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Guest Editor  
Scott McNealy

### KIM'S NOTEBOOK

Dear EduConnection member:

I'm pleased to author this guest column on education in the Participation Age, and to commemorate such visionaries as Sun Education VP Kim Jones, nominated for the Women in Technology Hall of Fame.

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Scott McNealy,  
Chairman and  
Co-Founder  
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Join Sun's top event for high performance computing, Tampa, November 11-13

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#### Sun Net Talks

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# EduConnection



October 2006

### EDU INSIGHT

## Security and Identity Management Named #1 Issue for Education IT

Security and identity management has become the #1 issue facing education IT, according to the 2006 EDUCAUSE Top Ten Issues survey. Size up the growing problem — and how Sun's systemic approach can help you fortify your security and identity management systems. [MORE »](#)



### EDU IN ACTION

## Training Today for the Thought Leaders of Tomorrow Training Today for the Thought Leaders of Tomorrow

The new Iraqi Virtual Science Library is giving engineers and scientists online access to more than a million documents vital to rebuilding the nation. Find out how an ambitious public/private partnership is helping eliminate the digital divide. [MORE »](#)



### SPECIAL OFFERS

#### Save 35% on the Sun Fire X4500 Hybrid Data Server

Education customers, save up to 35 percent on the Sun Fire X4500 — the industry's first hybrid data server. This four-way x64 server delivers blazing performance and the highest storage density available, with up to 24 TB in 4U of rack space. [MORE »](#)



#### Get a 25% Discount on a Sun Ray Thin Client Bundle

A Sun Ray thin client infrastructure can reduce complexity, slash energy costs, and improve security. And now educational organizations can save more than 25 percent on a Sun Ray thin client and monitor bundle. [MORE »](#)



## EDU RESOURCES

### Consolidation ROI Calculator

Size up your savings from server and application consolidation. Contact us for a more thorough analysis.

### Solaris Express

Get a development edge with work-in-progress code for Sun's operating system

### [www.curriki.org](http://www.curriki.org)

Learn and share at the Sun-founded Web resource where educators can easily add, edit and change curriculum

### Sun BluePrints

Browse a comprehensive resource collection of technical best practices on solving tough IT problems

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For a limited time, education and research customers can buy one, get one free with matching grants on select Sun products.

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## INSIDE TECHNOLOGY

### Slicing and Dicing Servers: A Guide to Virtualization and Containment



Containment and virtualization technologies, such as Solaris Containers, offer IT administrators powerful new weapons to consolidate servers and applications to reduce costs, improve manageability, and stop server sprawl. But which is right for your organization? [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.



## Guest Editor Scott McNealy: Empowering Education in the Participation Age



Dear Colleague,

I'm honored to have been selected as the guest editor of Kim's Notebook this month. These are exciting times for education IT, as we leave the Information Age and enter the Participation Age — an age in which everyone and everything is interacting on The Network. Lower barriers to entry and exit, plummeting device prices, and connectivity from any piece of hardware that has a browser mean that everyone is a creator, an editor, and a publisher.

From blogs to Java technology, SMS messages to Web services, participants are forming communities to drive change and create new businesses, new social services, and new discoveries. Sharing and collaboration will stimulate innovation to not only get everyone on The Network but to drive global and economic change.

At Sun, our strategy has always been to share. We pretty much invented open source. We know that breaking down barriers and creating communities drives innovation. Look at how some of the great innovations like Java technology, Google, and eBay came to be.

In the Participation Age, education should be open and accessible and community-driven. Today's student is tomorrow's researcher, developer, business owner, and global citizen. The more corporations, non-profits, educators and individuals collaborate to expand opportunities, break down barriers to access, and improve overall quality, the better the chances for innovation at every turn.

### **Sharing Knowledge to Improve Education Worldwide**

No one questions that technology is changing our daily lives. Yet significant work remains in providing teachers, students and parents access to the educational resources they need. In 2004, Sun started the Global Education Learning Community (GELC) to drive knowledge sharing, to continue to develop the resources needed to improve the quality of education worldwide. The GELC is now [curriki.org](http://curriki.org). It is an open, free Web resource where educators can easily add, edit, and change curriculum. And because it's based on sharing and open-source, all users need is access to a browser.

[Curriki.org](http://Curriki.org) is a growing community for developers, teachers, and educational institutions collaborating on more than 300 projects. Members include the Curriculum Corporation of Melbourne, Australia's Curriculum Corporation, and the Monterey Institute for Technology and Education. Curriki.org is focused on curriculum in the math and science area for middle school and high school students.

Sun continues to drive the development of communities to support educators through the free exchange of technology, curriculum, and best practices. I am proud of the technology and products resulting from Sun's significant investment in research and development. Our technology is solving some of the biggest challenges facing educational institutions today including data security and identity management, content management, disaster recovery and business continuity and, of course, strained IT budgets.



I have a reputation for questioning conventional wisdom. At Sun, contrarian thinking, creativity, integrity, and innovation are core company values. I am proud to work with dedicated professionals committed to solving our biggest problems.

### **Sun's Kim Jones: A Visionary in Technology and Education**

Sun's employees are our biggest asset. They drive thought leadership and innovation with the world through blogs, open community forums, and through their role as leaders in technology and the industry.



I am proud to honor Kim Jones, one of Sun's outstanding leaders, on the occasion of her nomination into the Women In Technology Hall of Fame. Kim is a visionary in both the technology and education industry. As Vice President, Sun Global Education, Government, and Health Sciences, Kim is working to eliminate the digital divide by expanding global reach through education, research, and philanthropy.

In her role, Kim has lead the implementation of a broad range of strategic programs that have accelerated the use of science and technology in education, not to mention driving leading-edge university research. Through Kim's sponsorship of curriki.org, students, parents, and teachers now have access to open, free Web-based content as well as curriculum resources, introducing them to technology that will open new doors.

Kim is a practical visionary, leading and changing how Sun approaches customers and industries. She drives policy initiatives and has testified before the Congressional Web-based Education Commission. She is frequently called upon to discuss the impact of technology in education at influential meetings around the world including NCTET, Sun Education Research Council meetings, and other education symposiums.

In 2001, Sun honored Kim with the prestigious Leadership Award in recognition of her outstanding leadership of Sun's Global Education and Research line of business and her modeling of Sun's values of integrity and courage, innovation, customer focus, teamwork, and results-orientation.

Congratulations, Kim, on your nomination to the Women in Technology Hall of Fame. And thanks to all of you in the education community who strive every day to break down barriers, provide access and support our young people as they grow into the leaders of tomorrow.

Scott McNealy  
Chairman and Co-Founder  
Sun Microsystems, Inc.

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



## Slicing and Dicing Servers: A Guide to Virtualization and Containment

Virtualization is a CIO's dream. Part of an emerging family of containment technologies, server virtualization is designed to lower costs by reducing the hardware and system administration required to run applications, and to speed application deployment by allowing multiple deployment scenarios to be tested with ease.



Sun provides a range of options on multiple operating systems across both SPARC and x86 product lines. Sun's innovative Solaris Containers technology, part of the Solaris 10 Operating System, lets you run isolated systems in which each one thinks it is running on a dedicated system.

This article, the first in a series, covers server-oriented containment and virtualization with a focus on Solaris Containers technology. Part 2 of the series will cover virtualization technology on the x86 platform. Part 3 of the series will cover storage virtualization.

### One Application, One Server = Server Sprawl

Deploying applications, selecting appropriate server resources to support them, and managing the resulting environment is a complex problem. Many IT managers take a simple approach – assign each application its own server. Why? They do not want applications to interfere with each other in any way, and conclude that this can only be accomplished through dedicated, application-specific hardware servers.

This belief may be motivated by mistrust of the application, mistrust of other users or applications that could potentially share the same server, not wanting to put too many eggs in one basket, or other technical or organizational reasons. The result of this approach is often server sprawl – a large number of servers that are typically underutilized, difficult to manage effectively, and which increase data center space, cooling, and power requirements.

A variety of hardware and software technologies has evolved to help address these problems. Nearly all of the solutions involve some form of containment. In computing environments it may be important to contain applications, processes, groups of users and possibly complete operating systems. Each of these categories can be thought of as a service — a long-lived set of software objects with well-defined states, error boundaries, start and stop mechanisms, and dependency relationships to other services. A service must be viewed and managed – that is, contained – as a single entity. A container is a bounded environment for a service; such environments can be implemented and managed using a wide variety of hardware and software technologies.

### The Two Flavors of Software-Based Containment

Hardware containment methods originated in the 1960s and 1970s on early mainframe systems and continue today on modern enterprise-class servers. Software-based containment solutions are a more recent approach. These solutions generally do not require specialized hardware and can run on a wide range of systems, from laptops and desktop workstations, to mid-range and enterprise-class servers. There are two general architectures of software-based containment — one uses a hosted virtual machine monitor (VMM), and the other is operating system virtualization.

In a hosted VMM, a primary operating system runs directly on the system hardware, and a VMM runs as an application under the host operating system. VMware Workstation and Microsoft

#### ADDITIONAL RESOURCES

- » [Sun Virtualization Learning Center](#)
- » [Solaris 10: Containers](#)
- » [Solaris Containers Learning Center](#)
- » [Oracle Pricing with Solaris 10 Containers](#)



Windows Virtual Server 2005 are examples of this type of hosted VMM environments. The hosted VMM permits multiple guest operating systems, such as Linux, Microsoft Windows, or the Solaris OS, along with their applications to run simultaneously in a contained manner on the host system. Administrative tools are provided to allocate and change resources among the guest operating systems. Additionally, applications can be run directly on the primary operating system, ignoring the VMM entirely.

Not all server containment technologies require a VMM. In fact, VMMs can consume significant CPU resources as they rewrite or redirect guest operating system code, especially when they need to intercept and redirect privileged guest operating system instructions.

### Operating System Virtualization with Solaris 10 Containers

If a collection of processes and resources can be defined and bounded to match the requirements of a contained server environment, server virtualization can be accomplished efficiently without the use of a separate VMM. This type of containment can be described as operating system virtualization and this is the approach taken with Solaris Containers.

Only one instance of the Solaris OS runs on the hardware and it is referred to as the global zone. The administrator defines one or more non-global zones that contain virtual server environments. A non-global zone appears to all users as a fully realized server. Non-global zones are isolated from each other. Not only do they have their own separate name space, non-global zones cannot see one another, their processes, or their attributes such as IP addresses.

#### New Oracle Pricing Model

A new Oracle pricing model for Solaris 10 Containers lets Solaris/Oracle users develop a software consolidation strategy that is cost effective from both a hardware and software perspective. [More »](#)

Non-global zones also cannot share memory, and even have their own user level operating system services. Because every zone is isolated in this way, zones can be independently booted and rebooted at will without disturbing the other environments on the system. A Solaris Container provides isolation and resource control — important building blocks for creating a secure IT infrastructure.

### Trade-Offs Between Containment and Virtualization

Which technology is right for your data center? Virtualization technologies are maturing, enabling them to provide contained environments for quickly creating and testing applications and operating systems, guarantee application of quality of service, and increase overall system utilization and return on investment. At the same time, some virtualization technologies can:

- Add complexity to the overall IT infrastructure
- Increase licensing and administrative costs
- Potentially add system overhead
- Complicate diagnosis of system problems

For example, consider an environment in which Oracle software is run under VMware on the Linux operating system on a Sun V40z server. If a problem is experienced, how do you identify its cause? Which vendor is ultimately responsible for helping you find and fix the issue?

The biggest factor impacting the selection of one containment model over another is the operating environment for which the application to be contained has been written. Unfortunately, factors that affect infrastructure decisions are often taken into account late in the process — after the application design and development phase have been initiated.



Once the operating system has been agreed upon, options for containment models are limited and tend to be vendor-specific. The table below outlines important virtualization guidelines that can aid the decision-making process.

If you have	Then...
Multiple Solaris OS or Open Source Applications	Consolidate using Solaris Containers
Mixture of Linux and Solaris OS Applications	Consider migrating Linux applications to Solaris OS  Consolidate Solaris OS applications using Solaris Containers on one server, and Linux applications using VMware ESX virtual machines on another server
Microsoft Windows and/or Linux Applications Running on Different Versions of Operating Systems	Consolidate onto a single server using VMware ESX virtual machines
Applications on Different Operating Systems and architectures from IBM	Consider migrating to Solaris Containers or consolidate using IBM LPARs

Consider the following when selecting a virtualization technology and approach:

- **Platform Availability:** Different platforms provide different levels of availability. VMware only supports 32-bit applications on the x86 and x64 processor set. Solaris Containers operate on x86, x64, and UltraSPARC processors.
- **Performance:** If overhead is a concern, VMware may not be an option. The layers of software and different operating system kernels present in these software architectures may add additional overhead and slow overall system performance.
- **Manageability:** If data center manageability is a crucial factor, Solaris Containers are a good choice. The operating system standardization they ensure for a large percentage of applications helps ease the management burden, and footprint reduction is possible with high-end servers.
- **Isolating software problems:** If being able to isolate software problems is important — and it commonly is — then observability is essential. If an application in a VMware guest operating system is not behaving as expected, it may be difficult to diagnose what is happening in the operating system with respect to the entire platform and the foundation environment. With Solaris Containers, the global zone allows complete visibility into all container-sized application services and the underlying hardware.

Containment and virtualization technologies are beginning to play a critical role in IT infrastructure design decisions. It is important for IT managers, CTOs and CIOs to understand these evolving concepts and solutions and to know what questions to ask about their potential benefits and pitfalls. Virtualization is a key part of an overall strategy to reduce server sprawl and increase resource utilization in a systemically secure manner.

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.

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## Security and Identity Management Named #1 Issue for Education IT

Security and identity management has become the #1 issue for CIOs to resolve to ensure the long-term success of their institution's IT infrastructure, according to the 2006 EDUCAUSE Top Ten Issues survey.



IT funding — the #1 issue for the past three years — was displaced into the #2 spot for the first time by security and identity management in the EDUCAUSE survey of hundreds of educational institution IT professionals. In 2005, security and identity management had moved from the #3 to #2 position of Top Ten issues.

The growing importance of security and identity was evident during the annual EDUCAUSE conference, one of the largest trade shows for education technology professionals, held October 10-12 in Dallas, Texas.

Many attendees visiting the Sun booth at EDUCAUSE were looking for security and identity management solutions. No wonder. Education IT professionals face unique security challenges:

- **Widely Distributed Networks:** Machines in residential university networks are not owned by the university, but by students. The university functions like an ISP with little control over applications and patch management (in contrast to a corporate network, with centralized administration and patch management).
- **Viruses, Worms:** Unpatched, unprotected student machines are prone to worms, viruses, spyware, associated with usage such as peer-to-peer file-sharing, MP3 swaps, and instant messaging.
- **Intellectual Privacy/Asset Loss:** Data privacy issues associated with student/alumni data, and IP issues associated with research data or financial data.
- **Distributed Denial of Service (DDOS):** University networks used as launch pad for cyber attacks.

### ADDITIONAL RESOURCES

- » [Toward Systemically Secure IT Architectures](#)
- » [Solaris 10 Operating System Security](#)
- » [Sun Secure Global Desktop](#)
- » [Sun Ray Thin Clients](#)
- » [Sun Java System Identity Manager](#)

### Secure by Design: The Sun Approach to Security

How well an organization has deployed and integrated security into its network can be a significant contributor to its overall productivity. But security is not an object, nor is it simply a list of features. Security is an ongoing discipline that monitors what's happening — in your organization and out in the world — and applies this knowledge to the development and safe deployment of IT resources.



[Click to enlarge](#)

Sun believes that you can minimize the complexity and cost of appropriate security by designing systemic security into flexible, open architectures that include processes for dynamic assessment of policy and risk. By focusing on security as an integral part of all of its products, Sun provides a solid foundation for preventing, not just fixing, security problems.

The bottom line is secure operation. The Solaris Operating System, Sun Secure Global Desktop, Sun Ray thin clients, and Sun Java System Identity Management solutions comprise four key components of Sun's systemic approach to security and identity management.

### **Solaris 10 Operating System**

The release of the Solaris 10 OS marks Sun's most comprehensive, security-enabled OS yet. Most binaries in the Solaris 10 OS are digitally signed, and administrators can track changes easily. All patches or enhancements are embedded with digital signatures, eliminating the false positives associated with most file integrity-checking software when upgrading or patching.

As part of the Solaris Fingerprint Database project, digital signatures are provided for all files shipped in the Solaris OS. These signatures allow you to check the integrity of Solaris files to ensure that no hacker has modified critical system files. Solaris 10 offers unique user rights management (also known as role-based access control, or RBAC) and process rights management (also known as privileges).

These technologies reduce security risk by granting users and applications only the minimum capabilities needed to perform their duties. Unlike other solutions on the market, no application changes are required to take advantage of these security enhancements. For years, the Solaris OS has included firewall protection technology with every copy shipped to protect individual systems from attack.

### **Sun Secure Global Desktop**

Sun Secure Global Desktop Software delivers information, data, and applications through a virtualized desktop environment to desktops, laptops, thin clients, and mobile devices. This solution is able to meet and exceed these demanding secure mobility requirements by facilitating secure application access to a wide variety of applications from a wide range of client devices.

Using Sun Secure Global Desktop Software, desktops PCs running Microsoft Windows, Solaris OS, Linux, and Mac OS X can all be used and mixed on the same network to access multiple applications running on multiple platforms. Sensitive applications can be migrated from desktop PCs to centralized servers where they can be more closely monitored and managed without forfeiting productivity. This model allows IT to maintain strong security policies without limiting user flexibility.

All supported client devices can access applications on Windows, Solaris, Linux, and other UNIX environments, as well as mainframe and midrange systems, without concern that sensitive information is being stored on standalone desktops and laptops. Additionally, users can easily move from device to device and their session follows them, even on Windows mobile Pocket PC devices.

Best of all, Sun Secure Global Desktop replaces the need for complex hardware or software VPN solutions and, unlike a VPN solution, the data never leaves your data center. Users experience real-time access to applications and data with a fully featured and rich graphical experience, whether they are at a desk in the classroom, traveling to a building across campus, or on the other side of the world.

### **Sun Ray Thin Clients**

Traditional thick-client desktops are a costly solution for providing ubiquitous access to services. They are also a source of many well-documented security risks, including software piracy, data theft and loss, and malware infection and propagation. The use of thick-client technology magnifies the security challenges facing organizations today.

The sheer number of deployed systems often makes it difficult and costly to ensure that they are operating in a consistent, compliant, and safe manner. Furthermore, organizations often lack sufficient control over what software is installed on those platforms by end users, either intentionally or otherwise. Similarly, data is often copied to, or cached on, desktop platforms where it might not be safeguarded to the level required by an organization's security policies.

Finally, thick clients have an intrinsic value, making them valuable targets for theft and illicit resale of hardware and software. Once stolen, the information stored locally on the thick client can be accessed, used, or sold, with the potential for causing damages far beyond the intrinsic value of the stolen machine.

**Sun Ray thin clients** address many of these security issues through the effective creation of desktop utility environments in which small, stateless networked devices replace traditional thick clients as the desktop. These devices have no local configuration, storage, or state, and they must be used in conjunction with a server environment (a desktop utility).

With secure desktops, there is no longer a need to deploy security controls on each and every desktop, and there are fewer audit logs to collect and analyze, because configuration and policy enforcement are centrally managed. Consequently, the use of thin-client devices can help reduce the overall administrative burden and budget, allowing people and resources to be directed toward more strategic and proactive initiatives.

Thin-client devices used in support of a Secure Desktop Services strategy have a much lower intrinsic value and are therefore a less interesting target for thieves for the following reasons:

- They cannot be used in a standalone capacity outside of an existing thin-client environment.
- They do not retain any state, configuration, or data that can be copied, ransomed, or deleted if a unit is stolen.
- Because thin clients are effectively networked display terminals, they can leverage older, slower processors, smaller memory packages, and even operate without hard drives — all without adversely impacting the end-user experience. This means that even the parts that make up the thin client would not command high resale value.

### **Sun Java System Identity Manager**

With hundreds or thousands of instructors, administrators, and students accessing institutional networks and the applications and data they contain, managing who has access to what systems is not just a costly, time-consuming ordeal. It also represents a significant security risk that can lead to unauthorized access to sensitive information.

**Sun Java System Identity Manager** and other solutions in Sun's identity management portfolio provide a comprehensive solution that can reduce the time and cost of managing disparate identity management silos while greatly fortifying security.

Sun's newly released Identity Manager 7.0 is the industry's first identity management product to combine both user provisioning and identity auditing in a single solution. It enables IT organizations to streamline governance of which users have access to which applications through centralized, automated user provisioning. Importantly, it also covers deprovisioning of users to help IT administrators zero in on the serious problem of former employees, contractors, or students retaining access to vital systems after they have left the institution.

In addition, policy-driven auditing provides administrators with exception-driven reporting to highlight violations, and a powerful auditing facility for preventive and detective compliance. With it, educational institutions can eliminate costly manual approaches, reduce help desk and operations workloads, lower total cost of ownership, and reduce the number of user accounts that need to be reviewed.

Few organizations have the luxury of starting fresh with their IT landscape and building in systemic security at the start. Most organizations need to adapt their existing, legacy deployments and transform them to support security and compliance more systemically.



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For some organizations, this might be as simple as a few minor adjustments to their overall IT security plan. For others, it might be more of an evolutionary process that will require a sustained commitment of time, money, resources, and organizational focus. Wherever your institution is along the continuum, Sun has the resources to improve campus IT security.

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## Training Today for the Thought Leaders of Tomorrow

It is likely that members of today's workforce will be disrupted in their careers by some new technology or new service model. Those disruptions are occurring faster and faster and coming from multiple directions.



That doesn't mean you can't retool and do some disrupting yourself. In other words, things change so rapidly now that there is more opportunity to cycle back around and carve out something new. No one has a lock on power or status or title for very long anymore.

The rapid pace of change in today's job market was the [subject of a recent podcast](#) by Dr. Moira Gunn, host of the NPR (National Public Radio) TechNation program, with career counselor Dr. Marty Nemko. According to Nemko, "serial specialization" is one of the keys to elongating your career.

### ADDITIONAL RESOURCES

- » [Sun Academic Initiative](#)
- » [Sun Tech Days](#)

"You need to become a serial specialist," Nemko said. "Today's specialist in technology is going to be obsolete in three to five years. So you have to learn the art of becoming a specialist again and again and again. Even if you can write well and speak well and work well on teams, that isn't going to be enough. But I think choosing your one little narrow area of specialty isn't going to be enough either. You have to use resources to get special fast."

Sun supports students in all phases of their careers to gain and retool their skills. Sun Academic Initiative partner institutions get no-cost quality curriculum and support directly from Sun to help keep pace with technology and differentiate their academic programs by offering education in innovative technologies.

### Sun Academic Initiative Offers Flexible, Hands-On Instruction

The Sun Academic Initiative offers integrated curriculum solutions via a variety of delivery methods. Students can get in-class, hands-on instruction from Sun authorized faculty and participate in projects and case studies facilitated by experienced, technical professionals. Students can also study at their own pace online from any browser through the Sun Web Learning Center.

The courses in the Sun Academic Initiative Program help prepare students to become certified in Sun technologies, such as the Java programming language and Solaris Operating System. And that certification can go a long way in helping them succeed in the process of becoming a serial specialist. Sun Academic Initiative participants receive a substantial discount on certification costs.

The [Sun Academic Initiative](#) is a great way for students to get the "edge" they need for long-term career success, said Thulasidoss Mohandoss, regional director, Government, Education & Healthcare, Asia South, Sun Microsystems.

"In today's world of higher education, students are looking for more than just a degree or diploma. They are looking for an edge," Mohandoss said. "With free Sun technology training from the Sun Academic Initiative program and through seminars targeting developers, students from participating institutes can master the skills that will propel them into fulfilling their career goals, right from the start."



### **In Bangladesh, Sun Partnerships Help Create Opportunities**

In Bangladesh, seven universities and technical training institutions recently joined hundreds of other participating institutions around the world to offer Sun training and technology through the Sun Academic Initiative program. The Bangladesh initiative was coordinated by JOBS-IRIS Bangladesh, a multi-donor funded organization that aims to create sustainable employment through private sector development.

At an event celebrating the partnership between Sun and JOBS-IRIS Bangladesh, A. Imran Shauket, country representative, JOBS-IRIS Bangladesh, cited the results of a recent survey partly funded by JOBS.

“It is anticipated that worldwide there will be a shortage of up to two million skilled information technology jobs by 2008, including 500,000 in India alone,” Shauket said. “Training in Sun technology is both a tool for personal skill enhancement as well as national economic development. As more students and career employees master new skills and become certified, this in turn creates a talent pool of well trained technical professionals that benefits the local economy.”

### **Sun Tech Days: Building Developer Skills Worldwide**

Sun Tech Days are bringing Sun experts for focused training sessions to a location near you. The World Wide Tech Day tour commenced in Seattle, Washington, in October 2006, and continues in Prague, Czech Republic, in November 2006 and on to Hyderabad, India, in February 2007. Attendees can choose from sessions on Java Programming, Developer Tools, Solaris OS, Web 2.0, and Open Source.

Tremendous demand and excitement surrounds Sun’s World Wide Tech Day tour. For instance, in China, a recent event at China Academia of Science (CAS) Graduate School attracted 646 students and professors from various institutes in Beijing to celebrate the return to Beijing of Sun’s James Gosling, the “Father of Java Technology.” The attendees also got a look at new Sun products and technologies, including NetBeans and OpenSolaris.

“At the beginning of the event we had a full room with many students sitting on the floor and standing around. During the 3.5 hours some people left, but newcomers quickly filled in their spaces. At the end of the event we still had a full room, with people sitting on the floor and standing around. All the presentations were well received by the audience, and they were having a lot of fun with us,” reported John Jiang, Sun Developer Network program manager, from Beijing.

However, you don’t have to wait to attend a Sun Tech Day to begin retooling your skills. [The self-paced lab portion of Sun Tech Days](#) events are available for home use — log on and you can access a Sun Tech Day lab and begin your skill development at home at your own pace.

The Sun Developer Network Channel offers short topical videos and podcasts that zero in on tools and resources that can simplify your application development. [Check out Sun’s latest video interviews on identity management](#) and learn about current trends, solutions, and challenges facing developers as they implement security into new and existing applications.

Sun has the tools training and resources to help you and your students to gain the latest skills to help in personal, institutional, and national retooling efforts.

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



## Save 35% on the Sun Fire X4500 Hybrid Data Server

By integrating state-of-the-art server and storage technologies, the Sun Fire X4500 Server delivers the remarkable performance of a four-way x64 server and the highest storage density available, with up to 24 TB in 4U of rack space. This system also delivers incredibly high data throughput for about half the cost of traditional solutions.



The X4500 server is ideal for such key education applications as high-performance technical computing, grid deployments, business intelligence and data analytics, digital media streaming, and nearline storage. It features:

- Fast, energy-efficient dual core AMD Opteron processors
- Highest storage density
- Incredibly high throughput: approximately 1 GBps from disks to network and approximately 2 GBps from disk to memory
- Unprecedented data integrity and dramatically simplified administration with Solaris OS and ZFS
- Enterprise server RAS features; redundant, hot swappable components

### Education Promotional Configuration:

Sun Fire X4500 x64 Server: 2x AMD Opteron Model dual-core 285 (2.6GHz/1MB) processor, 16GB PC3200 DDR1/400 (8 x 2GB) memory, 48 SATA 3.5" 500GB 7200RPM HDD; 24TB, 2x PSU, Service Processor, 4x 10/100/1000 Ethernet ports, 4x USB 2.0 ports, 2 64-bit/133MHz PCI-X slots, 1x 64-bit/100MHz PCI-X slot, VGA port, no power cord, order Geo-specific x-option. Solaris 10 OS preinstalled, RoHS-5. For Education and Research only.

**Part Number: A76-PGZ216GHMH-E**

**Last Order Date: December 31, 2006**

List Price: **\$69,995 US**

Education Promotional Price: **\$45,995 US**

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 25% Discount on a Sun Ray Thin Client Bundle

Sun Ray architecture consists of two types of components: Sun Ray virtual display client and Sun Ray Software. Sun Ray clients are simple, low-cost, low-power devices that require no desktop administration. Unlike complex Microsoft Windows or embedded Linux-based thin clients and PCs, Sun Ray clients do not need to be upgraded when new applications are introduced or more computing power is required.



With a smart card, a user simply inserts a smart card into any available Sun Ray client and instantaneously accesses an existing session over a local or wide area network.

Sun Ray Software 4 provides user authentication and encryption between the server and the clients, as well as user session management. It not only enhances security, but also helps reduce the complexity and administration of the IT environment. [Download a free trial version.](#)

### Educational Promotional Configuration:

Sun Ray 2 with 19" flat panel monitor bundle. Includes one Sun Ray 2 client with one Sun 19" flat panel display (1280 x 1024 resolution). RoHS 6 compliant. Type 7 country kit not included. For Education and Research only.

**Part Number: NTC-10Z-7202A-01-E**

**Last order date: December 31, 2006**

List Price: **\$899.00 US**

Education Promotional Price: **\$649.00 US**

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.