

Welcome to the Virtual Enterprise at Sun. My name is Shane Sigler of Sun Microsystems, and I'm here today to talk to you about server virtualization.

Here at Sun, we believe that virtualization is everywhere in the enterprise. It's not just at the client layer, it's not just at the storage layer, and it's not just at the server layer - it's everywhere within your enterprise. But what I really want to focus on today is the server virtualization layer, and this really spans the server, OS and application layer.

Virtualization has been around for many, many years, and there are four general ways to look at virtualization. On the left, we have hard partitions, these allow a lot of isolation within an application, but very little flexibility in terms of running, say, multiple different operating systems. As we move to the right, into virtual machines, you get more flexibility and still get a lot of isolation. As we move farther to right with OS virtualization and resource management, you get more flexibility, but less isolation within the applications.

What I'd really like to spend the time on today, though, are the two main areas of a lot of the emerging technologies - virtual machines and OS virtualization - and walk through a number of the different technologies that are emerging and deployed commonly in customers today.

The first technology I'd like to talk about is Solaris Containers. Solaris Containers were introduced with Solaris 10, and provides an application environment isolation mechanism, such that, from an administrative point of view, you can give your individual application developers their own view of an operating system; but from the administrative side, you have one instance of the operating system kernel to manage, which is the base operating system sitting on top of the server. This gives a lot of flexibility from the application developer, as well as the data center manager, to deploy applications. Because you're running the same instance of the operating system, it provides a very lightweight way to run lots of different copies of the application, or different applications, on the same physical piece of hardware; but also provides the isolation that the developers want so that one developer doesn't interfere with the other developer. So again, a very lightweight way to do isolation, as long as you can run on the same operating system environment.

Moving on to VMware ESX, as one of the first virtual machine types, VMware allows a number of different features differently than what Solaris Containers allow, because what it does is, it actually provides you a hypervisor directly on the bare metal, that allows you to run different operating systems. So, if you have an application or development environment where you need to run some Windows, some Linux, and even Solaris, and run that on the same box, ESX allows you a way to do that. What it does is, it provides a hypervisor and a control domain in the same package - this is the ESX layer. This goes on the bare metal and then in this case, you load an unmodified copy of Windows, Linux or Solaris on top of that box. So, each of those operating systems sees that it has entire access to all of the hardware there, and doesn't know that there's other copies of the operating system running. So, this provides a great way to get even greater utilization out of the individual machines, but provides great isolation of the applications. So, you can have multiple developers on the box without them knowing that there's other developers sharing the same physical resources, providing a great way to leverage the investment, as well as reduce the number of systems in your data center, from either a development or a production side. We have many customers today who are running this to allow them to reduce - dramatically reduce - the number of systems that are running in their data centers and reduce the space that they need as well as the power and cooling that they need. And it also has the ability to reduce the administrative burden, because now they don't have to power up and rack quite as many machines in their data center.

Microsoft Virtual Server provides something very similar to what ESX does, but it does it in a slightly different way. In this case, you actually load a full copy of Windows Server at the bottom, and then you run Virtual Server on top of that operating system. So in this case, you have the control domain of Windows, with the hypervisor, and the hypervisor provides the same level of functionality with ESX, and it allows you to run additional copies of Windows or Linux, as well as Solaris, on top of the same physical hardware. The difference is that, because you're running a full copy of Windows as the base OS, you can choose to run individual applications in that, or you can just use that as a control OS and minimize the overhead of running that system.

And in this case, Windows is starting to add additional functionality in terms of different versions of Linux that are supported, as well as different versions of Solaris. So, again, this provides the same functionality as ESX, in that it allows you to run individual operating systems, or even the same operating system, to provide additional development environment or production environment to reduce the overhead of running the systems in your data center.

Xen is an emerging technology to do virtualization as well. Xen is actually a community effort that Sun is contributing to, as well as the other Linux vendors, such as Red Hat and SUSE, and how Xen differs from VMware is that it, too, runs a hypervisor, but it has a control domain that is an individual operating system. And the control domain in this case is actually providing the IO level virtualization to the different operating systems that are running on top of it.

So, what this allows is - more flexibility to support different types of IO devices. Perhaps you have a custom IO device that you need to support on a particular piece of hardware, Xen will allow this in a much more flexible way, but it still allows you to run all of the individual operating systems, such as Windows, Linux or Solaris, on top of that hypervisor. So, it provides the same level of functionality, and in some cases, a little more functionality, with the flexibility of the different IO devices.

So, again, a new, emerging technology that's being co-developed by the community, as well as the number of the different system vendors like Sun. Xen is an emerging technology that you'll start to see much more of over the coming year.

The last technology I want to talk to you about are logical domains. Logical domains are a product that we're bringing out on our SPARC platform, such as the T2000 and T1000. The logical domains is actually more of a mix between our traditional Dynamic system domains on our high-end systems, and the hypervisor or virtual machine managers, in a much more lightweight fashion. So, it works in conjunction with the hardware and a control domain, in this case, Solaris, to allow you to run different instances of operating systems. And with the recent announcement of Ubuntu being supported on our T1000, T2000 platforms, we'll be able to run Solaris and Ubuntu Linux side-by-side on the SPARC platforms. And for products such as the T2000, where you have 32 hardware threads, you have a great deal of CPU power there and this allows, again, a lot more flexibility in our data center to be able to run lots of different applications on a single physical box, allowing you to get much more out of that physical box and again, reducing the server count in your data center, the number of servers that you have to administer, making it much quicker to also roll in different applications. To sum up, virtualization is really everywhere within your enterprise, and hopefully, the overview of server virtualization was helpful; but just to recap: we believe that server virtualization is going to help you take back control in your data center by allowing you to be much more flexibility in terms of rolling out new applications, as well as providing a great way to reduce the number of systems that are in your data center, causing you space problems and power problems and heating problems. So hopefully, this overview of server virtualization has been helpful, and thank you very much for your time.