

Solaris in the Small Office/Home Office Environment

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21 March, 2005

Background

I became interested in Solaris while on a consulting assignment for a telecommunications software company, almost eight years ago. Before that, I had played with Unix a little, and had even ordered a copy of the Coherent “UNIX act alike” operating system for IBM PC ATs so I could run “UNIX” on my TI ‘286 laptop. My first application under Coherent was a series of shell scripts to manage the mailing list for my wedding invitations. Soon I moved on to the AT&T UnixPC, and played some more. Then one day, this mysterious operating environment called “Linux” was being discussed, and I ordered a box of diskettes for a copy of an early Slackware distribution and spent days not getting X Windows to work on my PC. In frustration I put Windows 3.1 on my PC and didn’t think about it again.

Then, a few years later I started working with Sun workstations professionally, and I found that my biggest problem, getting X Windows to run, was a non-problem if you used hardware and software from the same manufacturer! I quickly found a low cost Sun IPC and started tinkering in my basement. Over time, I progressed through Sun hardware line, taking possession of a new machine just as it became too slow for “serious work” (or was fully depreciated and no longer of value to it’s prior owner). I’ve since moved on professionally, and find myself working for a company that is MS Windows-based, I find myself spending my time at home, tinkering with my Solaris boxes.

My home network includes a Sun Ultra 450 server, a couple Ultra 60s and a couple Ultra 30s, a couple Ultra 2s are on the shelf awaiting assignment, and I have installed Solaris on a PC laptop (Toshiba Tecra 8000), desktop (white box “clone”), and a recent model server (Dell PowerEdge 400SC).

Motivation

My motivation for giving this presentation is to present Solaris as the “unknown” fourth choice for an OS at home – everyone knows about MS Windows XP, Apple Mac OS X, and the various Linux Distributions (including the various *BSD distributions), but Solaris, now that it is freely downloadable, and supports a diverse collection of Intel x86 systems, as well as the ever more affordable UltraSPARC hardware (post dot-com auctions) is a very viable alternative.

History of Solaris

Solaris is the Operating Environment supplied by Sun Microsystems for their workstations and server products since the company's founding in the mid 1980s. It is based on the UNIX Operating System from AT&T. Initially, Solaris was BSD-based, meaning it was based not only on the software that came from AT&T, but it included many enhancements from the University of California Berkley school of Computer Science. In 1992, Berkley announced that they were going to stop distributing their Unix software with their current release, BSD 4.4 – subsequently, in 1993 Sun announced that they were going to adopt AT&T's then current System V and move away from the BSD enhancements. This created the Solaris 2 Operating Environment, and the previous BSD-based operating environment previously known as SunOS was to renamed Solaris 1.

Current Status of Solaris - Open Source or Not?

After many major and minor revisions, Sun has just released Solaris 10 (first quarter, 2005), and has announced intentions to support an Open Source version of Solaris (see <http://www.opensolaris.org/>), similar to their past work with Open Sourcing Star Office (see <http://www.openoffice.org/>). If you'll recall, Sun bought Star Division in 1999, and in 2000 released the first version of Star Office. Soon afterwards, Sun announced the Open Office initiative and the two offerings have developed in parallel. While I havenot taken the time to review the actual licenses for the current Open Office and Open Solaris efforts, I can say that in my opinion, whatever details Open Source *Enthusiasts* take exception to, on the whole, I expect this effort to have a net-positive impact on the future of Solaris (and OpenOffice).

Choose a Platform - UltraSPARC or x86

Choosing a platform to run Solaris on is really a function of your needs, your budget and what hardware you have available. Solaris runs well on both a variety of Intel x86 boxes and Sun's own UltraSPARC-based systems. (Sun's earlier SPARC-based hardware, while well supported under Solaris 9, has been dropped under Solaris 10. For this presentation I am concerning myself mainly with Solaris 10, the current shipping release of Solaris – see <http://www.sun.com/software/solaris/get.jsp>)

If you have no budget to buy hardware, Solaris 10 runs well on many commonly available x86 boxes you may have available. (see the Hardware Compatibility List (HCL) for details, <http://www.sun.com/bigadmin/hcl/>). Generally, business desktops are capable of running Solaris, older consumer desktops may not be as well supported. In general, the more exotic your hardware, the less likely it is to be supported. More recent hardware (say, last years Dell desktop system, like a Dimension 4600 with a 2.4 GHz P4 CPU) does an excellent job, but save yourself some aggravation and check with the HCL (above) before attempting to install Solaris on your older PC, so you know what to expect (for some system there are notes to aid in the installation process). Laptops are also listed on the HCL, but the choices are more constricted. Typical issues with Laptop installs involve support for the graphics chips on the laptop - there are third-party vendors that offer Xservers that support many more chipsets that Solaris does initially (see

<http://www.xig.com/> - while their offerings are commercial, with costs ranging from \$69 to \$129, depending on chipset and desired features) they will allow you to deploy Solaris on existing hardware.

Some considerations if you are able to buy *new* hardware are:

- Processor – Solaris 10 requires one of the following CPUs (there is no specific speed requirement associated with any of them): Sun UltraSPARC 64-bit and Fujitsu SPARC64, Sun and third-party x64 platforms (AMD Opteron-based or Intel EM64T-based systems), and Sun and third-party 32 bit x86 platforms.
 - UltraSPARC hardware, while built for 24x7 operation, can be expensive if purchased new. Second/third-hand systems that are perfectly serviceable in a Small Office/Home Office (SOHO) setting, with quite reasonable prices. Be sure and only consider UltraSPARC II (or greater) systems for Solaris 10, as UltraSPARC I-based systems (like the Ultra 1 and some Ultra 2 CPUs) are not supported.
 - Intel x86 hardware, if on the HCL, are very cost effective and offer some interesting alternatives to UltraSPARC hardware.
 - Symmetric Multi-Processing (SMP) is supported under both processor types, but due to the multiple ways Intel x86 hardware vendors implement SMP, I suspect that SMP will be better supported on Sun's own hardware.
 - UltraSPARC and x86 hardware is not *clock speed comparable* – I'm not going to attempt to make any comparisons here, but suffice to say that while current Intel x86-based desktops have CPUs that exceed 2 GHz, rest assured that UltraSPARC CPUs running at half the clock speed will *feel similar to an end-user for most common desktop activities*.
 - Recent Intel x86 processors have up to 2 Megabytes of CPU cache, but recent UltraSPARC CPUs have up to 8 Megabytes of CPU cache – in a Reduced Instruction Set Computer (RISC) like UltraSPARC-based hardware, cache size has a significant impact on the effective speed of the system, while in Complex Instruction Set Computers (CISC) like the Intel x86 family, the impact is not as significant.
 - **For serviceable performance under most conditions, I'd suggest a practical minimum processor speed of 400 MHz for both 64-bit UltraSPARC and x86 systems, and any available speed for the x64 Opteron-based systems. CPUs under 400 MHz may work, but you will find yourself waiting for certain events to complete. If your available hardware doesn't meet these suggested minimums, an increased amount of RAM can help overcome slower processors in many situations.**
- Memory – Solaris 10 requires 128 Megabytes for installation, but I am not sure that this is a hard/enforced requirement. Significantly more memory would be a good idea, with 512 Meg being a very usable memory size.
 - UltraSPARC hardware typically has either 8 or 16 memory *slots*, and memory in these machines is installed in sets of 4 DIMMs, allowing for four banks of memory to be installed. Some more recent *desktop systems*, like the Ultra 5, 10, and Sunblade 100/1000/2000 series typically take 2

DIMMs at a time, and have provisions for two banks of memory DIMMs at one time. There are, of course, exceptions notably in the 1U server systems and the big iron servers (Enterprise 3000 and up). Almost all UltraSPARC hardware can take 1 Gigabyte of RAM, and most can take more, but higher density DIMMs are more expensive than their x86 counterparts.

- Intel x86 hardware typically has either two or four memory slots, and memory may be upgrade either by adding one or two DIMMs. While many current x86 based system can support more than a gigabyte of RAM, older systems may be limited, esp. Pentium II and III systems. Intel x86 based system RAM is typically less expensive than for an UltraSPARC system.
- **If your intended application requires a significant amount of memory, consider an x86-based solution. If your application requires under 2 Gigabytes of memory, most UltraSPARC hardware can support that large a memory space.**
- Graphics
 - UltraSPARC hardware tends to have slower graphics options than most contemporary Intel x86-based systems, in fact many older SBUS-based UltraSPARC systems only supported 256 colors (early Ultra 1s, for example). More recent PCI-based systems have very serviceable graphics options, but the truly high-end options are quite expensive compared with similar x86 options.
 - UltraSPARC hardware supports multi-head operation when run with multiple framebuffers (graphic cards) installed.
 - Intel x86 hardware supports an incredible variety of graphics options, and Solaris will typically support at least basic operation on most graphic cards, but will most likely not support things like the incredible on-board graphics acceleration many current graphics cards offer. Third-party Xservers are available (see <http://www.xig.com/>).
 - Intel x86 hardware can support multi-head operation when run with multiple graphics cards installed, and third-party software installed (see http://www.xig.com), on both desktop and laptop systems.
 - To use a Sun monitor (with a 13W3 connector) on a PC (with an HD-15 connector), you will need a 13W3 Male to HD15 Female adapter (like: <http://www.cablestogo.com/product.asp?cat%5Fid=1313&sku=28277>).
 - To use a PC monitor with an HD15 Male connector to a Sun workstation with a 13W3 connector you would need a 13W3 Female to HD15 Male adapter (like: <http://www.cablestogo.com/product.asp?cat%5Fid=1313&sku=28275>).
 - **If graphics are your most important criteria for measuring performance, consider running an x86-based Solaris system as your desktop (client) system, realizing you may need third-party drivers to get the maximum benefit from high-end graphics adapters.**
- Storage – Solaris 10 requires an estimated 5-7 Gigabytes disk space, depending on software packages selected.

- UltraSPARC hardware typically includes a single or double channel SCSI controller, and room for anywhere from two to 20 SCSI HDs. Some of the more recent desktop systems support IDE (Ultra 5, 10, Sunblade 100), but their implementations of IDE are not *state of the art* (nor were they when they were introduced). Suitable SCSI cards are available to allow you to install SCSI peripherals, affording the user the full benefit of a SCSI-based system.
- Intel x86 hardware is typically IDE-based, but tends to be high performance implementations – which are used to great advantage in current Solaris implementations. More recent interfaces like Serial ATA (SATA) are not supported, but may be in the near future as these devices become more common. High-end RAID controllers, like those on recent x86 servers, may be supported, but be sure and check the HCL (above) before making any assumptions.
- SCSI drives are typically more expensive than IDE drives on a per-Gigabyte basis.
- IDE drives are available in much larger sizes (capacity) than SCSI drives, but be aware that early IDE-based UltraSPARC systems are limited to around 130 Gigabytes IDE drives (larger drives can be used, but Solaris can only access the first 130 Gigabytes on the drive).
- Both UltraSPARC and x86 hardware that supports USB devices (either natively or through an add-in card) will work with Solaris – some older systems (Like the Ultra 2, which is SBUS-based) do not allow for the addition of USB controllers. In most cases, USB devices can not be used as boot devices on UltraSPARC hardware, but can be used on recent x86 hardware.
- **If maximizing total disk storage space is your concern, an x86-based Solaris solution may be your best choice. For maximum performance, an UltraSPARC solution using UltraSCSI drives may be your best choice. If cost is not a factor, an x86-based Solaris box with of of the supported SCSI RAID controllers would be another choice.**
- Networking
 - UltraSPARC hardware typically has one 10/100 Mb/sec Ethernet port built in to the system – additional 10/100 or 10/100/1000 Mb/sec ports may be added by installing a supported PCI card (again, check the HCL).
 - More recent Intel x86 hardware has one built-in 10/100/1000 Mb/sec Ethernet port built in to the system, and additional 10/100 or 10/100/1000 Mb/sec ports can be added by installing a supported PCI card (Check the HCL to ensure compatibility)
 - **If you have a need to deploy Gigabit Ethernet to all your machines, you may want to consider an x86-based solution, since the Intel Gigabit network controllers are well supported under x86 Solaris. Gigabit on UltraSPARC hardware is certainly possible, but the cost of the controllers may be prohibitive.**
- Printing

- Solaris, historically supported both text and Postscript printers, but with Solaris 10, support has been added (through the incorporation of Ghostscript technology?) for non-Postscript ink and laser printers.
- Network and locally-attached printers are supported, and most network print controllers will support Solaris – some indicate this on the package (either by mentioning Solaris by name or referring to Unix support), this appears to be a lucky outgrowth of the increase in popularity for Mac OS X.
- **If you are going to buy a printer specifically for your Solaris network of systems, I'd suggest a Postscript printer to ensure maximal compatibility. New functionality in Solaris 10 should allow you to add non-Postscript printers, and add support for some ink jet printers, but I'd prefer to rely on proven technology – besides, Postscript LaserJet printers are quite affordable on the used equipment market, and they have tremendous operational lifetimes (years and years and years, if my LaserJet 4M and 4MV are any indication).**
- Other
 - Modems – Serial and PCMCIA modems are supported on both UltraSPARC and x86 hardware. **Consult with the Hyla FAX documentation if you plan on using the FAX capabilities of your modem.**
 - KVM
 - UltraSPARC hardware with proprietary connectors requires a Sun-specific KVM, and can not be shared with a “PC” KVM unless a hardware converter is added to interface the system with conventional PS/2 keyboard and mouse interfaces and to convert the typical 13W3 video connector to hd-15 VGA connector (like: <http://www.cablestogo.com/product.asp?cat%5Fid=504&sku=22577>). Some more advanced KVMs are multiplatform and can support mixing Sun, PC and Mac hardware on the same KVM, but they tend to be quite expensive.
 - UltraSPARC hardware with USB interfaces can be used with some “PC” KVMs, just be sure and check the HCL before you attempt to use it. Again, you may need a 13W3 to hd-15 adapter to use a standard SVGA monitor with the system.
 - Intel x86 hardware with PS/2 and/or USB interfaces for the keyboard and mouse should work fine with “PC” KVMs.
 - Serial Console
 - UltraSPARC hardware includes support for a serial console, allowing servers to run “headless” and still allow the operator to control the server, either locally or remotely, via a console switch (like, for example, a Portmaster terminal server – see <Http://www.portmasters.com/>).
 - Intel x86 hardware typically does not come with a provision for a serial port console, except on some very particular server systems. For those systems that do not include serial console support in the

BIOS, an add-in card like the PC Weasel 2000 (see <http://www.realweasel.com/products.html> - priced at about \$350 for the PCI card option, an ISA version is available for about \$250)

Software

- Office Automation
 - OpenOffice.org project: <http://www.openoffice.org/> a full-featured office automation package, based on the Star Office product from Sun
 - MySQL project: <http://www.mysql.org/>
- FAX
 - Hyla FAX – a good, solid Fax program that allows you to set up a Fax server, serving both Solaris, Linux, MAC, and MSWin clients: <http://www.hylafax.org/>
- SMB Server (for Windows clients)
 - SAMBA server – allows you to make you Solaris system either a client or a server in an SMB peer-to-peer network: <http://www.samba.org/>
 - Freely downloadable Using Samba book from O'Reilly: <http://www.oreilly.com/catalog/samba2/book/toc.html>
- Internet Servers (email, web, FTP)
 - Solaris includes Sendmail, Apache in the OS installation
 - Wu-ftp is included in the Companion CD (see below)
- Entertainment – see Websites (below) for links to various resources.
- Many more applications are included in the Companion CD available for download from Sun, along with the rest of the Solaris 10 CD-ROM/DVD .iso images at: <http://www.sun.com/software/solaris/get.jsp>

Resources

- O'Reilly Media, Inc. – One of the premier publishers of Unix/Open Source books, and their web site offers interesting articles on various open source topics: <http://www.oreilly.com/>
- Slashdot.org – Like drinking from the fire hose of Open Source information – as the *Open Sourcing* of Solaris rolls out, you can be sure it will be mentioned, discussed and debated, as well as almost any other technical (or even non-technical) topic: <http://slashdot.org/>
- There are many books on Solaris Administration, aimed at various levels of abilities (including “The Complete Idiot’s Guide to Solaris 9” and “Solaris 9 for Dummies”), be sure and flip through any book you plan to purchase, to ensure it meets your needs. After the presentation I hope to have a list of recommended books of my own, but for now, Bill Bradford has a good list of books available at his website: <http://www.sunhelp.org/books>
- Additionally, consider Linux websites/books – much of the Open Source software that runs on Linux also runs on Solaris – some software may need to be compiled for your particular platform, but many good Linux books are available that cover the use and configuration of various Open Source software.
- Open Source technical books, from O'Reilly: <http://www.oreilly.com/openbook/>

- While a little dated, the Unix Hater's Handbook can provide a bit of humor, and a different perspective "to the way things are" in Unix (follow the link to download the PDF): <http://research.microsoft.com/~daniel/unix-haters.html>

Websites

- SunHelp – A great site for many things Sun-related, including a great mail list for new users sunhelp (see <http://www.sunhelp.org/mailman/listinfo/sunhelp/>) and lots of interesting sun-related information linked off the home page.
- BigAdmin – Sun's website for System Administrators, Sun works hard to include pointers to pertinent to Solaris system administrators:
<http://www.sun.com/bigadmin/>
- Sun System Handbook – A great hardware reference for Sun hardware, including upgrade options, links to manuals, etc for Sun's various systems:
http://sunsolve.sun.com/handbook_pub/
- Sun Solaris Documentation – links to all Sun's Solaris manuals:
<http://docs.sun.com/app/docs>
- Links to lots of varied web sites for all kinds of applications and software:
<http://www.solaris4you.dk/sunsolaris.html>
- Sunfreeware.com – This is the original source for much of the software on the Companion CD, if you are looking for more recent pre-compiled binaries for your system, be sure and check here: <http://www.sunfreeware.com/>

Specific installation scripts

- Send an email request to me at SolarisSOHO@gmail.com for updated info, including pointers to sample installation scripts, notes, etc. for specific SOHO applications mentioned in the presentation.