

## **SunNetwork Shanghai Keynote June 2, 2004**

### **John Loiacono, Executive Vice President, Software Sun Microsystems Inc.**

John Loiacono: I would like to thank you all again for inviting us out here in Shanghai. It is a beautiful area for us to bring our technology firsthand and Jonathan's entire staff and our executive team at Sun here for all of you. Now, Jonathan talked a lot about the vision and direction and the commitment to the regions. We currently have over 600 people here in China and over 4000 people in the region and this is our first Sun Network Conference that we are doing here in Asia-Pacific. We plan to continue doing so on a regular basis. We will be back here on a yearly basis to actually duplicate this effort. We will move it around from city to city, but we plan on returning here. We have a cadence about every quarter; we do a major launch. It is called the Sun Network Conference thematic. We have done four or five so far. Today we are here to announce several things. So over the next two days you are not just going to hear about the vision and some of the software components. But you are also going to hear, right after me

in fact, from Mark Canepa who is going to be talking about our Storage direction and where we are going with some utility pricing and some of the special features in Storage. You are also going to hear from Robert Youngjohns, talking about our dedication to the region and what we are doing in the space here. You will also hear from David Yen, who will be talking about systems and architectural design as well as system and microprocessor design. Finally you are also going to hear from one of our CTOs, and Bill Vass is going to tell you how we are implementing Sun technology within Sun and actually implementing some of the things that you are going to be seeing here on stage.

As Jonathan mentioned, there are several devices, gadgets, PCs, cars, automobiles; there is almost a limitless number of things that have grown exponentially. These devices that span the more dominant devices today like cell phones but moving to even more dominant devices like RFID tags and what not are proliferating at an exorbitant rate. So the challenge is how do you build network-based services and actually map to that vision? I think Jonathan teed up the vision very clearly. The point now is how do you build that? I want to focus my presentation on kind of the reality of what we are doing today to build software, hardware and services around building a network infrastructure to deploy services that you can actually go

make and generate revenue from. How do you do that? Well, the first thing you need to start with is of course the network. If you are going to have everyone and everything connected to the network you need to start with the network. In fact the deals we are doing with things like certain apps around the global telecommunications infrastructure that we are working with people on; this is something that is happening in and around all of us. The second thing of course is connecting the devices that Jonathan talked about. The number of devices is now prolific; connecting those devices to the network. But again a device by itself usually is inoperable and in fact you need to have an operator. You need to have a person that is attached to that device. So if it is a cell phone it is one of us who uses it. If it is an administrator using a personal computer or using a car or using any kind of device of course to access those things. But again, once you have the access point you need to have the service itself that you get access to. So the back end of this of course is all the services, whether those services are things like a business application, getting your financial banking statement, or whether that is a gaming tool that actually runs on a device like this, or whether it is actually a dashboard service that runs in your automobile. Finally what you of course need is the infrastructure software and services to make all this happen. So what I want to do is walk you through where we play in this space today and the investments that we are making.

The first one I am going to focus on is in the network infrastructure itself and it is the services infrastructure I am going to focus primarily on, the platform. So to start there we talk about the fact that we have a huge investment in what is happening with Solaris and things like our N1 technology for managing services and managing systems and infrastructure. As Jonathan pointed out there is a big emphasis here and we surprised a lot of people in the fact that we are trying to help people lower their costs dramatically. In doing so we are moving to a low-cost platform in addition to our SPARC platform, in which we have made major enhancements. We have lowered the cost dramatically. We have some new technologies in the form of chip multi-threading coming soon. We are also working with companies like AMD to get Solaris running on the AMD platform. My next slide is actually a surprise to many people. It is that although we were late to the market with an x86 solution in fact we are leaders when it comes to these new 32 and 64-bit Opteron-based systems. We actually lead the industry in both price and price-performance and in fact we plan to continue that because although we have two-way systems today, we have committed that we would have four-way systems and beyond coming very shortly. In fact, price-performance wise you can see where we stack up against not just the other Opteron players but against things like Itanium and even the Xeon processor in a head-to-head

comparison. Now that said, one of the other things that we are very proud of is that we have taken this Solaris operating system that heretofore has only been available on the SPARC processor and made some major enhancements over the past several years. In fact, today we now have Solaris running on the Opteron and x86 platforms. The next generation of Solaris will enable you to run your Linux applications un-modified, un-recompiled, right in Solaris out of the box. In addition, people are surprised to learn that Solaris is actually less expensive than RedHat or in fact any of the other major Linux distributions. That is not a typo; it is correct. Solaris is less expensive than RedHat. We have also now made it have functional parity on SPARC and on the x86 platform. You now get the same feature set across both. Our entire software portfolio now runs on Solaris x86 and in fact over 1100 total applications run on the platform. Lastly, Solaris x86 now runs on more than 200 certified platforms other than the Sun platform. People say, "Well that is great for you but I want to run it on my existing HP or IBM or Fujitsu or whomever else's x86 hardware." It is now certified to run on over 200 and that number is growing every day.

Now that is specifically on x86. As we talk about our dealings and our association now with Fujitsu, moving forward we are making major enhancements that work on both SPARC and x86. That is around

availability, reliability, containment, fault isolation, and performance. But rather than talking about these things I think I would rather show them to you. So what I am going to do is walk over here and have Tony help me out. Tony has been hiding over here in the shadows falling asleep. We are going to wake Tony up. So Tony what I want to do is actually show some of the new features that are coming in Solaris and I think there is actually a slide for the demo. But what I want to do is walk you through and show how we can actually take Solaris and divide it into small pieces. So today you can take a large-scale system and divide it from a hardware perspective into multiple subsystems if you will. What I am going to now show is how with Solaris you can actually take that and with almost an infinite granularity divide the operating system into literally thousands of sub-pieces. So why don't you walk us through the process?

Tony:

Sure. So we have a tool here, which is showing us our data center. Obviously we have quite a number of machines but by pointing and clicking I can select one and as it were, open the digital door. I can look inside and the first thing I see is that inside this SunFire 6800 there are four independent hardware domains.

John Loiacono: So if I looked up there noticing the number of CPU's there are 20 CPU's in this system and 32 gigabits of main memory and this has been divided into four sub-pieces.

Tony: And we can see that by clicking on these particular domains just how the divide has occurred down in this informational area; clock speed, CPU's, RAM and so forth. But of course as well as dividing it in hardware terms we can also make the device as you were saying in terms of software. Because now with the container mechanism we have almost infinite granularity.

John Loiacono: You are going to take the four-CPU domain; you divided it into 40 independent systems effectively.

Tony: Forty systems within a system. They are software entities fault isolated from one another all functioning independently.

John Loiacono: So the point being is that if for example you had an application running in container number 25 and something happened, it was a web application let us say and you took that system down, you had a virus. Well in fact containers 1 through 24 and 26 through 40 would be un-impacted. A virus cannot move from container to container. So in fact each of the systems, each of the applications running in that

container sees it running on a dedicated platform. So in fact you have taken a system that has been one operating system and divided it into this case 40 sub-pieces. Now if you go inside one of these how is this actually broken up?

Tony: You can see if I click on this particular one that there is a cap for memory and a minimum amount of CPUs so we can see just what the resource allocation is for this particular container. This means that you have a very precise control over the granularity of resources as you allocate them throughout your system.

John Loiacono: So again, what we are showing you here is we have taken a single copy of the operating system running on a single processor or in fact running on many processors and actually allow you to dissect it and cut it into pieces. In fact, with Solaris 10 you can divide it into over 8000 containers so an almost infinite level of granularity, which means if you have for example 50 applications running on 25 different systems you could consolidate those into a single or a few systems and again get server consolidation for lowering your costs overall. The thing I want to point out as I go back to the slides now is that what I just showed you, if you notice on the bottom there these are features that are not just running on Solaris or on the SPARC microprocessor. But it is also applicable to the Intel and Opteron processors as well.

So all the features I am talking about, the container technology and I am going to show you another one here in just a second. These technologies are actually available on multiple platforms. Now, one of the new enhancements we are making is around the file system. If you go back to the demo, Tony or I will walk you through what you do today when you are actually adding a file system. Now, most of you in the audience are saying, "First of all, what is a file system and why would I care?" Well, for those of you in the audience who are system administrators you will love this. For those of you who are not administrators you will kind of go, "This is a bunch of technical jargon." Well I am going to show it to you very quickly to make the point that if you do not care about this, you will because it will save you money. This is how you simplify administration so people are not spending hours and hours of time administering your systems but in fact are doing more productive things, Tony.

Tony: Basically today we have had a very fixed relationship between file systems, volumes and actual physical storage. Moreover, to allocate the new file system has been exhausted and very low level so that is obviously...

John Loiacono: An administrator would have to actually type in and hack through this and this would take minutes or hours.

Tony: It can take weeks and it is very complex and it is very costly for your business and that is what you get towards the end.

John Loiacono: Another thing is when you are looking at it that FS stands for File System and the volume is actually addressing the disk drives below. So in fact all the things we just did we added one file system and we added some disk capacity in that range so that now this file system is associated with that disk. Notice though, it is not shared; it is isolated and dedicated to each platform.

Tony: We have managed to resolve a little way beyond that into the (inaudible) physical storage and we got to the point where there was something of an improvement. We attached a component and we were able to allow a certain amount of sharing, which we demonstrate here.

John Loiacono: Now we are addressing value and disk capacity.

Tony: We have got to be able to do better than that. So now we can show what the Sun Dynamic File System can achieve. So the third thing you will notice is this whole idea of volumes has gone away and we have substituted for it the new notion of a storage pool and all of the physical storage is (inaudible) that.

John Loiacono: So what you have done is you have virtualized the fact that today everybody has a dedicated, isolated, partitioned off set of files and when we just throw them all together, we have virtualized them. You now have a set of resources you get access to and now you want to add to that let us say. How hard is that to do?

Tony: I will show you. It is a line, a single line to create a new file system.

John Loiacono: So you added two lines and with two lines you added two new users and two file systems.

Tony: Exactly.

John Loiacono: What if I wanted to add disk capacity to this?

Tony: It is very much the same thing. It is extremely easy. Just a few lines of code will allow you to do it because the flexibility of this technology

has really taken all of the back break out of it, the low-level coding and so forth.

John Loiacono: Excellent, thanks Tony. What we showed is we are taking many of the features that have been considered mainframe class features and we are putting them in an operating system and charging you less than you would for an actual Linux operating system. So all the things I am showing you today, all the features I have just shown you are available online. You can go and actually download the next generation of Solaris and use it today. It does not ship in commercial quality until the end of this calendar year but it ships in development quality right now and it is free. Repeat, Solaris 10 the next-generation operating system is at no charge available today through something called Software Express. You get access to many of the new features I have just highlighted for you today and in fact it is available right now at no charge. So now we have actually talked about how you automate a system that takes a piece of hardware and an operating system and that is interesting. But if you actually want to build network-based web services in fact you need a lot more than that. So now we are going to talk about kind of the upper part of this, which is the Java Enterprise System.

Jonathan walked you through some very interesting pricing models.

We have the \$100 US dollars per year pricing for enterprises and we also talked about the per citizen pricing. But what do you get with that? Well, with that you get all the critical software required to build these network infrastructure services. These include things like an application server, a directory server and a web server. Many of you have seen Sun software over the past two to three years. I would tell you that if you have not downloaded, benchmarked, or looked at Sun software in the past year to year and a half, you have not seen our software portfolio. The team has made huge strides in things like our J2EE application server from a performance and functionality perspective. We used to be far behind and many people benchmarked us two years ago and said, "Wow, you guys are just so far behind in functionality." We have not only raced to catch up, we are now in a leadership position and what we can do from a performance standpoint compared to all the other leading vendors from IBM, BEA, Oracle etc. So again I think it is a very compelling reason for you to actually go and look at the new software and what is happening. We have made major enhancements, the things that are highlighted in red. We have huge enhancements to the Java Enterprise System portfolio. We have made new components. We have made new feature sets that are now available. So what I want to highlight for you is in the lower right-hand corner, which is something called the N1 Grid System. This is a portfolio of software that allows

you to get better utilization of your systems. I showed you the containers demo that said, "Take a single system, divide it into pieces and you can up your utilization for that system." This also expands though to not just a single operating system and a single computer, but to multiple computers and then multiple data centers. You can aggregate all these resources, virtualize them, multi-platform both Sun and non-Sun systems, and then actually do monitoring and managing of the resources allocated to run your services. Again this is aimed at dramatically lowering the cost of how you deploy those services.

The other key aspect I have talked about is virtualizing a system and how you do systems management. Now we are going to talk about actual service management. On the left-hand side here as we have talked about before these are services that you deploy in your organizations today. They span from ERP systems to inventory systems to warehousing systems to HR, marketing, finance etc. Now on the right-hand side you have your employees, you have your partners, you have your constituency that you deal with to do your business. The challenge is how do you take your services and link them with the right employees or the right partners? Certain people should get access to certain services and others should not. Today the way that is done is you have an approving manager, a human being who actually intercedes and says, "This person gets access to

these services.” What we are talking about today is a new system that allows you to use an automated, computerized software infrastructure to do this for you in an automated fashion. So today we are proud to announce that we have a portfolio product that comes in three pieces. The first piece is a Directory Server or a repository for all your employee information; name, phone number, e-mail address, specifics about that particular employee. This is where you store the information. The second piece is called the Access Manager. This is where you get the authorization and the authentication; who are you and what do you have access to? The last piece is the Identity Manager and this is where policies are set and defined and then associated with each employee and they do synchronization there. So rather than talk about it let me actually just show you this. Tony is going to walk us through a quick demo here. I would like to add a new employee to my organization and we all know how difficult that can be and give him access to the right services that we want them to have. So Tony, what would I do with this new system?

Tony:

With this new system administrator it is perfectly simple. I have logged in off of the admin to my portal here and in the middle I can see that I have to approve access for a new researcher. I am just going to take a look at what the approval really consists of. I can see the identity management software. I am going to rely on it here to

make this happen. I can see the particular applications that are going to be appropriate for this person and that is really all I need to do. There is no other human intervention required. I simply click approve and then I am given confirmation that this has occurred. Nobody else is in the chain. What I wanted to happen according to this will happen because of the Identity Management software.

John Loiacono: Two things are really key here. Number one, I want to be able to add services to a new employee coming onboard or changing departments and I want to instantly be able to say, "You now have access to these services." If you are in HR you get to look at someone's HR record. If you are in marketing you cannot see their HR record. How do I set that up? These policies are pre-defined. The second most important thing is what happens when I decommission an employee? I would venture to guess that today in all of your organizations there are X employees who are still accessing information within your networks. Meaning today they get access to your e-mail account or an old e-mail account or back into an engineering organization because you had no way to track who these people were, what passwords they had and what services they had access to. Now we have created an entire portfolio of software that allows you to do it in an automated fashion very simply, very easily, cost-effectively and very quickly. If I can go back to the slides real

quick.

So we have talked about how we are managing services, we are managing systems. One of the things that is real frustrating for people is the fact that desktop systems are so proliferated throughout our entire organization. We have laptops and we have desk sides. The challenge is that these systems are used by our employees and they get access to viruses, they get access to unproductive web sites that people should not be perusing. So what I am going to do now is I am going to use Carl over here, who was also asleep that we have woken up. Carl has a laptop running the Java Desktop System. We have now made some major enhancements to the Java Desktop System that allow you to manage your assets and in this case a client. The client is a traditional laptop or desk side device. So Carl is going to come in and what I would like to do is be able to control my environment better than I can today. I would like to be able to limit where my employees go because in fact I know Carl here likes to shop on e-Bay during business hours. That is not a good thing for me. Carl likes to play games during business hours. I do not like to see that either. So what I want to do is I want to have Carl help me administer the environment to someone maybe in customer service or maybe someone in engineering and say, "How can I actually configure their environment to control what they can and cannot do?"

Carl: As you pointed out I spend way too much time monitoring my auctions here. But it is very simple with this latest feature of the Java Desktop System to manage the clients. On the screen you should see three desktops and they represent two customer service desktops and an engineering desktop.

John Loiacono: This is Carl's system on the far left; that is his administration console. In the center you will see two systems. The system on the left is a customer service rep and the system on the right is an engineering desktop and those are located on the other side of the partition here. What we are going to do now is have Carl go in and temporarily take control of those systems and reconfigure them on the fly.

Carl: I can access a terminal on the system. I can access my games and this is really bad. You really want to increase the productivity of your users. The way you do it is very simple. Here you have your staff and the different departments that they belong to.

John Loiacono: So these are predefined policies that have been set up so that people can actually know. You have set engineering up a certain way that has certain policies and rights to it.

Carl: Correct and that is what I am going to do now. So for engineering I am actually going to apply the engineering profile and for customer service you will see the customer service profile being applied.

John Loiacono: So as you applied that, if you noticed the systems there, his backup has changed on his system because he is in customer service. In a second I am assuming we are going to see the center system; the system on the left will also change to the customer services environment. The one on the right is now the engineering environment. So not only do you change the background but we have actually changed the entire profile of what is on that desktop system. So Carl, why do you not actually show us your system here? A minute ago you showed me that you could get access to games and you get access to e-Bay. Can you still do that?

Carl: Let me try to get to e-Bay. We have a slow network so while I do that again I showed you that I do not have the terminal anymore, that is gone.

John Loiacono: So there is no terminal and you have now been forbidden to go to e-Bay.

Carl: As you can see here I have forbidden access to e-Bay.

John Loiacono: Can you get your games now?

Carl: Unfortunately I think I am going to have to start doing some work now.

John Loiacono: What we have done is we have allowed Carl to come in and set up a profile. You can set any parameters you want. You can have no limitations or you could actually tighten things down. What we have done is given you the ability to control the assets in your organization. That by the way can be used not just to do configuration, but to actually go and remotely take care of or manage the system itself, and do repair or something on a temporary basis. So again, we are turning the asset back over to corporations to allow them to control the devices. You will find you cannot do this in a Microsoft world. You cannot even do this in a Macintosh world. Nobody else has these capabilities. So what we showed you is the ability to manage a system, virtual systems, a network of systems. We have allowed you to manage services and identities and even desktop applications.

The last thing I want to talk about is what happens when you have an almost unlimited number of infinite services? Today Jonathan talked about the fact that we have the ability to get to billions of devices. As we move ahead you are going to find that this is a sample of an RFID

tag. They come in all shapes and sizes. They come much smaller than this and much larger than this but this is an RFID tag that would be affixed to a product. In this case it is affixed to a vial here on a piece of medication. It can also be affixed of course to the actual container package that actually has three of these inside of it. Now, what we are also proud to announce today is what we are doing in the space of RFID. What happens in the RFID world is in fact very simplistic. You have a tag that is on a product. The product is scanned by a device reader. There is a set of software that is required to translate the information that is taken off of the tag and then basically integrated into your workforce system, your enterprise management system, your warehouse inventory system, wherever it might be. Sun has taken the leadership role and we actually have a new suite of software, something called the Sun Java RFID Software. It includes an event manager that basically takes the information off the reader and translates it into the integration system as well as a repository or information server that actually stores some of this information. It is somewhat intelligent in the sense that here is my device that has packages inside of it. By the way, I am showing you a single box. This could be an entire pallet. We just did not have room onstage here to roll a pallet out. But in fact I would take the device and have it read. It pops up an image of what the product is and shows you that there are actually three components in the box itself.

What I am going to do is come over here and open this up and take one of the vials out so now there are only two left in and I will put the two back in. Now when I go back and reset that and I will re-scan it and in a second you will find that it will pop up and only have two products in it. So these are very simplistic. What we are doing right now is working with companies like Wal-Mart in the United States, which is again in the retail side but also in manufacturing worldwide in the pharmaceutical industry as Jonathan pointed out. To make sure that this only gets to who it is supposed to go to, and tying the information from these to actual information on the back-end systems about who I am, and what medication I should and should not have. In addition to the things I have just showed you, we not only have this in technology but we are also helping people deploy this. In fact we have opened up a test center in Dallas, Texas in the United States. We have customers coming in and actually building proof of concepts around RFID, building blueprints on how to actually go and deploy this in the organization. Further, we are committing to opening up centers here in Asia-Pacific as well as Europe and those will be open shortly so stay tuned for those.

So, I have just thrown a ton of stuff at you. I have brought you a lot of information. I just want to point out a couple of things. Jonathan talked a lot about what we are doing in the sense of communities and

the fact that we are really driving towards bringing communities together. One of the largest communities in the development space in the world is around Java. So I would like to invite all of you here to attend later this month I think our eighth or ninth Java ONE Conference in San Francisco. We anticipate having in the neighborhood of 15,000 people come to talk about the business opportunities, the technical advancements and some of the new innovations that are happening in the Java space. I encourage you to come and check out Sun software today. It is not what you might have seen 12 or 18 months ago. There have been major strides in improvement of quality, in performance and functionality so I encourage you to come to that. Then also the follow-on event to this event is that we have some new products and services that we did roll out today that will be out shortly that we are going to announce in the September time frame, at the SunNetwork Conference in Q3. So again I encourage you all to attend that if you possibly can in California. Once again, thank you for your time.

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