ATO	Yes
X-Option	Yes
Available Drivers	Solaris 10, Windows XP Professional, Windows XP Professional x64, Red Hat Enterprise Linux WS v3 (32-bit and 64-bit), Red Hat Enterprise Linux WS v4 (32-bit and 64-bit), SuSE Linux Enterprise Desktop 10

NVIDIA Quadro FX 5500 PCI Express Graphics Card

The NVIDIA Quadro FX 5500 Graphics card is an ultra high-end 3-D graphics card with dual-display capability. The NVIDIA Quadro FX 5500 graphics card provides Sun customers an ultra high-end workstation graphics solution, shattering the limits of performance, programmability, precision, and quality for professional MCAD, DCC and scientific applications. The NVIDIA Quadro ultra-high end CPUs feature a revolutionary new architecture with 2x the geometry and fill rate, 5x the hardware pixel read-back performance and 1.25x the memory bandwidth of previous generation workstation graphics, and support up to 1024MB ultra-fast GDDR3 memory. Implementation of rotated-grid full-screen anti-aliasing (RG FSAA) introduces far greater sophistication in the multi-sampling pattern, significantly increasing color accuracy and the visual quality of edges and lines without compromising performance. The Sun Ultra 40 M2 Workstation supports up to two NVIDIA Quadro FX 5500 graphics cards with NVIDIA SLI technology.

Table 7-4 summarizes key specifications and features of the NVIDIA Quadro FX 5500.

Form Factor	Double-wide card (consumes the space of its own slot and the adjacent slot)
Bus Type	PCI Express x16
Memory	1024MB of DDR SDRAM (256-bit interface)
Connector	DVI-I 1.0 Dual Link Connector
	DVI-I Dual Link Connector
	3-pin mini-DIN stereo connector
Single DVI Support	Yes
Dual DVI Support	Yes
Maximum Resolution	Sun 24-inch TFT LCD: 1920 × 1200
	Sun 20-inch TFT LCD: 1600 x 1200
	Sun 19-inch TFT LCD: 1280 × 1024
	Sun 17-inch TFT LCD: 1280 x 1024
Max Display Supported	Two per board
Max Displays Per Sun Ultra 40 M2 Workstation	Four
Standard Configuration	No
ATO	Yes
X-Option	Yes
Available Drivers	Solaris 10, Windows XP Professional, Windows XP Professional x64, Red Hat Enterprise Linux WS v3 (32-bit and 64-bit), Red Hat Enterprise Linux WS v4 (32-bit and 64-bit), SuSE Linux Enterprise Desktop 10

SLI for NVIDIA Quadro

Professionals who use digital content creation (DCC) applications, computer-aided design (CAD) and computer aided engineering (CAE)- or visualization or imaging applications are constantly searching for ways to increase performance. Now they can, with a breakthrough NVIDIA 3D platform technology.

NVIDIA SLI (Scalable Link Interface) technology is a revolutionary approach to scalability and improved performance. NVIDIA SLI takes advantage of the increased bandwidth of the PCI Express bus architecture, and features hardware and software innovations within NVIDIA Quadro graphics processing units (GPUs) and NVIDIA media and communications processors (MCPs). The NVIDIA SLI patent-pending technologies work seamlessly to deliver an intelligent application-transparent mechanism for scaling performance. And depending on the application, NVIDIA SLI can deliver up to 2x the performance of a single GPU configuration for unprecedented user experience.

NVIDA Quadro GPUs deliver powerful, elegant graphics with the highest image quality for graphics-intensive applications. NVIDIA SLI-certified GPUs feature dedicated, built-in SLI hardware and take advantage of the additional bandwidth of the PCI Express bus architecture. Professional users benefit by using SLI technology on dual NVIDIA Quadro GPUs to span an OpenGL window across multiple displays, or to run a single application per GPU. And professionals who attach an SLI connector reach top-speed performance on a single display by leveraging the capabilities of two NVIDIA Quadro GPUs. NVIDIA SLI can output in both digital and analog format for the highest image quality.

SLI offers two operation modes:

1. SLI Frame Rendering: Combines two PCI Express graphics cards with an SLI connector to transparently scale application performance on a single display by presenting them as a single graphics card to the operating system.

 Benefits

- Visual simulation, broadcast, and video applications that are fill rate-limited will benefit from using the split frame rendering (SFR) mode.

- SPECviewperf 8 and other applications that are geometry-limited will benefit from using the alternate frame rendering (AFR) mode.

 Requirements:

- Two identical NVIDIA Quadro graphics cards (NVIDIA Quadro FX 5500, 3500)

- SLI connector

2. SLI Multi View: Combines the power of two NVIDIA Quadro PCI Express graphics cards to span a single hardware-accelerated OpenGL application window across multiple displays, run a single application per GPU with multiple display outputs, or enable other flexible usage of two PCI Express graphics cards.

Benefits

- View professional applications over multiple displays to increase visual real estate. (currently available on Linux only)

Requirements:

- Any two NVIDIA Quadro PCI Express graphics cards: NVIDIA Quadro FX 5500, 3500, 1500, or 560
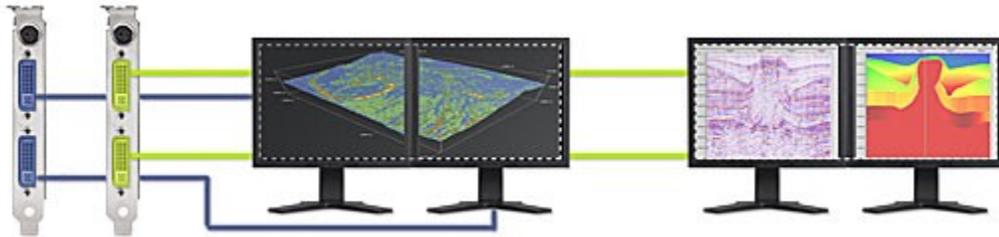
For more information on NVIDIA SLI technology see http://www.nvidia.com/object/quadro_sli.html

G-Sync for NVIDIA Quadro

The NVIDIA Quadro G-Sync board is an option card that delivers Frame Lock and Genlock functionality to unprecedented levels of industrial realism, visualization and collaborative capabilities. NVIDIA Quadro G-Sync can be combined with an NVIDIA Quadro FX 5500 graphics card to provide advanced multisystem visualization and multi-device film and video environments. The NVIDIA Quadro G-Sync supports Frame Lock, Genlock, and synchronized framebuffer swap and refresh rate.

The NVIDIA Quadro G-Sync board can be purchased along with a Quadro FX 5500 or separately for field upgrades.

The NVIDIA Quadro G-Sync board is designed to fit into any available expansion slot within 6 inches of the NVIDIA Quadro FX 5500 G-Sync connector. The board derives all data and power directly from the NVIDIA Quadro FX 5500 graphics board.

Frame Lock

Allows the display channels from multiple workstations to be synchronized, creating one large "virtual display". The "virtual display" can be driven by a multi-system cluster for performance scalability.

Genlock

Genlock allows the graphics output to be synchronized to an external source, which is typically film and broadcast video applications.

8.0 Environment and Regulations

Environment

The Sun Ultra 40 M2 Workstation plans to meet or exceed the following environmental specifications.

Table 8-1: Environmental Specifications Met by the Sun Ultra 40 M2 Workstation

	Sun Ultra 40 M2 Workstation
AC Power	90 – 264 V AC, 47 – 63 HZ
Operating	2° C to 35° C (41° F to 95° F); 7% to 93% relative humidity, non-condensing
Non-operating	-40° C to 68° C (-40° F to 158° F); 93% relative humidity, non-condensing
Operating Acoustic Noise	4.9 Bels
Idling Acoustic Noise	4.7 Bels

Regulations

The Sun Ultra 40 M2 Workstation plans to meet or exceed the following regulations.

Table 8-2: Regulations Met by the Sun Ultra 40 M2 Workstation

	Sun Ultra 40 M2 Workstation
Safety	UL/CSA-60950, EN 60950, IEC 60950 CB
Ergonomics	EK1-ITB-2000
RFI/EMC	EN 55022/CISPR22 Class B, FCC CFR47 Part 15 Class B; EN 6100-3-2, EN 61000-3-3
Immunity	EN 55024
Regulatory Markings	UL/cUL, TUV-GS, CE, FCC, ICES-003, C-Tick, VCCI, GOST-R, BSMI, CCC, S-Mark, MIC
Power Management	PowerNow. Standard ACPI Power states (S0, S3, S4, S5)

9.0 Ordering and Availability

Sun Ultra 40 M2 Workstation Standard Configurations

The following are part numbers and descriptions for the Sun Ultra 40 M2 Workstation factory standard configurations.

Table 9-1: Sun Ultra 40 Workstation Standard Configurations

Part Number	Description
A83-FGZ2-9AN-16-DS	Two 2.6GHz/1MB (Opteron Model 2218) Dual Core Processor, NVIDIA Quadro FX 5500 Graphics Card, 16GB ECC (DDR-667) Memory (4 x 4GB ECC DIMM), 250-GB 7200rpm Serial ATA 1.5Gbps Hard Disk, 1 * DVD-Dual, 2 * 10/100/1000 BaseT Ethernet port, 8 * USB 2.0 ports, 2 * IEEE1394a ports, 2 * PCI Express x16 slots, 2 * PCI Express x8 slots, 1 * Conventional PCI slot
A83-FFZ2-9AQ-8G-DS	Two 2.2GHz/1MB (Opteron Model 2214) Dual Core Processor, NVIDIA Quadro FX 1500 Graphics Card, 8GB ECC (DDR-667) Memory (4 x 2GB ECC DIMM), 250-GB 7200rpm Serial ATA 1.5Gbps Hard Disk, 1 * DVD-Dual, 2 * 10/100/1000 BaseT Ethernet port, 8 * USB 2.0 ports, 2 * IEEE1394a ports, 2 * PCI Express x16 slots, 2 * PCI Express x8 slots, 1 * Conventional PCI slot
A83-FWZ1-9AS-2G-DU	Two 1.8GHz/1MB (Opteron Model 2210) Dual Core Processor, NVIDIA Quadro NVS 285 DDR-2 Graphics Card, 2GB ECC (DDR-667) Memory (2 x 1GB ECC DIMM), 160-GB 7200rpm Serial ATA 1.5Gbps Hard Disk, 1 * DVD-Dual, 2 * 10/100/1000 BaseT Ethernet port, 8 * USB 2.0 ports, 2 * IEEE1394a ports, 2 * PCI Express x16 slots, 2 * PCI Express x8 slots, 1 * Conventional PCI slot

Sun Ultra 40 M2 Workstation X-Options and XATO Options

The following are part numbers and descriptions for the Sun Ultra 40 M2 Workstation X-Options and XATO (External Assemble to Order) options.

Table 9-2: Sun Ultra 40 M2 Workstation Options

Part Number	Description
A83-AA	Sun Ultra 40 M2 dual socket AMD Opteron-based workstation base system - Chassis Motherboard, no optical disk drive, 2x10/100/1000 Ethernet ports, Two x16 PCI Express slots, two x8 PCI Express slots, one legacy PCI slot (32-bit/33 MHz), DVI-to-VGA adapter, 1000 watt Power Supply. XATO ONLY
4190A-Z	ATO Option 2.8-GHz Opteron 2220 SE dual core CPU for Sun Ultra 40 M2 Workstation
X4190A-Z	X-Option 2.8GHz Opteron 2220 SE dual core CPU for Sun Ultra 40 M2 Workstation
4193A-Z	ATO Option 2.6-GHz Opteron 2218 dual core CPU for Sun Ultra 40 M2 Workstation
X4193A-Z	X-Option 2.6-GHz Opteron 2218 dual core CPU for Sun Ultra 40 M2 Workstation
4192A-Z	ATO Option 2.2-GHz Opteron 2214 dual core CPU for Sun Ultra 40 M2 Workstation
X4192A-Z	X-Option 2.2-GHz Opteron 2214 dual core CPU for Sun Ultra 40 M2 Workstation
4191A-Z	ATO Option 1.8-GHz Opteron 2210 dual core CPU for Sun Ultra 40 M2 Workstation
X4191A-Z	X-Option 1.8-GHz Opteron 2210 dual core CPU for Sun Ultra 40 M2 Workstation
5289A-Z	ATO Option 8-GB Memory Kit (2x 4GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).
X5289A-Z	X-Option 8-GB Memory Kit (2x 4GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).
5288A-Z	ATO Option 4-GB Memory Kit (2x 2GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).
X5288A-Z	X-Option 4-GB Memory Kit (2x 2GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).
5287A-Z	ATO Option 2-GB Memory Kit (2x 1GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).
X5287A-Z	X-Option 2-GB Memory Kit (2x 1GB) for Sun Ultra 40 M2 Workstation. This memory kit operates at PC5300 (aka DDR-667).

Part Number	Description
RB-ST1CE-250G7K	ATO Option 250-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
XRB-ST1CE-250G7K	X-Option 250-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
RB-ST1CE-500G7K	ATO Option 500-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
XRB-ST1CE-500G7K	X-Option 500-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
RB-ST1CE-160G7KZ	ATO Option 160-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
XRB-ST1CE-160G7KZ	X-Option 160-GB Internal SATA Hard Drive for Sun Ultra 40 M2 Workstation
RB-SS1CE-146G15KZ	ATO Option 146-GB Internal SAS Hard Drive for Sun Ultra 40 M2 Workstation
XRB-SS1CE-146G15KZ	X-Option 146-GB Internal SAS Hard Drive for Sun Ultra 40 M2 Workstation
SG-PCIE8SAS-Z	8-port SAS PCI-E HBA internal connection LSI3081E
4213A	ATO Option second drive cage for more than four hard disk drives for Sun Ultra 40 M2 Workstation
X4213A	X-Option second drive cage for more than four hard disk drives for Sun Ultra 40 M2 Workstation
8016A	No hard disk drive (diskless configuration)
4172A	ATO NVIDIA Quadro FX 5500 Graphics Card for Sun Ultra 40 M2 Workstation.
X4172A	X-Option NVIDIA Quadro FX 5500 Graphics Card for Sun Ultra 40 M2 Workstation.
4186A-Z	ATO NVIDIA Quadro FX 3500 Graphics Card for Sun Ultra 40 M2 Workstation
X4186A-Z	X-Option NVIDIA Quadro FX 3500 Graphics Card for Sun Ultra 40 M2 Workstation
4185A	ATO NVIDIA Quadro FX 1500 Graphics Card for Sun Ultra 40 M2 Workstation
X4185A-Z	X-Option NVIDIA Quadro FX 1500 Graphics Card for Sun Ultra 40 M2 Workstation
4184A-Z	ATO NVIDIA Quadro FX 560 Graphics Card for Sun Ultra 40 M2 Workstation
X4184A-Z	X-Option NVIDIA Quadro FX 560 Graphics Card for Sun Ultra 40 M2 Workstation
4183A	ATO NVIDIA Quadro NVS 285 DDR-2 Graphics Card for Sun Ultra 40 M2 Workstation
X4183A-Z	X-Option NVIDIA Quadro NVS 285 DDR-2 Graphics Card for Sun Ultra 40 M2 Workstation
8201A	SLI Cable included for dual mid to high end graphics configurations
4173A	ATO Option G-sync board
X4173A	X-Option G-sync board
7276A	ATO Option DVD-Dual (DVD-ROM/CD-RW combo) Drive for Sun Ultra 40 workstation
x7276A	X-Option DVD-Dual (DVD-ROM/CD-RW combo) for Sun Ultra 40 workstation.
x8019A	DVD Dual Upgrade Option Kit. Customers who bought the Sun Ultra 40 workstation with no optical disk drive and wish to upgrade to a DVD-Dual drive after the fact can purchase this part.
8118A	ATO Option DVD-ROM for Sun Ultra 40 M2 Workstation
X8119A	X-Option DVD-ROM Upgrade Kit including front bezel and drive for Sun Ultra 40 M2 Workstation
8116A	ATO Option DVD-Dual for Sun Ultra 40 M2 Workstation
X8117A	X-Option DVD-Dual Upgrade Kit including front bezel and drive for Sun Ultra 40 M2 Workstation
8115A	No optical disk drive (filler panel option) for diskless configuration of Sun Ultra 40 M2 Workstation
x7285A	Sun PCI-X dual Gigabit Ethernet UTP low profile
x7286A	Sun PCI-X Gigabit Ethernet MMF low profile
x7280A-2	Sun PCIe low profile dual Gigabit Ethernet UTP, low profile bracket on board, standard bracket included, RoHS-6 compliant
x7281A-2	Sun PCIe low profile dual Gigabit Ethernet MMF, low profile bracket on board, standard bracket included, RoHS-6 compliant

Sun Ultra 40 M2 Workstation Display Options

The following are part numbers and descriptions for the various Sun Ultra 40 M2 Workstation display options.

Table 9-5: Sun Ultra 40 workstation Display Options

Part Number	Description
X7203A	Sun 24.1-inch LCD
X7200A	Sun 20.1-inch LCD
X7202A	Sun 19-inch LCD
X7204A	Sun 17-inch LCD

Keyboards & Mice (Type 7 Country Kits)

The Sun Ultra 40 M2 Workstation uses the Type 7 RoHS-6 compliant country kits. The Type 6 country kits CAN NOT be used with the Sun Ultra 40 M2 Workstation.

Table 9-6: Sun Ultra 40 M2 Workstation Country Kits

Part Number	Description
X3730A	Spanish Keyboard, North American Power Cord
X3731A	North American Universal ("PC style")
X3732A	French
X3733A	German
X3734A	Swiss-French
X3735A	Swiss-German
X3736A	Swedish
X3737A	United Kingdom
X3738A	UNIX Universal
X3754A	Taiwanese
X3755A	Korean
X3756A	Japanese
X3758A	United Kingdom UNIX
X3759A	European UNIX
X3760A	Norwegian
X3761A	Portuguese
X3762A	Spanish
X3763A	Danish
X3764A	Italian
X3765A	Dutch (Netherlands)
X3766A	Australian
X3767A	Finnish
X3868A	European Universal
X3782A	Chinese
X3783A	UNIX (Power Cordless)
X3785A	Russian
X3787A	Turkish-Q
X3790A	Belgian
X3791A	Arabic

Diskless Configurations

SunFed customers can order diskless configurations of the Sun Ultra 40 M2 Workstation through ATO only. Diskless means the Sun Ultra 40 M2 Workstation will be sold without any hard disk drives (HDD) and without any optical disk drives (ODD).

Availability

The Sun Ultra 40 M2 Workstations are scheduled to reach General Availability (GA) on November 29, 2006!

10.0 Sun Enterprise Services Offerings

Why the Warranty Isn't Enough

While computer system warranties provide business customers with some assurance of product quality, they do not provide many essential system services or operating system support. In addition, warranties provide default repair times and coverage hours which may not suit customer needs. It's just that a warranty and a Service Plan are two very different things with two very different objectives. Break/fix is no way to live - make sure your customers have Service Plan coverage on all their active Sun systems. For more information go to: www.sun.com/comparewarranty

The SunSpectrum Service Plan

The SunSpectrum Service Plan is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum Service Plan provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris Operating Environment software, and telephone support for Sun software packages. The majority of Sun's customers take advantage of the SunSpectrum Service Plan, underscoring the value that it represents. Customers should check with their local Sun Services representatives for program and feature availability in their areas.

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract. Always use the SunSpectrum Service Plan for total system support when Solaris is the operating system of choice.

The four levels of SunSpectrum support contracts are outlined below.

Table 10-3: SunSpectrum Support Contracts

Program	Description
Mission-Critical SunSpectrum Platinum℠ Support	Designed to support client-workstation, mission critical solutions by focusing on failure prevention, rapid recovery and year-round technical services planning. Support is provided 24x7.
Business-Critical SunSpectrum Gold℠ Support	Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24x7.
System Coverage SunSpectrum Silver℠ Support	Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve CD/on-line services. Support is provided 8 AM to 8 PM Monday through Friday.
Self-Directed SunSpectrum Bronze℠ Support	Provided for customers who rely primarily upon their own in-house service capabilities. Enables customers to deliver high quality service by giving them access to UNIX® expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 AM to 5 PM Monday through Friday.

SunSpectrum Hardware Only Support

In-warranty or out-of-warranty, Sun Hardware Only Support provides an affordable, convenient way to maintain Sun systems. With easy access to Sun technical support and quick system repair or replacement, and to Sun's Online Support Center, Sun Hardware Only Support has customers covered so they can truly get the most out of their time and investment in Sun technologies.

The extended features of Sun Hardware Only Support now allow customers to choose the service that best supports their business needs by offering a choice of coverage hours and response times, which include:
- Technical support during hours that suit the customer's business requirements
- Hardware service with a choice of coverage hours and response times ranging from next business day to 7x24 support
- Online support capabilities including Web-based service requests, service status, access to technical resources, and more

Sun System Service Plans for Windows OS

The Sun[sm] System Service Plans for Windows OS are designed to be flexible enough to cover most customers requirements for support:
Highlights:
• Integrated whole-system support for Sun's X64 systems running Microsoft Windows
• All the essentials for one great price
• Priority service
• No "per incident" limits

Sun System Service Plans for Windows OS: Features Matrix

Features	Premium Service Plan (Mission Critical Systems)	Global Service Plan (Business Critical Systems)	Standard Service Plan (Same Day Support)	Basic Service Plan (Non-Critical Support)
Telephone and Online Technical Support	24/7 Live transfer	24/7 Live transfer	8-8, M-F Live transfer	8-5, M-F 4hr response
Hardware Service Coverage	24/7 2hr onsite	8-8, M-F 4hr onsite	8-5, M-F 4hr onsite	Replacement Parts 2nd Business Day
Online System Admin Resources	Yes	Yes	Yes	Yes
Support Notification Services	Yes	Yes	Yes	Yes

* Availability of specific features, coverage hours and response times may vary by location and/or product.
* Response times are determined by customer defined priority. The response times shown are for service requests designated by the customer as "Priority 1".

Installation Service for the Sun Ultra 40 M2 Workstation

Enterprise Installation Services, or "EIS" is a proven methodology by which Sun and Sun authorised partners will install and test Sun systems. The standard of installation quality is unmatched, which means that the customer has the best possible start to his/her IT deployment of the Sun Ultra 40 M2 Workstation. The easiest way to quote an installation service is to use the EIS-% part numbers on Webdesk.

http://www.sun.com/service/consulting/installintegrate/installation.html

The Online Support Center

The Online Support Center (OSC) provides Web-based solutions anytime, anywhere. Providing high-quality availability services has always been a top priority at Sun. As a pioneer in web-based customer solutions, Sun continues to utilize the power and versatility of the Internet to offer customers a broad variety of online service offerings.

The online answer/transaction process can save customers valuable time by eliminating the time spent waiting on the phone for a customer service representative. The Online Support Center empowers the user by offering anywhere, anytime access to Web-based support, training, and consulting solutions for Sun hardware and software products. The site serves as a portal for proactive service offerings, systems support features, and resource links.

For more information on the any of the above Sun support offerings, please visit: http://www.sun.com/service/support.

11.0 Other Useful Documents

Table 11-1: Additional documents related to the Sun Ultra 40 and Sun Ultra 40 M2 Workstations

Title	Contact	SunWIN Token #
Sun Ultra 40 Workstation Family Data Sheet	Narisol Nepomuceno	460385
Sun Services for x64 Workstations	Michele Lawrence	443663
Sun Ultra 40 Workstation Family Competitive Beat Sheets	Lisa Clark	460386
Sun Ultra 40 Workstation Competitive Pricing Comparison	Lisa Clark	466887
Sun Ultra 40 Workstation Family Just The Facts Documents	Lisa Clark	460387
Sun Ultra 40 Workstation Family Customer Presentations	Lisa Clark	460405
Sun Ultra 40 Workstation Family Technical Presentations	Jonathan France	460406
Sun Ultra 40 Workstation Solution Brief for EDA	Brian Healy	429802
Sun Ultra 40 Workstation Solution Brief for MCAD	Anand Datey	450625
Sun Ultra 40 Workstation Solution Brief for MCAE	Anand Datey	429805
Sun Ultra 40 Workstation Solution Brief for Research/Visualization	Brian Healy	422243
Sun x64 Systems for Oil & Gas Solution Brief	Brian Healy	460408