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Silicon at the Core of Innovation

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A Corporation's Social Responsibility

By Jonathan Schwartz

Being headquartered in California's Silicon Valley, surrounded by thousands of startups, I can attest to a company's ability to change the lives of its employees as well as the communities in which it operates. Companies create professional and financial opportunities, develop leaders, broaden horizons, and even fund family educations.

A far smaller number of companies have the capacity to change the lives of their customers, through products or services that enable innovation, create opportunity, or connect people. A company that invests in and supports the customers, employees, and partners it serves doesn't just have customers, it has loyalists and evangelists.

A tiny fraction of companies in the global economy have the ability to transform their employees and customers while also benefiting the environment in which they operate. Companies with products and technologies that change the course of education, healthcare, politics, commerce, or even global warming. These are the companies that have the greatest opportunity of all — and the greatest responsibility.

I believe a company should drive progress through its innovation and creativity, leading not only with its minds, but also through its actions.

As a technology pioneer and leader, as well as a public company, Sun drives value for all our constituents, whether it's shareholders, Ministries of Education, supply chain managers, developers, or CIOs. But we are not only responsible for delivering growth to our shareholders, we are also responsible for doing so in a way that is consistent with our values of integrity, transparency, and fairness.

To me, that is the meaning of corporate social responsibility regardless of what business you're in — a responsibility not only to shareholders, but also a dedication to the health and well-being of employees, customers, communities, and the planet.

Jonathan Schwartz

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» **Innovate. Act. Share: Sun Corporate Social Responsibility**

This letter is excerpted from Sun's Corporate Social Responsibility report.
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Silicon at the Core of Innovation



On March 27, 2007, Sun announced the formation of a new microelectronics division, signaling an expanded focus on making Sun's silicon innovations available to a broader set of customers. Dr. David Yen, executive vice president of the new division, shares with Sun Executive Boardroom readers his view on why the timing is right for this move and what new possibilities it signals for customers.

Q: Why did Sun form a new microelectronics group?

A: This move is in alignment with Jonathan Schwartz's strategy of pushing Sun's intellectual property to a broader customer base. Our Solaris Operating System already enjoys much success beyond our own x86 server platform because of this strategy.

We're doing the same thing now on the silicon side by pushing our processor, networking interfaces, and other silicon technologies to a customer base outside of Sun.

Q: What will the new group do and how does it address the needs of customers?

A: This team has been around for 16-18 years supporting the development of our SPARC processors. We have high-end microprocessor design expertise, which is the most demanding, as well as chip testing and tool development expertise. It's an engineering development powerhouse with well over 1000 engineers — a very significant competency in the industry as a [fabless electronics house](#).

We have also made significant progress in the throughput computing market and are now leading the industry. Both our upcoming [Niagara 2 processor](#) and [Neptune network throughput technology](#) are unique and we've seen a lot of outside interest in embedding or licensing these technologies into various customers' product lines.

Customers will be able to leverage the breakthrough silicon multithreading from Sun to build their own highly threaded, networked products for the new Web 2.0 buildout.

Q: What is the business environment for microelectronics these days?

A: Very good. We're seeing two things happening. First, the number of network-attached devices — other than servers — is exploding. There are cell phones and "Blackberrys," but also things like portable game and music players, satellite radio, GPS, etc. At the same time, the companies making those devices are rethinking their approaches. They used to build on custom processors with custom OSs, but custom development takes time — and time to market is critical to their success.

Volume begets value.
Value begets profitability.
We're making our
technology available to
whoever wants it.

So now, more of these companies are looking at general-purpose processors and general-purpose OSs, and that's perfect for us. We have chip multithreading, or CMT, processor technology, and the Solaris OS they need, plus the whole Solaris ISV ecosystem. That means they can focus on their value-add, rather than on custom processor and OS development — which is expensive and time-consuming. And of course, the kinds of services that appear on these devices are all inherently threaded, so that creates demand for our CMT-based servers and multithreaded network technology. So, we believe that Microelectronics will not only create new business for Sun, it will also create a pull for our existing businesses.

There is also demand for smaller, cooler technologies to alleviate datacenter constraints and address environmental

concerns such as power and cooling. This is driving an effort to design CPUs that deliver higher throughput while minimizing power consumption and space. The ability to get more out of a piece of silicon real estate is limited by [Moore's Law](#) and the answer is [chip multithreading](#).

Lastly, the fabless industry is growing rapidly. This trend is allowing companies to contribute their intellectual property for new designs and products. By setting up an independent microelectronics business unit, we can spread such innovation to a much broader market beyond Sun's own customers. In early April, we licensed our throughput [networking intellectual property](#) to [Marvell](#), which gives them the ability to further develop, manufacture, and distribute all of its derivatives. Not only will Marvell's customers benefit from the improved features and costs, but Sun can become a customer for the chips Marvell develops as well.

Q: In what way do silicon investments provide competitive advantage?

A: Having our own silicon and hardware capability allows Sun to offer a more complete integrated solution — to maximize the benefits of all layers of technology, from silicon to system architecture to platform packaging to operating system to the software stack. This maximizes Sun's ability to optimize for such integration. For customers who just want an integrated solution, this is the best value.

However, in the spirit of openness, since we are contributing our IP and technologies to the marketplace, there is a much broader set of customers who can now utilize these technologies to create products that bring them competitive advantage. No other company offers a more complete and optimized multithreaded environment — from Java technology to the Solaris OS to our UltraSPARC CMT to our latest networking throughput silicon technology. Our silicon investments complete the multithreading throughput equation for our customers.

Q: How will this be different from the microelectronics business that Sun had in the mid-'90s?

A: The only thing in common between those two groups is the English word "microelectronics." Today, Sun is a much tighter, fully leveraged organization. To maximize the flexibility and availability of our technology to the outside world we have separate businesses, but we are all SUNW shareholders. Our whole goal now is to make our innovations available to any customer who wants them.

Q: How does this relate to the [Sun/Intel announcement](#) back in January?

A: With Intel endorsing Sun as the mission-critical OS for Xeon, it allows us to propagate our Solaris technology because it is the industry's best interest. With our strong interest in the x86 world, Intel took notice. And, in the spirit of our new tact with microelectronics, if Intel is interested in working with us on microprocessors, we're all ears.

Q: How does this tie to the [OpenSPARC initiative](#)?

A: The [OpenSPARC initiative](#) is a very important effort. With the open sourcing of Niagara and UltraSPARC T1, there have been various efforts outside of Sun to extract part of the eight-core, 32-thread Niagara. There are two companies who have extracted one of the eight cores out and offered it to the general marketplace — [Simply RISC](#) and [Polaris Micro](#). Sun also released a single-core, single-thread design in March 2007.

The significance of this effort is that this implementation can comfortably fit into the commercial FPGAs (field-programmable logic) offered by a few companies. This allows people, particularly college students, to do rapid prototyping. Since it fits into the capacity of the commercially available FPGAs, there's additional capacity for students to do experiments, which provides a nice vehicle for professors to offer lecture or lab courses.

We intend to work actively in that regard to expose our innovative throughput computing technology to the next generation to broaden the understanding and appreciation of the SPARC architecture.

About David Yen

David Yen brings over 27 years of technology know-how, engineering vision, and strong business management expertise to Sun. As executive vice president of the Microelectronics group at Sun, Yen will oversee the developments in network, cryptography, and high performance computing. Prior to this role, Yen led the company's Storage Group. Other key roles at Sun have included vice president and general manager for Sun's enterprise server business, executive vice president of processor and network products, and executive vice president of scalable systems.

Yen was co-founder and director of hardware development of Cydrome, Inc., a mini-supercomputer startup, before joining Sun in October of 1988. Prior to Cydrome, Yen was employed by IBM Research for manufacturing automation and TRW, Inc. for advanced processor development. Yen earned a bachelor's degree in Electrical Engineering from National Taiwan University, received an M.S. and Ph.D. in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign, and completed a General Management Program at Stanford Business School.

Stretching the IT Dollar with Virtualization



What is virtualization and how does it affect the bottom line? For nearly 10 years, VMware of Palo Alto, California, has made a name for itself by making computing more efficient with virtualization technology. Sun recently spoke with Raghuram Raghuram, vice president of product and solutions marketing at VMware, to find out about the business benefits of virtualization.

Related Resources

- » [View a Sun Net Talk Webcast on Virtualization](#)
- » [EVP John Fowler: The Business Benefits of Virtualization](#)

Q: What is virtualization?

A: Virtualization is a layer of software that partitions — or carves up — the resources of a server so that multiple operating systems can simultaneously, yet safely, access them. This creates what we call virtual machines — software that acts like physical servers. Virtualization allows fewer servers to run more applications and operating systems.

The technology can also be used to aggregate resources across servers, which creates a pool of computational resources that keep chugging away regardless of demand. If a virtual machine fails, business applications can be shifted over to another virtualized environment without affecting operations.

Q: How does this cut IT operating costs?

A: Virtualization can substantially reduce hardware purchasing costs — and enterprises don't have to worry about where they'll house ever-increasing amounts of hardware. Plus, the management of applications and operating systems becomes more cost-effective because business-critical applications are no longer spread out among multiple servers.

Q: Does virtualization also reduce power consumption?

A: Many utilities think so, and offer rebates and incentives for companies with virtualization programs. According to our research, the average power and cooling costs of a server are reduced by \$560 annually by using virtualization technology. Here's why: the average application typically uses only 10 to 15 percent of a server's energy, yet the server still requires as much power and cooling to run a few applications as it does to run many applications. So if a server that usually runs at 10 percent utilization can be made to run at 50 percent utilization, the result can be a five-fold gain in power efficiency.

Q: How else does virtualization impact the bottom line?

A: Virtualization goes a long way to meet changing market conditions faster — and we're seeing more of these benefits as the technology matures. For example, buying, testing, and implementing more servers used to be the way companies would meet increased customer demand. But with virtualization, an organization can draw upon the computing power of its existing servers to respond to demand in a matter of days or even minutes, instead of the weeks and months previously required to catch up to new market challenges.

With virtualization, an organization can draw on the computing power of its existing servers to respond to demand in a matter of days or even minutes.

Q: Is virtualization confined to servers, or can it be used for desktop computers, too?

A: Virtualization can certainly be used for the desktop, particularly to improve manageability and security. For example, desktop systems used by contractors and remote employees are not always easy to manage or secure, but with virtualization, IT managers can partition areas on these machines so applications can only communicate over authorized network connections.

Q: Does company size matter when employing virtualization?

A: Not really. We have customers with 50 or fewer employees that use virtualization, as well as very large corporations on the Fortune 100 list. The degree to which the technology is used varies, and sometimes depends on how many servers the company owns — or how aggressively an organization wants to virtualize its hardware.

Q: What are the technological limits of virtualization?

A: Right now the limits of virtualization revolve around how much server computing power an application needs. Only a few business applications — perhaps 10 percent of the market — require dedicated hosting by a single server. But for the remaining 90 percent of business-critical applications, virtualization works very well.

Q: How has the virtualization industry changed over the last five years?

A: Most people don't know this, but virtualization — at least for mainframe computers — has been around since the 1960s. Yet it was only in the late 1990s, when we began to virtualize standard x86 servers, that the benefits of the technology could be spread across the enterprise. Now virtualization has become a critical element in product road maps throughout the high-tech industry. Processor vendors are now changing their architectures to allow more virtualization capabilities, and hardware companies are shipping servers with configurations dedicated to maximizing virtualization.

Virtualization Net Talk

Learn more about the business benefits of virtualization with our on-demand Webcast

Q: What is on the horizon for virtualization?

A: Business continuity looks like the next big thing for virtualization. Most companies that use UNIX-based machines, such as Sun SPARC servers, typically have invested in business continuity capabilities that protect IT investments from disasters. But with many Intel-based servers, the complexity of the environment makes it difficult to implement these initiatives.

With virtualization, however, installing business continuity measures across applications and operating systems becomes nondisruptive and affordable. It's all part of how virtualization makes computing more efficient, which ultimately saves money while making the enterprise more nimble.

About Raghu Raghuram

Raghu Raghuram is vice president, product and solutions marketing at VMware, Inc., where he leads worldwide product marketing, solution marketing and business planning for the company's infrastructure business. Prior to joining VMware in 2003, Raghuram held product management and marketing roles at Netscape, AOL, and Bang Networks.