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KIM'S NOTEBOOK

Dear EduConnection member:

With Education facing huge data storage challenges, SVP Eula Adams joins me on the one-year anniversary of Sun's StorageTek acquisition to survey the storage landscape and solutions. [MORE »](#)

Kim Jones,
VP, Global
Education,
Government,
and Health
Sciences
Sun Microsystems, Inc.



EDUCATION EVENTS

- » **Connectathon**
Zero in on hardware and software interoperability. San Jose, CA, February 1-8
- » **JavaOne**
Registration opens soon for the premier Java technology conference. San Francisco, May 8-11
- » **HIMSS**
Health Information and Management Systems conference. New Orleans, February 25 to March 1

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January 2007

EDU INSIGHT

Is Your Datacenter Ready When Disaster Strikes?

When disaster strikes, will you be ready? Find out how to storm proof your datacenter for enterprise continuity, starting with a free trial download of Sun Cluster software.

[MORE »](#)



SPECIAL OFFERS

Education Only: Save More than 33% on Sun Storage

Find out how the Sun Academic Initiative Program can help prepare students for certification in Java and Solaris OS technologies to boost their marketability and earnings potential. And now you or your educational institution can participate at a specially discounted price. [MORE »](#)



Education Only: Get a Sun Fire V890 Powerhouse at a 30% Discount

Exclusive savings for Education: Scale up to a Sun Fire V890 server with the UltraSPARC IV+ processor and get over 5x faster performance, extensive compute capacity, and doubled memory. [MORE »](#)



EDU IN ACTION

Blackbox: The Datacenter in a Shipping Container

Forget what you know about datacenters and meet Project Blackbox. Self-contained in a 20-foot shipping container, the world's first virtualized datacenter is ideal for institutions that want management simplicity, extreme performance, and power and space savings. [MORE »](#)





» **Humor Break: Xeon Crispy Chicken**

A datacenter chicken barbecue is, um, one way to get ROI from overheated, power-hungry servers

» **Innovating@Sun Podcast**

Tune in to hear what makes the Sun Fire X4500 Server the world's first server/storage hybrid

» **New! Solaris 10 OS Update**

Download Solaris 10 OS 11/06, the latest release of the world's most advanced operating system

Storage Virtualization: Closing the Data Management Gap

Growth in data volumes is outpacing storage capacity in most datacenters. How do you get off the collision course? Storage virtualization solves the problem by pooling resources, slashing complexity, and reducing costs. Last in a three-part series. [MORE »](#)



Get Involved. If there are topics you'd like to see in future issues of *EduConnection* or you would like to submit an article, we want to hear from you. [Click here to e-mail us.](#)

Please have Sun Sales contact me.



Update from the Sun StorageTek Team — One Year After the Acquisition



One year after the acquisition of StorageTek, I had the opportunity to chat with Eula Adams, Sun senior vice president of Sun Microsystems Global Storage Practice. He and his team provide a “line of sight” from the Storage Product Group to ensure that Sun’s R&D investments achieve maximum return. “Flawless Execution” is the Storage Practice mantra.

Eula is a member of Sun’s leadership team and a former StorageTek senior executive. Prior to his joining StorageTek in 2004, he was a member of the executive management committee at First Data Corporation for more than 13 years.

Jones: What advantages do Sun customers gain from the acquisition of StorageTek?

Adams: When Sun acquired StorageTek, it added a brand that has built a solid reputation as an aftermarket solutions provider. We have preserved the attributes and assets that built StorageTek’s loyal customer base and are offering [additional archive solutions and disk systems](#). Separately, Sun and StorageTek were partners well before the acquisition and shared many of the same enterprise customers.

Where we didn’t, today we are introducing legacy STK customers to Sun’s innovative breakthrough technologies and end-to-end solutions for the datacenter, the department, and the labs — wherever secure, reliable and accessible data management is required. So, customers are guaranteed the solid services and products they relied on before the acquisition, with the technology and innovation of a full-service computing partner.



Jones: Managing the explosion of content on campus is one of the biggest challenges facing a university CIO today. From the digital archiving and preservation of a library’s content archive to real-time Web access to course materials and student records, our customers are struggling to provide 24/7 availability. With stretched budgets and even thinner IT resources, outages due to nature or human error can quickly become a disaster. What differentiates Sun solutions in the areas of disaster recovery and content management?

Adams: When a disaster strikes or for routine campus operations, data must be [protected](#), archived, and shared by everyone and everything on a network. This requires continuous protection in an eco-responsible manner — “eco” meaning both economics and ecology, both effective power usage and total cost of ownership.

The Storage business at Sun contains a comprehensive portfolio of solutions for our customers to meet their data management needs — a mix of Sun intellectual property and partner products. Unlike some of our competitors, we fully believe that tape is required by most of our customers for long-term, cost-effective data archival.

We employ a “bookend” strategy to continue our growth and leadership today and in next generation storage platforms with [tape](#) and breakthrough products built on Sun technology,



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including leadership in long term archive with our tape intellectual property and partnering for a best of breed disk portfolio. Sun provides an open interoperable stack from the disk up through the application to enable customers to choose best-of-class components for their solution.

Jones: Market leadership demands innovation, and Sun has maintained its position at the forefront of enterprise storage technology by continuing to develop products tailored to meet emerging customer needs. What can our Education customers expect from Sun in the future?

Adams: Moving forward, Sun will continue to introduce new storage paradigms with breakthrough products such as [Honeycomb](#) — a searchable storage database! Imagine the savings from having your archived data securely stored but instantly accessible AND searchable based on the rules and needs of your business.

There's [Project Blackbox](#) — a datacenter in a box that can be drop-shipped, so to speak, at disaster sites, customer locations where additional IT capacity is needed, in locations where real estate is more affordable, and at sites that need to be cognizant of their power usage and other impacts on the environment — which is just about any place these days. And [Solaris](#) — the trusted operating system that runs everything from our desktops to our servers to our large virtual tape libraries.

It was great to catch up with Eula Adams. Eula and his team can help you choose from our broad portfolio of road-tested consulting, implementation, support, managed and educational services to make sure we match the right services to your data management needs. From a point product to a holistic approach and from reactive to proactive measures — we see the small details and the big picture.

Education customers are looking to Sun to deliver effective, cost-efficient storage and retrieval of massive quantities of data. Both Sun and StorageTek companies had provided pieces of the solution. With Sun's acquisition of StorageTek, the combined company is uniquely able to provide the complete solution. Now, only Sun can provide a continuum of solutions that marry disk and tape storage with innovative data management software on the secure Solaris OS platform.

Contact Eula's team today to get started.

Sincerely yours,

Kim Jones
VP, Global Education, Government, and Health Sciences

Questions or comments? Please email education_news@sun.com



Storage Virtualization: Closing the Data Management Gap



Data is growing faster than the deployment of storage management capacity. In 2006, about 40 terabytes of disk were attached to the average non-mainframe server. The average storage administrator can handle about 8 terabytes of data. The gap between data volume and storage capacity continues to widen in the non-mainframe datacenter, even though the industry is taking every measure possible to close it.

This article, the third in a series on virtualization, covers storage virtualization.

Storage Virtualization: Reducing the Data Volume/Capacity Gap

Storage virtualization can reduce the gap between data volumes and storage capacity by consolidating multiple systems under a single interface, as well as streamlining the management of storage. In addition, virtual tape libraries can greatly improve the efficiency and effectiveness of backup operations. In a survey conducted by The Enterprise Storage Group (ESG) in October 2005, users were asked to quantify the benefits of virtualization. According to this study, storage virtualization:

- Improves device utilization levels
- Reduces storage management complexity and overall costs
- Facilitates interoperability and more “open” storage systems
- Enables resource consolidation
- Enables applications to more fully leverage virtualized storage, thanks to the tight integration of operating systems and virtualization technology

ADDITIONAL RESOURCES

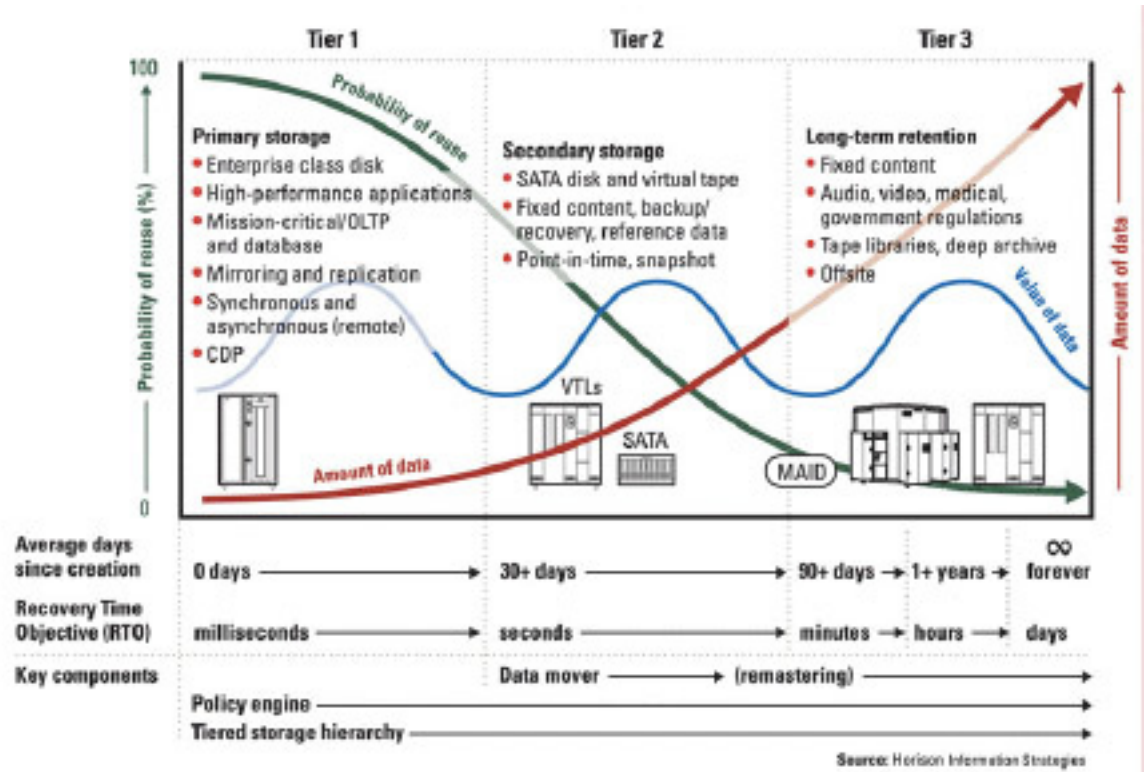
Virtualization means simplification. Anywhere an organization can begin to simplify, it should take steps to do so immediately.

The Three Primary Tiers of the Tiered Storage Hierarchy

The industry has coalesced on a three-tiered storage model. There are multiple tiers within each of the major tiers. Primary storage, or “tier-1 storage,” is the home for mission-critical, high performance online transaction processing.

Secondary, or “tier-2 storage,” has been fueled by the rapid progress and movement of Serial ATA disk from the desktop into the datacenter. This has set up a very effective backup and recovery tier for data, and has become a home for a variety of different architectures that use Serial ATA disks.

Long-term data retention, or “tier-3 storage,” is served by traditional tape technology, thanks to the increasing need to keep data once it has been created. When the tape library was introduced in 1988, it was assumed that most data would not have a useful life of more than two years. However, issues of regulatory compliance and fixed content have required organizations to implement long-term storage solutions to maintain data indefinitely. Tape technology dominates the tier-3 world, while disks are taking over most of the tier-1 and tier-2 applications.



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The graphic illustrates how data is managed and exchanged across the three-tier storage model.

A Future Storage Network Topology

A virtualized storage environment would allow data to move between different tiers without having to be read into and written from each individual server, which is often the case today. This approach provides more intelligence into the storage switching fabric and the storage devices, which can be accomplished in-band or out-of-band. This strategy implies that some of the virtualization will move away from the server and closer to the data itself for both file and block data.

Looking ahead, this or a similar architecture is likely to exist in any organization's future. Keep this in mind when talking to suppliers about what they can do to prevent the need for having every piece of virtualization architecture implemented on every single server.

Policy-Based Migration Using Sun StorageTek Products

Policy-based migration in architecture is important because it moves data between the tiers with virtualization products. Sun StorageTek Storage Archive Manager (SAM) software provides sophisticated capabilities for defining automated archiving policies, enabling administrators to group related files into common archive sets based on attributes such as file size, ownership, or file extension, providing fine-grained control over how and where data is archived.



It also allows them to specify files that should never be archived such as temporary files, thus saving time and resources. SAM software's automated policies can use a combination of criteria to identify files that are eligible to be migrated to tape or less expensive storage. SAM software functions to virtualize the file system so that infrequently used data can be stored on less expensive media, but can be accessed as easily as if it were online.

Block data can also be migrated across tiers using [Sun StorageTek 9900 Tiered Storage Manager \(TSM\)](#) in conjunction with [StorageTek 9900 Universal Volume Manager \(UVM\)](#). UVM allows storage administrators to aggregate multiple storage systems of various type (fibre channel, SATA) from various vendors under a single management interface while providing a common set of copy and replication services.

The end result is better utilization of storage resources, improved management efficiencies, and lower

Once the systems are aggregated into a common pool, administrators can use TSM to migrate data volumes from tier to tier according to policy. Again, the end result is better utilization of storage resources, improved management efficiencies, and lower cost.

How to Get Started in a Heterogeneous Environment

The goal is to get as many pieces of virtualization in place to reduce the storage management gap atop a common and simplified architecture. Only Sun has the expertise, broad portfolio of superior products, and the partner relationships to create scalable, end-to-end storage virtualization solutions that meet the specific needs of companies of all sizes.

- **Virtual Tape:** Sun provides both mainframe and open systems storage virtualization solutions. Sun StorageTek pioneered virtual tape and supports 69 percent of the mainframe virtual market with [Virtual Storage Manager](#), and supports the open systems market with [Virtual Tape Library \(VTL\)](#) and disk-to-disk-to-tape solutions.

A tape virtualization solution from Sun reduces complexity in growing data environments. It simplifies IT management tasks, allowing data managers to more easily interact with a disparate collection of systems, solutions, processes, and interfaces.

- **Disk System Virtualization:** Sun is the only provider of both mid-range and enterprise class disk virtualization solutions. These solutions allow organizations to aggregate multiple storage systems from various vendors under a single point of control, and provide them with a common set of management tools and copy/replication services.

By having multiple systems in a common pool, IT departments can manage more data with fewer administrators, reduce training costs and in some cases extend the capabilities of their existing assets. A virtualized pool of multiple storage systems of various classes creates a tiered storage infrastructure to more closely align the cost of storing data to its value to the organization.

Data can be promoted or demoted across tiers automatically, according to a pre-defined policy. Sun offers disk storage system virtualization in both its [midrange](#) and [enterprise class disk systems](#). Both provide a low-risk, "built-in" way to evaluate storage system virtualization.



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As a market leader in data center virtualization, Sun can help organizations simplify data management, protect data, accelerate recovery, drive down the true cost of storage, and improve the day-to-day performance of data users across the network.

This article was the third and final in a series on virtualization technology. Sun also offers solutions for virtualization on X64 servers and at the operating system level with Solaris Containers.

Questions or comments? Please email education_news@sun.com

This article has been synthesized from the Sun BluePrints article, [Slicing and Dicing Servers: A Guide to Virtualization and Containment Technologies](#), Harry J. Foxwell and Isaac Rozenfeld, October 2005.



Is Your Datacenter Ready When Disaster Strikes?



Is your university datacenter ready when disaster strikes? Disasters arise not only from technology-related problems, such as application outages and hardware downtime, but also from environmental events that might affect a room, a building, or a region. The real effects of a disaster are often not felt immediately, with extended downtime often occurring downstream from actual events.

IT disaster planning continues to pose a major challenge for many colleges and universities. According to Kenneth Green, director of The Campus Computing Project, “Just over half (55.7 percent) of U.S. institutions report a strategic plan for IT disaster recovery, essentially unchanged from 2004 (55.5 percent) or even 2002 (53.0 percent).”

ADDITIONAL RESOURCES

- » [Sun Java Availability Suite](#)
- » [Business Continuity Planning](#)

“One year after Hurricanes Katrina and Rita and five years after the 9-11 attacks, it is still surprising that so many colleges and universities have yet to complete or update their IT disaster plans,” said Green.

January is the time to storm proof your datacenter. Sun recently announced new [Solaris Cluster technology](#) to make it easier and more [cost-effective than ever for Education customers](#).

Clustered Approach

Sun’s customers often take clustered approaches to maintaining continuity. Level 1, known as a local cluster, would have applications running on a single server; servers are then clustered to have multiple applications within a unified environment. This approach gives tolerance to an application should the hardware fail, in that the application can run on another server.

Moving up to a Level 2 approach entails stretching clusters into different rooms or buildings, maybe at considerable distances from one another. Moving further, to Level 3, entails separating clusters into geographically dispersed locations, where they can be managed in those locations to ensure continuity. Sun customers that adopt a clustered approach today receive specific and unique advantages.

Solaris Cluster Software

In January, 2007 Sun unveiled the latest version of the Java Availability Suite that now includes Solaris Cluster software a multi-site disaster recovery solution and premier clustering and availability software platform. Sun Java Availability Suite helps customers to achieve and maintain high levels of datacenter availability across unlimited distances during planned maintenance, or in the event of an unplanned event, such as a failure or disaster.

Solaris Cluster provides high availability and global disaster recovery to suit the evolving needs of virtually any datacenter — across local distances, campuses or metropolitan areas, and across the world, ensuring business continuity without compromise. With out-of-the box support for the largest number of commercial and open source applications, open and flexible

configurations for both horizontal and vertical scaling, integration with the Solaris kernel and support on both SPARC and x64 platforms, Solaris Cluster provides industrial-strength high availability to your applications.

The Solaris Cluster framework extends high availability features of Solaris — it includes Sun Cluster, Sun Cluster Geographic Edition, developer tools and support for commercial and open source applications through agents. It is the latest release of the tested and proven Sun Cluster software.

How Does Solaris Cluster Work?

By tightly coupling Sun's servers, storage and networking solutions, Solaris Cluster provides the maximum level of service availability and performance for a cluster system.

The servers (nodes) in a cluster communicate through private interconnects. These interconnects carry important cluster information (data as well as a cluster "heartbeat"). This heartbeat lets the servers in the cluster know the health of the other servers within the cluster, ensuring that each server is "alive."

If one of the servers goes offline and ceases its heartbeat, the rest of the devices in the cluster isolate the server and "fail over" any application or data from the failing node to another node. This failover process is done quickly and transparently to the users of the system. By exploiting the redundancy in the cluster, Solaris Cluster ensures the highest levels of availability.

What Is Sun Cluster Geographic Edition?

Sun Cluster Geographic Edition software enables a multi-site disaster recovery solution that manages the availability of application services and data across geographically dispersed Sun Clusters. In the event that a primary cluster goes down, Sun Cluster Geographic Edition enables systems administrators to start up the business services with replicated data on the secondary Sun Cluster.

How Can Education Customers Get Solaris Cluster Technology?

Sun offers several options for Education customers to test and deploy Solaris Cluster technology.

Free Evaluation: Customers interested in evaluating the Sun Cluster 3.2 and [Sun Cluster Geographic Edition 3.2 software](#) are able to [download these products](#) as part of the Java Enterprise System evaluation program at no cost. To purchase support, however, customers must first purchase a license.

Subscription Offering: [Sun Java Availability Suite](#) is an integrated software platform that delivers best-in-class high availability keeping global enterprises running 24x7 through planned maintenances, failures, wide area outages or disasters. Sun offers Education customers a 50 percent discount on this and other Sun Java Enterprise Suites. Sun Java Availability Suite consists of four components:

- **Solaris Cluster Software:** Provides application and service failover to help ensure high availability for mission-critical services running across up to 16 nodes.
- **Solaris Cluster Geographic Edition Software:** Delivers multi-site disaster tolerance, connecting clusters across unlimited distances.
- **Solaris Cluster Agents:** Manages the availability of applications. The Java Availability Suite offers the largest number of prebuilt agents for industry applications, as well as a toolkit to build agents for custom applications.
- **Developer Tools:** The Java Availability Suite contains the developer tools within the Sun Java Studio Enterprise and Sun Java Studio Creator.



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Perpetual License

Customers can purchase both [Sun Cluster 3.2](#) and [Sun Cluster Geographic Edition 3.2](#) products with their perpetual entitlements with support sold separately. Special deeply discounted price tiers have been created for Education customers.

When disaster strikes, will you be ready? Storm proof your datacenter with enterprise continuity solutions from Sun. Get your preparations under way with a [free trial download of Sun Cluster software](#).

Questions or comments? Please [email education_news@sun.com](mailto:education_news@sun.com)



Blackbox: The Datacenter in a Shipping Container



Housed in a standard 20-foot shipping container for maximum flexibility, Project Blackbox packages compute, storage, and network infrastructure capabilities into scalable, modular units outfitted with state-of-the-art cooling, monitoring, and power distribution systems.

Project Blackbox will be easily transported using common shipping methods. Simple hookups for water, AC power, and networking will enable customers to quickly deploy Project Blackbox upon delivery. Customers will be able to order a variety of standard and custom configurations of systems, storage, networking, and software.

ADDITIONAL RESOURCES

- » [More about Project Blackbox](#)
- » [Sun Eco Center](#)

Headed toward productization in mid-2007, Project Blackbox engineers the cost, complexity, and rigidity out of legacy datacenters. By applying Sun's trademark innovation to the constraints of the traditional datacenter, Project Blackbox delivers four unique advantages:

- An "instant-on" and rapid deployment advantage
- Breakthrough economics from scalability, use of standard components, cooling innovation, and lower cost to build
- A 100 percent virtualized infrastructure that lets customers build once, deploy anywhere
- The convenience and flexibility of deploying a virtualized datacenter when and where needed

Datacenter in a Shipping Container?

While there's an incredible amount of innovation that's gone into the design, it's important to understand how critical the standard shipping container is to this concept. The shipping container we know and love today was invented in the 1950s by a man from North Carolina named Malcom McLean. The first ship, named Ideal-X, was a converted WWII transport vessel that sailed from the port of New Jersey to Houston.

Two things link this work to Project Blackbox. First is the economic discontinuity caused by the idea. Prior to the standard container, it cost \$5.86 per ton to load a ship. Afterwards the cost dropped to \$0.16 per ton!

The other bridge to the past wasn't about the container itself, but about what Malcom did next. In 1956, Malcom patented his container design. But instead of holding onto them and trying to sue anyone who copied the idea, he submitted the design to ISO and gave the organization a royalty-free license. Today we'd call that enlightened, but back then it was just plain crazy.

Yet it worked, and today there are over 18 million shipping containers in use worldwide. But Malcom must have known that challenges of having to compete in the open market was well worth the trouble if the open standards made that market huge.

Use Scenarios for Campus Deployment

The modular nature of Project Blackbox will allow Education customers to tap its benefits in an endless variety of deployment environments. Some scenarios could include:

- A campus datacenter struggling to keep pace with growth could rapidly build a datacenter and place it next to an inexpensive, green energy source



- An urban campus could place a container in a suburban or rural warehouse, on a rooftop, or in a parking garage where space is more abundant or less expensive. This would allow the campus to increase datacenter capacity without having to undertake the cost and complexity of building a new class-A facility.
- Countries looking to expand their ICT training capability in underserved areas could leverage Project Blackbox's easy management and support for up to 10,000 simultaneous desktop users — without administrators — to bring computing to remote villages and quickly mobilize IT systems.
- In the event of a natural disaster, schools could move data and applications away from the disaster site and confidently by taking advantage of Project Blackbox's powerful, ruggedized design.

Inside Project Blackbox

The Project Blackbox prototype is a computing powerhouse capable of hosting a configuration that would place it among the top 200 fastest supercomputers globally. The current prototype could support the following capacities:

- A single Project Blackbox could accommodate 250 Sun Fire T1000 servers with CoolThreads technology, with 2000 cores and 8000 simultaneous threads
- A single Project Blackbox could accommodate 250 x64-based servers with 1000 cores
- A single Project Blackbox could provide as much as 1.5 petabytes of disk storage or 2 petabytes of energy-efficient tape storage
- A single Project Blackbox could provide 7 terabytes of memory
- A single Project Blackbox could handle up to 10,000 simultaneous desktop users
- A single Project Blackbox has sufficient power and cooling to support 200 kilowatts of rackmounted equipment

Sun is ready to take you on a tour of the world's first virtualized datacenter. To learn even more about the breakthrough innovation and benefits Project Blackbox will soon deliver, please visit sun.com/blackbox or contact Sun.

Questions or comments? Please email education_news@sun.com



Education Only: Save more than 33% on Sun Storage

The Sun StorageTek 6140 Array is the perfect entry point for growing campus datacenters to step up to enterprise-class protection at an easy-on-the-budget price. The Sun StorageTek 6140 array combines availability, reliability and data protection while increasing performance to protect business critical information. Mix and match SATA and Fibre channel drives to meet growing backup and archiving requirements, cost effectively.



Education Promotional Configurations: More than 40 Sun products are deeply discounted for Education. Many offers expiring March 31, 2007.

Description	Edu List Price	Last Order Date
Sun StorageTek 6140 array with 2GB cache and 4 host ports, Rack-Ready Controller Tray, 8000GB, 16 x 500GB 7.2Krpm SATA Drives, 2 x 1GB-cache memory FC RAID Controller cards, 2 x redundant AC power supplies, 2 x redundant cooling fans, 2 x copper FC ports for expansion trays and 4 x host ports with shortwave SFPs, 2 x 5M fibre optic cables, 2 x 6M ethernet cables and management software, 3 yr on-site warranty included (Standard Configuration), RoHS-5. EDU ONLY XTB6140R11A2A800-E	\$19,750	March 31, 2007
Sun StorageTek 6140 array with 2GB cache and 4 host ports, Rack-Ready Controller Tray, 4800GB, 16 x 300GB 10Krpm 2Gb FC-AL Drives, 2 x 1GB-cache memory FC RAID Controller cards, 2 x redundant AC power supplies, 2 x redundant cooling fans, 2 x copper FC ports for expansion trays and 4 x host ports with shortwave SFPs, 2 x 5M fibre optic cables, 2 x 6M ethernet cables and management software, 3 yr on-site warranty included (Standard Configuration). RoHS-5. EDU ONLY XTB6140R11A2X480-E	\$32,995	March 31, 2007

Promotional pricing is U.S. list price. Similar discounts may be offered in your geography; customers outside of the U.S. should contact their local Sun sales office. This special pricing is offered only to eligible education institutions that have a Sun Education buying contract (EdVEU). You may purchase the following promotions by speaking to a Sun customer service representative. If you need assistance at any time you can speak with a Sun representative by calling 1-800-SUN-0404 and selecting option 1, then 2 for Sun Education and Research sales. Products on this discount price list for Education are non-discountable; this offer cannot be combined with other discounts or sales allowance programs.



Get a Sun Fire V890 Powerhouse at a 30% Discount

Put the new UltraSPARC IV+ processor to work in this desk-side or rack-mountable 17 RU tower and get over 5x faster performance, extensive compute capacity, and doubled memory. It is scalable to eight processors, 16 threads, and 128 GB of memory to give you headroom to spare.



Education Only: Save 30% on the Sun Fire V890 server.

Education Promotional Configurations: More than 40 Sun products are deeply discounted for Education. Many offers expiring March 31, 2007.

Description	Edu List Price	Last Order Date
Sun Fire V890 Server, 2 * 1.8GHz UltraSPARC IV+ processors with 32MB cache each, 8GB of DRAM (16 * 512MB DIMMS), 4 * 146GB 15Krpm FC-AL hard disks, DVD R/W, 1 * FC-AL disk controller, 1 * Gigabit Ethernet, 1 * 10/100 BaseT Ethernet port, 2 * serial ports via splitter (not provided), 2 * USB ports, 9 * PCI slots, 3 power supplies & redundant cooling fan trays, Solaris 10 and Java ES pre-installed RoHS-5 Compliant (Standard Configuration) EDUCATION ONLY.	\$27,559	March 31, 2007

Promotional pricing is U.S. list price. Similar discounts may be offered in your geography; customers outside of the U.S. should contact their local Sun sales office. This special pricing is offered only to eligible education institutions that have a Sun Education buying contract (EdVEU). You may purchase the following promotions by speaking to a Sun customer service representative. If you need assistance at any time you can speak with a Sun representative by calling 1-800-SUN-0404 and selecting option 1, then 2 for Sun Education and Research sales. Products on this discount price list for Education are non-discountable; this offer cannot be combined with other discounts or sales allowance programs.