Solaris x86 FAQ

Dan E. Anderson

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     RUSSKAYA / RUSSIAN
     Versionr by Dubna
     International Universityr
     (Version 2.4, 10/1999)r
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r PDF & HTML formats.r
r See "Ebook formats" for links.r r

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r r If you have questions or comments,r please send a message tor <u>Dan Anderson</u>.r rɼr r

r r *r http://www.sun.drydog.com/faq/r* r r

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From: Dan Anderson <faq@drydog.com>r
Newsgroups: alt.solaris.x86,comp.unix.solaris,alt.answers,comp.answers,news.answersr
Subject: Solaris x86 FAQr
Approved: news-answers-request@MIT.EDUr
Summary: This posting answers frequently-asked questions from ther
         alt.solaris.x86 newsgroup that aren't already covered in ther
         Solaris 2 FAQ.  It should be read by anyone who wishes tor
         post Solaris x86 questions to the alt.solaris.x86 orr
         comp.unix.solaris newsgroups.r
Followup-To: alt.solaris.x86r
r
Archive-name: Solaris2/x86/FAQr
Posting-Frequency: quarterlyr
Last-modified: 2010/02/17r
URL: http://sun.drydog.com/faq/r
Version: 2.28r
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Maintainer: Dan Anderson <faq@drydog.com>, San Diego, California, USAr
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r *New question since last month.r

r +Significantly revised answer since last month.r r

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r http://sun.drydog.com/faq/r r

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r (2.0) INTRODUCTIONr

r The Solaris x86 FAQ: Frequently-asked Questions about Solaris x86.r

r This posting contains frequently-asked questions, with answers, about ther Sun Solaris 2 Operating System on the Intel Platform (x86)r found in ther alt.solaris.x86r andr comp.unix.solarisr USENET newsgroups.r Ther alt.solaris.x86r newsgroup covers Solaris on the Intel platform,r for version 2.5 and higher.r The most up-to-date copy of this FAQ is atr http://sun.drydog.com/faq/r r

r Ther comp.unix.solarisr newsgroup is for Solaris on all platforms--r Sparc or Intel.r Please also consult Casper Dik's excellent FAQ onr Solaris 2, which mostly applies to Solaris x86 too.r It's at:r http://www.wins.uva.nl/pub/solaris/solaris2/r and elsewhere.r Solaris Nevada is also known as OpenSolaris, with a 5.11 revision string.r Solaris 7, 8, 9, and 10 are also known as SunOS 5.7, 5.8, 5.9, and 5.10.r Solaris 2.x is also known as SunOS 5.x.r

r For earlier versions of Solaris/x86, please see the (somewhat dated)r "Solaris 2.4 x86 FAQ" by Bob Palowoda archived at various dusty cornersr on the net.r The (mostly historical) Sun 386i (Roadrunner) is coveredr in Ralph Neill's (hard to find) FAQ.r

r If you post questions tor alt.solaris.x86r orr comp.unix.solaris,r please be sure to indicate:r

> r
> - r the machine type and brief configuration, e.g. Pentium II 450 MHz,r 128 MB RAM, 200 MB swap space, 8 GB XYZ hard drive, etc.,r
> - r the exact Solaris version number, i.e. Solaris 7 is NOT sufficient,r whereas "Solaris/x86 7 HW 3/99" is more useful.r

r r

r I'm doing this on my own time as a public service.r PLEASE DO NOT ASK ME QUESTIONS THAT SHOULD BE ASKED OF SUN.r Although I am now employed by Sun Microsystems, as of February 1999,r I work on Solaris cryptography software.r Nothing I say is endorsed or approved by Sun.r If you suspect you have software defect problems, pleaser call 1-800-SOFTSPT (1-800-763-8778 or 1-510-460-3267).r If you have hardware problems call your hardware vendor.r If you are outside the United States, contact your local Sun representative.r

r PLEASE DO NOT ASK ME QUESTIONS THAT SHOULD BE POSTED TOr alt.solaris.x86r orr comp.unix.solaris.r I don't have the time to diagnose individual Solarisr problems, and I probably don't know the answer either :-). Many experiencedr and knowledgeable people read the newsgroup. Post your question there.r However, answers, corrections, and comments should be directed to me.r

r No FAQ is the work of one person, but is a USENET community effort. Thisr material was "snarfed" from other FAQs, USENET newsgroup postings, mailingr lists, and personal knowledge. Generally the source is noted at the end ofr each question. Most answers have been reworded, or expanded, or updated.r Thanks to everyone who contributed directly or indirectly. Please send anyr corrections or additions to me.r

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r -Dan Andersonr r https://dan.drydog.com/comment.htmlr
alt.solaris.x86 FAQ Maintainerr
San Diego, California, USAr

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r (3.0) RESOURCESr (3.1) What web and FTP sites do I need to know about?r

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r http://sun.drydog.com/faq/r

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r The latest version of this FAQ is always at this URL.r It's available in text and HTML formats.r This FAQ also appears in ther alt.solaris.x86r orr comp.unix.solarisr newsgroups and on various FAQ archives. Check the date at the topr of this FAQ to make sure you have a recent version.r If you don't have USENET news access, you can search past postingsr and post your own messages atr http://groups.google.com/r

r r

r http://www.Sun.COM/software/solaris/x86/r

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r Sun's web site for Solaris on x86,r contains pointers to Solaris x86 product information,r updates, resources, news, etc.r

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r http://ww.Sun.COM/bigadmin/r

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r BigAdmin is Sun's System Administration Support and Education website.r Has Solaris knowledge base, Hardware Compatibility List (HCL),r device drivers, patches, and Device Configuration Assistantr (DCA) boot diskette images.r Links to drivers for Solaris x86 are atr r http://www.sun.com/io_technologies/solaris-drivers.htmlr

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r http://sunsolve.Sun.COM/ site.r

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r Sun's download website for patches and various technical documents.r Public patches are atr r http://sunsolve.Sun.COM/r Patch clusters require a service contract.r Sun also has another Solaris x86 FAQ atr r http://access1.sun.com/FAQSets/Solarisx86FAQs.htmlr

r r

r http://docs.Sun.COM/r

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r Sun documentation on-line. Includes manuals, guides, answerbooks,r and man pages in HTML format. Especially useful for configuringr new hardware and new systems is the *Information Library for Solarisr (Intel Platform Edition)*.r

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r http://sun.drydog.com/bookstore/r

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r My Solaris online bookstore, in association with Amazon.com,r where you can read reviews on selected Solaris booksr and order Solaris or other books.r

r r

r http://www.stokely.com/unix.sysadm.resources/faqs.sun.html#s86.faqs.linkr

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r Stokely Consulting's list of FAQs has lots of pointers resources, notr only for Solaris x86, but UNIX System Administration in general.r

r r

r http://sunfreeware.com/r

r

r Steven Christensen's Solaris Freeware Page. Pointers to LOTS of x86r pre-packaged GNU and other open-source software.r Download from web or use pkg-get.r

r http://home1.swipnet.se/~w-10694/helpers.htmlr

r

r Pointers to many Solaris viewers, players, and Netscape plug-ins.r Includes sample media files.r

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http://solaris-x86.org/r

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r A new site with tutorials and news on Solaris x86.r
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http://www.laxmi.net/cde.htmr

r
r CDE (Common Desktop Environment) FAQr
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r http://www.blastwave.org/r andr http://www.opencsw.org/r

r
r Both sites provide community-built packages for Solaris x86.r
r r

r r http://www.ibiblio.org/pub/packages/solaris/i86pc/r

r
r Selected Solaris x86 binaries conveniently packaged in pkgaddr format at the University of North Carolina (formerly Sunsite).r
r r

r ftp://x86.cs.duke.edu/pub/solaris-x86/bins/index.htmlr

r
r Joe Shamblin's annotated collection of Solaris x86 open source, withr pointers to documentation, make it good for open source browsing.r This site appears to be dormant (last updated circa 1998).r
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r http://sun.drydog.com/r

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r My Solaris x86 Webpage has includes a search engine that indexes selectedr websites containing Solaris x86 information, including those listed here.r Also contains the latest version of this FAQ and my online bookstorer (in association with Amazon.com).r
r r

r r http://www.sun.com/bigadmin/features/articles/x86_desktop.htmlr

r
r Good overview on installing Solaris/x86 for your desktop workstation,r including frequently-used add-ons such as Open Office.r Lots of good pointers.r Article published 2003.r
r r

r http://www.bolthole.com/solaris/r

r
r Phil Brown's Solaris tips, packages, and drivers.r (includes packages and drivers he wrote).r Lots of useful information.r
r r

r http://www.wins.uva.nl/pub/solaris/solaris2/r

r
r Last, but not least, Casper Dik's thorough FAQ on Solaris 2.r This entire FAQ is available as one file at:r http://www.wins.uva.nl/pub/solaris/solaris2.htmlr

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r (3.2) How do I subscribe to the Solaris/x86 mailing list?r

r Subscribe by sending an e-mail message tor r <solarisx86-subscribe@yahoogroups.com>r or visit Yahoo Groups' Solaris x86 web page atr r http://www.groups.yahoo.com/group/solarisx86/r You DON'T have to

register to join the list, but you do have to registerr to read the list archives on the web (sorted by thread and date)r

r r

r Sun maintains a similar "Solaris on Intel" discussion forum.r To access it, go tor http://forum.sun.com/r and select "Solaris x86 Platform Edition".r r

r A web-based forum, covering SPARC and x86, is atr http://www.solarisforums.com/r r

r

r (3.3) Where can I obtain Solaris 2/x86 maintenance updates?r

r Starting with Solaris 7,r Sun includes the drivers in the Maintenance Updates (MUs) andr updated versions of the OS.r r

r [Thanks to Alan Coopersmith]r

r r

r

r (3.4) Where can I obtain Solaris x86 patches?r

r The Solaris x86 driver updates can be obtained by HTTP from:r ftp://sunsolve.Sun.COM/r

r A listing sorted by release is available by clicking on "Patches"r at the SunSolve web page,r http://sunsolve.Sun.COM/r

r Pointers to patches, including one huge *_x86_Recommended.tar.Zr file for each release. This directory is publicly accessible--itr doesn't require you to be a contract customer. Patches are alsor available locally at many SunSites.r

r The "showrev -p" command shows what patches you have installed.r

r All files replaced by a patch are saved under /var/sadm/patch/r or /var/sadm/pkg/r r

r For Solaris 10, consider using "Sun Update Connection."r It's a GUI that manages your patchesr (similar to MS Windows and Linux update managers).r Once installed, just click on the GUI or run "/usr/bin/updatemanagerr from the command line.r It's available for free download fromr http://www.sun.com/service/sunupdate/r You need to be registered (free), and security and public patches are free.r Other patches require a service contract.r Currently, Sun Update Connection is available only for Solaris 10,r but if not patched it doesn't work (hangs) with Solaris zones (bug).r I recommend only applying critical security patches and patches forr specific problems you've had. Don't blindly apply all patches.r r

r

r (3.5) How can I obtain freeware, shareware, and GNU software on a CD-ROM?r

r Solaris 8 comes with some GNU utilities, such as gzip and less.r More binary packages for GNU and other Open Source softwarer are in a separate CD.r The CD is installed after Solaris is installed.r The packages on the CD all start with "SFW"r (SFW stands for "Sun Freeware").r

r For older versions of Solaris,r Micromata of Kassel, Germany offers its "Summertime" CD with precompiledr software for Solaris SPARC and Intel,r r http://www.micromata.com/summertime/r

r See question 3.1 above for FTP and web software sites.r

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r (3.6) What UNIX-like operating systems are available on x86?r

r

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- Solaris x86, SVR4-basedr (http://www.Sun.COM/)r
- SCO OpenServer UNIX, SVR3.2-basedr (http://www.sco.com/)r
- SCO UNIXWare, SVR4-basedr (http://www.sco.com/)r

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- Linux (http://www.linuxresources.com/, open source)r
- FreeBSD (http://www.freebsd.org/, open source)r
- NetBSD (http://www.netbsd.org/, open source)r
- OpenBSD (http://www.openbsd.org/, open source)r

r

r Note that the open source versions can also be purchased on CD-ROM,r which is a convenient way to get it. For Linux, there are multipler vendors selling CD-ROMsr (e.g., RedHat, http://www.redhat.com/).r Other systems are over the horizon, in beta, or for teaching/research.r E.g., GNU's HURDr r http://www.gnu.ai.mit.edu/software/hurd/,r Tanenbaum's Minixr r http://www.cs.vu.nl/~ast/minix.html,r or Lucent/Bell Labs' Plan 9,r http://plan9.bell-labs.com/r

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r (3.7) What books are available on Solaris x86?r r

 r
- r r *OpenSolaris Bible* (Wiley, 2009) by Solter, Jelinek, and Miner.r Excellent overall book, including Virtualization, ZFS, Dtrace, and basicr administration.r

r r

- r r *Solaris Security Essentials* (Prentice Hall, 2009) by Veach and Sun engineers.r Good book for security, including roles, encryption, authentication, and filesystem and network security.r

  r r
- r r *Solaris Internals* 2d ed. (Pretice Hall, 2006) by McDougall and Mauro.r Second edition updated for Solaris 10 and OpenSolaris.r Excellent overview on Solaris kernel implementation.r

  r r
- r r *Solaris 10 System Administration Essentials* (Prentice Hall, 2009) by Jain, Davenport, Bustos, and Sun engineers.r I haven't seen a review copy, but the authors know their stuff.r

  r r
- r r *Pro OpenSolaris* (Apress, 2009) by Foxwell and Tran.r

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r <BLATANT COMMERCIAL>r
Please visit my on-line bookstore,r http://sun.drydog.com/bookstore/,r in association with Amazon.com,r where you can order books on Solaris or any other topic.r I get paid a few percent of most books ordered there.r
<END BLATANT COMMERCIAL>r

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r (3.8) What magazine articles are available on Solaris x86?r

r "Sun injects Solaris X86 with new life as it makes its way to 64 bits"r *Sun World*. Feb. 1997 by Rick Cook.r http://www.Sun.COM/sunworldonline/swol-02-1997/swol-02-solarisX86.htmlr

r Note: please send other submissions to Dan Anderson atr r https://dan.drydog.com/comment.htmlr

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r (3.9) What's new for Solaris 10?r r

r Solaris 10 for x86 was released in 2005.r Solaris 10 features include:r an improved TCP/IP stack ("Fire Engine"),r "Solaris Zones"r (partitioning software that's sort of like an enhanced chroot jail--one kernel,r many OS instances),r "ZFS" Dynamic File System,r (mirroring, volume management, performance, scalability, and reliability improvements)r "FMA/Greenline" with self-healing features and fault management,r NFS v4,r Gnome 2,r DTrace diagnostic software,r AMD64 support,r andr Linux binary support.r r

r Solaris 10 06/06 now uses GRUB for x86 booting, along withr support for ZFS (Zettabyte 128-bit Filesystem),r andr lxrun (to run Linux binaries).r r

r Solaris 10 x86 is available atr r http://www.sun.com/software/solaris/binaries_program.xmlr r r r

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r http://sun.drydog.com/faq/r r

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r (4.0) PRE-INSTALLATIONr

r (4.1) What information should I have before an install?r

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       r
- Size of your diskr
- Ethernet hardware addressr
- IP addressr
- Bandwidth of your video card and monitorr
- Maximum vertical frequency your video card will driver
- Mouse typer

r

r The size of your disk determines what cluster you are going to install onr your system. I.e., an End User cluster, a Developers Cluster or ther Complete Cluster. See references to how to size your OS when installing.r

r The Ethernet hardware address from your Ethernet card would be helpful ifr you're on a NIS net and your going to do net installs. You would like tor have the Ethernet address in the /etc/ethers map file before you do anr install. Usually the manufacturer of an Ethernet card will have somer software that you can run under DOS to display this number or sometimesr you can find the Ethernet number on a sticker right on the Ethernet card.r If this is on a standalone network you probably don't need to know ther Ethernet hardware address. Don't confuse this with the software IP address.r

r Bandwidth of your monitor and video card are important. During the installr the install process is going to ask you for the size of your monitor andr what vertical resolution you want to drive the monitor at. Note that inr the update disk documentation they give a handy dandy monitor resolutionr bandwidth for monitors in the appendix. You may want to check this out.r See other references on video cards and monitors throughout the FAQ.r

r The install process will ask you about your mouse type.r

r [From Bob Palowoda's Solaris 2.4 x86 FAQ]r

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r (4.2) What hardware is supported by Solaris for Intel?r

r Solaris x86 is the version that runs on Intel-based PCs and servers.r Requirements vary to release, but generally a Pentium-class processorr or better from Intel or AMD, a PCI bus, 256 MB of memory, and 20 GB Disk.r Solaris base and Java Desktop System takes about 5GB.r Add Java Enterprise System (not needed except for servers),r for a full install takes about 11GB.r Add in swap and free space, so you should have,r say, a 10 or 20 GB disk or larger.r Many multi-processor boards and multi-processor cores are supported.r You must have a CD-ROM drive or access to NFS or a boot server over ther network to install.r A DVD drive is better, as it's fewer disks to swap.r

r The Solaris x86 Hardware Compatibility List (HCL) lists the testedr hardware. However, not all hardware combinations will work.r Also, hardware not listed may work, but are not guaranteed or supported.r The HCL is at:r http://www.sun.com/bigadmin/hcl/r After installing Solaris, please submit your own configuration at ther "Submit System" form to let others know that your hardware is compatible.r

r For troublesome devices and cards, I findr *System Administration Guide: Devices and File Systems*r atr http://docs.sun.com/r useful.r

r A downloadable Java JNLP application is available to detect whatr hardware support is available for your computer.r This app is runs on Linux or Windows and is a great preview of support.r r http://www.sun.com/bigadmin/hcl/hcts/device_detect.htmlr I don't need to check my Athlon 64 desktop, as it has Solaris.r My IBM Thinkpad has everything but WiFi support (it's coming) and ther internal modem.r

r [Updated from Casper Dik's Solaris 2 FAQ]r

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r (4.3) What size disks and partitions should I have?r

r Solaris base and Java Desktop System takes about 5GB.r Add Java Enterprise System (not needed except for servers),r for a full install takes about 11GB.r Add in swap and free space, so you should have,r say, a 10 or 20 GB disk or larger.r This can be pared down, butr with today's large disks, I usually install all of Solaris.r

r Solaris uses a tmpfs where both the swap area and /tmp share ar common disk space. Configure about 512MB - 1GB of swap space on a singler user system. Many programs use the tmpfs for speeding up applications.r My swap file is usually 1.5 times my physical memory.r

r Solaris installation usually suggests several filesystems.r However, for workstations, I recommend a simple layout with just twor slices in the Solaris partition:r root (/) and swap (/tmp).r and everything else goes in the root (/) filesystem.r If you're expecting a lot of overflow from /var (usually on servers),r consider creating a separate /var filesystemr (say 200 MB or more, depending on your needs).r r

---

r During installation, you will be asked to select the boot disk to use.r Next, you will be asked if you want to "Preserve Data?"r Answer "yes" if you have unused disk space and want to keep yourr existing operating system (e.g., Linux or Windows).r Answer "no" ifr you want remove all existing partitions on the disk andr use the all or part of the disk for Solaris.r

r If you are installing Solaris 9 or earlier on a disk with Linux, be especiallyr careful not to use the Linux swap partition for Solaris if installing Solarisr or vice versa installing Linux.r They both use the same partition ID, 0x82.r For Solaris 10 this is no longer true--Solaris 10 uses ID 0xBF, whichr does not conflict with Linux Swap partitions (0x82).r For more information, see the question later in this FAQ,r Can I install Linux and Solaris on the same drive?r r

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r (4.4) What are SCSI IDs expected by Solaris x86?r

r These are the typical values for SCSI devices. For tape and CD-ROM, theser are the defaults used in the /etc/vold.conf file for controlling the voldr mounter. You can set them to other ID's but remember to adjust ther vold.conf file to the new values.r

r

```
r
Boot drive              ID 0r
Second drive            ID 1r
Third drive             ID 2r
Reserved by Solaris     ID 3r
Tape                    ID 4r
CDROM                   ID 6r
SCSI controller         ID 7r
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r [From Bob Palowoda's Solaris 2.4 x86 FAQ]r

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r (4.5) What video card/monitor combination works best?r

r Some questions will arise when trying to configure your video card andr monitor size. The most critical area is when you do the install andr answer the questions about the vertical HZ, screen size 14, 15, 17,r 21-inch, etc. If you get it wrong you get the squiggles.r

r First, find your video card manual. Ha! I can hear the laughs from acrossr the world. What manual? If this is the case just select the slowestr vertical HZ. You can always change it later after the system is upr with kdmconfig.r

r Resolution: be safe and just use 1024x768 or smaller the first time throughr the install. Latter, boost it up to 16 million colors and specify ar bigger monitor size.r

r Screen size should be easy. Measure diagonally: [\] about that big.r

r If you don't know the video card type just select the standard vga8 to dor the install. Hopefully when your system boots it displays what video cardr you have in it.r

r A good video card combination such as the ATI and Sony 17sei can allow your to drive it at 76Hz vertical 1280x1024 on a 17-inch screen.r

r Hint: Look in the update readme files and at the end in one of ther appendices you'll find a chart of monitors and their scan rates.r It's usually good to refer to before you buy the monitor and video cardr combination.r You could have a very nice high bandwidth monitor and a lousy video cardr that can't drive it hard enough. Or visa versa, a good video card thatr can drive a high bandwidth but the monitor just can't handle it.r

r Another Hint: Even though there's no 14-inch monitor on the configurationr menu you can select the 15-inch setting. If the 14-inch monitor has ar good bandwidth it will sync up.r

r [Modified from Bob Palowoda's Solaris 2.4 x86 FAQ]r

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r (4.6) Is Plug-and-Play (PNP) supported by Solaris/x86?r

r Yes, with Solaris 2.6 and latter.r Sun FAQ 2234-02 atr r http://access1.Sun.COM/cgi-bin/rinfo2html?223402.faqr has instructions for configuring Solaris to recognize specific PNP devices.r See ther *System Administration Guide: Devices and File Systems*r atr http://docs.sun.com/r for details on each devicer (and see the *Driver Update Guide* when using updates).r r

r Personally, I find it a lot easier to disable PNP on cards that have thatr option.r Boot into DOS or Windows (with a diskette if you have to)r and run your card manufacturer's utility or configuration or diagnostic program.r I also disable the BIOS setting "OS supports PNP".r PNP can be tricky with Solaris sometimes.r

r To display your current system configuration runr "`prtconf -pv`"r

r r

r The following is fromr Sunr FAQ 2234-02,r whichr has instructions for configuring Solaris to recognize specific PNP devices:r

r r

r You have a device that is "Plug and Play" (PnP), but Solaris doesn'tr recognize it. Yet it seems that it is generic enough, like a modem,r that it should be recognized or it is listed by name in ther Hardware Compatibility List (HCL).r

r r

r Devices are recognized by matching their device id with entries in ther boot system's "master" file. This file is on both the boot disketter andr on the root in /platform/i86pc/boot/solaris/devicedb of an existingr Solaris 2.6 system.r

r

r First, be sure you are using the latest Driver Update (DU) for yourr version of Solaris. Your device may already have been added to thatr since the 2.6 CD was released. This can save you a lot of trouble. Ber sure to read the documentation that comes with that DU to see if itr describes your specific device.r

r

r To have the system recognize a device as an asy compatible device, ofr which a modem is a good example, the user needs to find out the ID ofr the particular device. This can be accomplished by looking at ther output of a `prtconf -pv` on an existing Solaris 2! .6 system with ther device installed. The node that is the one for the Plug and Play cardr will have a name property of the form `pnpXXX,DDDD`, where the XXX isr three letters and `DDDD` is four digits.r

r

r If one constructs a PnP ID by concatenating XXXDDDD, this will be the IDr for the Plug and Play card. To have the system recognize this card asr an asy device, the line in the above mentioned master file that containsr the driver name `asy` as its second field should be edited to have ther constructed ID as one of the IDs listed in the first field. As in ther example below:r

r

r `USR0006|USR0002|SUP1381 asy com pnpisa none "Serial port w/ built in`r `modem"`r

r

r becomes:r

r

r `XXXDDDD|USR0006|USR0002|SUP1381 asy com pnpisa none "Serial port w/built`r `in modem"`r

r

r NOTE: One should be very careful editing this file since if it isr trashed, the system may no longer be able to boot. When changing ther floppy, be sure to change a duplicate of the floppy—not the original!r When changing the file on you Solaris boot drive, be sure to save ther original as master.OLD or some such name.r

r

r After making this change to the master file on an existing system, ther user should do a `touch /reconfigure; /usr/sbin/shutdown -i6`r to reboot/reconfigure the system.r If you are changing a copy of the floppy just boot from the changed floppy.r The device will be recognized as the desired type and should automaticallyr have the proper driver attached.r

r

19

r This procedure may work for other drivers that are compatible withr various devices, but whose Plug and Play ids are not in the master file.r For example, the sbpro driver can drive many PnP sound cards that lookr like a Soundblaster PnP 16.r

r

r Only add IDs to existing lines. Do not create new lines by yourself.r If you truly have a new device then please submit a "Driver Requestr Form" to have it supported. If you look where you downloadr the latest Driver Update you should find a link to it there.r

r r

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r

r (4.7) Is Advanced Power Management (APM) supported by Solaris/x86?r

r APM isn't really supported on x86. Solaris is "APM tolerant" whichr means that if APM can do everything transparently to Solaris, it willr work. If it isn't transparent, Solaris gets confused.r

r So, SPARC has power management in the OS but x86 does not.r

r [Thanks to Doug McCallum]r

r r

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r

r (4.8) Are "floppy tape" devices supported by Solaris x86?r

r No. You have to use a SCSI tape backup device. Other options includer purchasing a zip drive, which is supported (except on the parallel port),r or backing-up your files to a MS-DOS/MS Windows partition and back it up fromr MS DOS/MS Windows or some other operating system.r

r r

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r

r (4.9) How can I get a "free" copy of Solaris?r

r A "free" copy of Solaris x86 (where "free" means ther download and license is free. You pay media, shipping, and handling costr if you don't want to download.)r is available fromr r http://wwws.sun.com/software/solaris/binaries_program.xmlr There are CPU and commercial use restrictions on this free license.r The Solaris media kit (DVD and CDROMs) costs US $50r or free to download.r r

r The download version includes everything butr the Open Source "Software Companion" CD, and the Star Office CDr (the latter is available for download separately or you can use Open Office).r r

r If you download and have problems, make sure you download in "binary" moder (check that the file size matches exactly).r Some CD burning software (especially for Windoze) requires the downloadedr files be renamed to have a ".iso" extension.r Please verify the CD or DVD you burned, if the software has that

option.r I recommend using "Easy CD Creator"r software if you are using Windows machinesr (seer http://www.roxio.com/).r Some people like Nero Burning ROM software, but I have no experience with it.r In any case, make sure you burn as a "Disk Image" or "Existing Project",r otherwise, the *.iso file will be burned as just a file on the CD/DVD,r instead of burning the exact image of the *.iso file.r r

r Keep in mind that the CD uses Solaris (long) filenames, notr DOS 8.3 filenames. So if you do a DIR on the cd, don't be alarmed ifr you don't see everything.r Also MS Windows does not recognize the industry-standard "Rock Ridge"r format for long filenames (in characteristic fashion,r MS Windows uses their proprietary "Joliet" format).r r

r For Solaris and other flavors of UNIX,r several CD burning utilities are available, such as cdrecord (CLI)r atr r ftp://ftp.fokus.gmd.de/pub/unix/cdrecord/,r BurnIt (Java GUI front end to cdrecord) atr http://sunsite.dk/BurnIT/,r or X-CD-Roast (Linux GUI) atr http://www.xcdroast.org/r r

r **Educational users**r .EDU-affiliated individuals can obtain Solaris and a number ofr other software packages via the EduSoft program for free.r See "Individuals" atr r http://www.sun.com/products-n-solutions/edu/promotions/edusoft/r r

r [Thanks to Sun Microsystems, Alan Coopersmith, John Groenveld,r and Toby McLaughlin]r r

r

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r

r (4.10)r What's missing from the "free" copy of Solaris that's in the commercialr version?r

r The following CD is supplied with the commercial version but notr with the free version:r Software Supplement for Solaris 7.r The latter contains SunVTS, ODBC Driver Manager,r Solaris on Sun Hardware AnswerBook, PC file viewer, ShowMe, and SunFDDI.r OpenGL is provided with Solaris only for the commercial Sparc versionr (Xi Graphics "Summit" software supports OpenGL 1.2.1 for Solaris x86;r XFree86 has OpenGL but doesn't support it for Solaris).r

r [Thanks to Mike Mann and Alan Coopersmith]r

r r

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r

r (4.11)r How do you create a Device Configuration Assistant (DCA) Diskette inr DOS/Windows?r r

r The DCA diskette is used for booting, in lieu of booting from CDROM orr hard disk.r The DCA diskette comes with the Solaris media, but you need to "roll yourr own" if you downloaded Solaris or if your DCA diskette becomes corrupted.r To create the diskette, follow these steps:r r

r

    r
1. Download DOS program dd.exe, which is used to write the DCAr image, fromr r http://www.sun.com/bigadmin/hcl/drivers/dca_diskettes/r orr r ftp://ftp.uu.net/vendor/sun/solaris/x86/dd.exer (Example: `dd S8_1001.3 a:`)r You can also use

the DOS rawrite.exe utility provided with Linux distributionsr (usually under the boot diskette directory).r r

2. Download the DCA diskette image for the Solaris x86 version thatr you want to installr (for example, S8_0101.3) fromr r http://www.sun.com/bigadmin/hcl/drivers/dca_diskettes/)r A DCA boot floppy image is also on the "Software 2 of 2" CD,r in the Solaris_9/Tools subdirectory.r r

3. Run dd.exe to copy the image to the floppy diskette:r `dd.exe <filename> a:`r

r r

r You have now created a (bootable) Solaris DCA diskette.r r

r [Thanks to Sean G.W. Graham]r

r r r

---

r

r (4.12) How can I get Solaris to see the thirdr ATAPI controller?r

r Solaris 7 can ber configured to support any ATAPI compliant controller which doesn'tr conflict with any existing device. The key factor is that its interfacesr must be complaint with the ATAPI specs. In other words, you need twor ranges of non-conflicting I/O ports, and an free IRQ, and hardware that'sr compliant with at least the ATA-2 and SFF-8020 specs. If it's a legacy-ISAr ATA controller than you'll have to manually configure everything via ther Device Configuration Assistant (DCA)r menus because the DCA only automatically probes for ISA-IDE devicesr at the two standard address ranges. If you're adding a compliant PnP-ISAr ATAPI controller or a compliant PCI-IDE controller then the DCA shouldr automatically configure everything for you because all PnP-ISA-IDE andr PCI-IDE devices are self-identifying devices.r r

r The problem you're likely to encounter is there aren't many compliantr add-in ATAPI controllers available. Most of them want to do revoltingr things like share ISA IRQs 14 or 15, or advertise the wrong range ofr I/O ports or don't specify the right PCI-IDE class bytes. In particularr most SoundBlaster-IDE cards have a broken Alternate-Status register.r The Solaris 7 ata driver assumes that the Alternate-Status register worksr as specified in the ATA-2 spec. Unlike the other non-compliant hardwarer problems, there's a trivial workaround for the SB-IDE hardware bug (i.e.,r don't use the Alt-Status register) but I've no idea whether anyone at Sunr has spent the 15 minutes it would take to apply the fix to Solaris 8.r r

r If you've got an add-in ATAPI controller card that doesn't come withr specs that clearly spell out that it won't conflict with your existingr controllers, or if it requires you to disable any built-in controllers,r then that's almost certainly one of those bogus controllers that isn'tr fully compliant with the ATAPI specs. I haven't yet found a legacy-ISAr ATAPI card that works correctly (they all want seem to want tor share IRQ 14 or 15), but people persist in telling me they exist. If your do find a compliant one then the Solaris 7 ata driver will work with itr just fine.r r

r [Save yourself some trouble and use a SCSI controller and disks. - ed.]r

r [Thanks to Bruce Adler]r

r r

---

r

r (4.13) Are Ultra DMA (UDMA) drives supported?r

r Solaris 7 or later recognizes UDMA drives in native mode.r They are not supported in Solaris 2.6 or older, although they arer recognized in its compatibility mode as regular ATAPI drives.r

r During installation, you may want to disable UDMA mode if your installr hangs during recognition of hard drivesr (which occurs shortly after the Solaris copyright line is displayed).r

r For Solaris 8, DMA is disabled for ATAPI devices,r as it caused installs to fail for several BIOSes.r For Solaris 10, it is enabled, at least for me.r It can be enabled with the `"ata-dma-enabled"` property from ther GRUB menu (`-B ata-dma-enabled=1`)r See the question on "How can I improve disk and graphic performance?"r for details.r

r [Thanks to Christopher Arnold and Steve]r

r r

r

r (4.14) Are Universal Serial Bus (USB) devices supported?r

r Solaris 8 supports USB, including Plug and Play.r However, not all devices attached to USB are supported.r The HCL lists supported devices (see the answer about the HCL, above).r r

r Also, there are three different types of USB host controllers, and Solarisr x86 (8 or 9) supports only one:r

> r
> - USB 1.1 UHCI is supported by Solaris x86.r
> - USB 1.1 OHCI is supported by Solaris x86r only with the newer USBA 1.0 frameworkr (which supports USB 2.0 EHCI devices).r
> - USB 2.0 EHCI is supported by Solaris 10.r It requires patches for Solaris 8 or 9.r On Solaris 9 x86, use Update 7 or later and install patch 115554-17.r On Solaris 8 x86, use HW 05/03 or later and install patch 109897-20.r EHCI with UHCI compatibility will also work.r
> - Avoid placing both USB 1.x and USB 2.0 devices on the same USB 2.0 hub.r They may not work for some configurations.r

r r

r Run the command "`prtconf -pv | grep 000c03`".r If there's no output from that command, your machine dosn't have USB :-(.r If there's a "`class-code: 000c0300`" line, you have UHCI USB and itr should be possible to use USB devices under Solaris x86.r If there's a "`class-code: 000c0310`" line you have an OHCI USBr controller, which is not supported with Solaris x86.r And "`class-code: 000c0320`" is an EHCI (USB 2.0) controller.r r r

r So, if your USB controller is UHCI, your USB keyboard/mouse shouldr be detected and should be usable as USB devices under Solaris x/9 x86.r If your system has an OHCI USB controller, you cannot use USB underr Solaris x86. Your only option is to enable "USB legacy support" forr the keyboard and mouse in the system's BIOS, and the BIOS will emulater a PS/2 keyboard and PS/2 mouse from the USB peripherals. In this case,r in kdmconfig, you have to tell the system to use the (emulated) PS/2 mouse;r the USB mouse pointer entry won't work!r r

r r r Detailed Contentsr r   23

r USB memory drives will appear as `/dev/rdsk/c1t?d?`r If formatted as DOS, mount as type pcfs. For example,r `mount -F pcfs /dev/dsk/c1t0d0 /mnt`r r

r Drivers for some USB devices are available from Philip Brown atr r http://www.bolthole.com/solaris/drivers/r For information on Solaris USB support, see Sun's USB FAQr and whitepaper atr r http://www.sun.com/io_technologies/USB-Faq.htmlr The FAQ has up-to-date information on USB 2 devices.r r

r

r (4.15) Is the scroll wheel on the mouser supported?r

r Yes, with Solaris 9 or 10.r It is autodetected and enabled by default.r

r If you use Xorg instead of Xsun graphics drivers, make sure you enabler it when running `xorgconfig`.r Or you can edit the Mouse section in file `/etc/X11/xorg.conf`r Change "`PS/2`" to "`IMPS/2`" and add to it:r
r `Option "ZAxisMapping" "4 5"`r r

r XSun, XFree86/Xorg, and Xi Graphics X Windows graphics card server softwarer all support wheel mice.r For earlier releases, user r http://www.tools.de/solaris/ps2wheel/r for PS/2 andr r http://www.bolthole.com/solaris/drivers/usb-usbsm.htmlr for USB mice.r r

r [Thanks to Jürgen Keil, Alan Orndorff, and Alan Coopersmith]r

r r r r

r

r (4.16)r What's difference between Solaris x86 Server and Solaris x86 Desktop?r

r There is absolutely no difference, other than what you arer licensed to do with it. You get exactly the same software withr the two products.r (This is not the case with Sparc server,r where the server product contains more CDs with some additional software.r If you want something like Solstice AdminSuite,r you have to order it separately.r r

r The Solaris desktop license restricts you from using the system asr "any type of server" (other than print or NIS).r or supporting more than two continuous users.r Read your license for details.r A Server Upgrade License is available.r r

r [Thanks to Andrew Gabriel]r

r r

r

r (4.17)r Solaris 7 or 8 doesn't recognize all of my large (>40GB) ATAPI.r For example, a 60GB disk shows up as only 28GB.r

r Apply patch 110202-01 fromr http://SunSolve.Sun.COM/r which fixes bug4353406 for Solaris 8.r For Solaris 7, you can modify a patch byr creating a directory called SOL_27 and duplicate the files andr directories contained in SOL_28.r r

r [Thanks to EB]r r

r

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r

r r (4.18)r Is Solaris x86 64-bit aware?r

r Yes. Solaris 10 is 64-bit processor aware.r You can run 32- or 64-bit binaries on a 64-bit kernelr (but drivers must be 64-bit).r Supported CPUs are AMDs Opteron and Athlon 64.r Use the `isainfo`r command to display the current kernel's 32-/64-bit capabilities.r To compile 64-bit binaries with GNU gcc,r use "`gcc -m64`" (or add "`-m64`" to CFLAGS and CXXFLAGS).r To compile withr Oracle Solaris Studio (Sun Studio)r http://developers.sun.com/prodtech/cc/r use "`-m64`"r For older versions of Oracle Solaris Studio, use "`-xtarget=generic64`"r

r r

r Solaris will also support ther new 128-bit ZFS filesystem, which supports 16 million million times ther storage of a 64-bit filesystem. Solaris 10 x86 supports EFI labels as wellr as the new UFS format that allows filesystems over 1 terrabyte.r 128-bit ZFS files are still limited to 64-bit access until 128-bitr processors and Solaris support are available.r

r

r However, if Solaris is installed on a 32-bit processor, these filesystemr features are not available,r due to the underlying Intel chip architecture.r However, Solaris x86 on 32-bit processors still supportr large files up to 1 Terrabyte for 32-bit processors.r In practice, the limit is 860 Gigabytes.r For example:r

```
r
$ ls -l /work/BackUpr
total 13239792r
-rw-r--r--   1 root     other     6775454208 Dec 11 00:47 csdb_nfs1.tarr
```

r

r [Thanks to Niklas Zackrisson, Alexander Zinkov, and Merle Ilgenfritz]r r

r

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r

r r (4.19)r What's the difference between partitions and slices?r r

r In the UNIX world, partitions and slices are often usedr interchangeably. In the x86 world, partitions usually refer to fdisk partitions.r To avoid confusion, it's preferable to refer to "partitions" asr "fdisk partitions." (e.g., you can only have fourr primary fdisk partitions in a x86 fdisk table.)r In the Solaris x86 world,r the term "slice" should be used to refer to slices which arer within the Solaris fdisk partition (e.g., "root" (/) and "swap"

slices.)r r

r [Thanks to John Groenveld]r r

r

---

r

r r (4.20)r I already used the 4 primary fdisk partition table entries.r Can I create a partition for Solaris within my extended partition?r r

r You can't because Solaris requires a *primary* partition tabler entry in the fdisk table and doesn't support placing the Solaris Partitionr within a DOS Extended Partition.r

r [Thanks to Bruce Adler]r r

r

---

r

r r (4.21)r What are the IRQ assignments?r

r IRQs, Interrupt Request Registers, numbered 0 to 15, handle interrupts fromr various internal and external hardware devices.r Multiple ISA devices can't share a IRQ, but multiple PCI devices can share.r r

r Here's a chart:r

r r

r
- IRQ 0[*] - System Timerr
- IRQ 1[*] - Keyboardr
- IRQ 2[*] - Programmable Interrupt Controller;r gateway to IRQs 9 - 15.r
- IRQ 3 - COM2 (ttyb) I/O Base 2F8h (usually a ISA modem)r
- IRQ 4 - COM1 (ttya) I/O Base 3F8h (usually a serial mouse)r
- IRQ 5 - Usually a secondary printer, NIC, or sound cardr
- IRQ 6 - Diskette Controllerr
- IRQ 7 - Parallel Printer; sometimes used for a sound cardr
- IRQ 8[*] - CMOS Real-Time Clockr
- IRQ 9 - Sometimes used for a sound or network cardr
- IRQ 10 -r
- IRQ 11 - Sometimes used for PCI Videor
- IRQ 12 - PS/2-style Mouser
- IRQ 13[*] - Math Coprocessor Exceptionr
- IRQ 14 - Primary ATAPI Disk controllerr
- IRQ 15 - Secondary ATAPI Disk controllerr

r r

r [*]IRQs 0, 1, 2, 8, and 13 are not on the bus connectorsr and are not available to I/O adapter cards.r r

r [Thanks to Jorgen Moquist and other sources]r r

r

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r

r r (4.22)r Are Laptops supported for Solaris x86?r r

r No, not anymore.r There's just too many and they tend to have strange hardware.r That being said, many happen to work.r Also, old drivers or desktop drivers sometimes function for laptop hardware.r For a list of known laptops compatible with Solaris x86, seer Philip Brown's "Solaris x86 Laptop List" atr r http://www.bolthole.com/solaris/x86-laptops.htmlr r

r Experimental wireless networking support is available with drivers fromr r http://www.opensolaris.org/os/community/laptop/wireless/r r

r If you want more than VGA resolution, you can try installing XFree86.r See section 8 of the faq on X Windows for morer information.r r

r Evan Rudderow points out that the simplest way to run Solaris x86 onr laptops is to run it under VMWare.r r

r If it's only Solaris you need on a laptop,r and you don't mind coughing up $$$$, you can get SPARC laptops fromr r http://www.naturetech.com.tw/r andr r http://www.tadpolecomputer.com/r r

r

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r

r r (4.23)r Is Serial ATA (SATA) supported for Solaris x86?r

r Yes. The following chipsets are supported:r ICH (ICH5, ICH5R, ICH6, ICH6R), SiliconImage (Sil 3112, 3114, 3512), andr nVIDIA (nForce4).r Personally, I have a MCS Athlon 64 motherboard with a nForce4 chipsetr and it works fine.r RAID support, if any, is handled by a Solaris driverr (such as Solaris Volume Manager).r r

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r r r r r r r r r r r

r (5.0) INSTALLATIONr

r (5.1) How long does the install take?r

r It depends on the CD-ROM and hard disk speed. On a 300 MHz Pentium withr a multispeed SCSI CDROM, from the time "Initial Install" starts, itr only takes about a half hour. Add another half hour for initial probesr and configuration menus. Add a lot more if you have problems, of course.r Upgrades take about 3 hours or more. This is because the system mustr determine what critical configuration data must be saved and replace itr on a "per-package basis".r

r I'm the impatient type and given up totally on system upgrades. Now Ir have a separate disk drive which I use for initial installs because itr goes so much faster. With the typical SCSI drives costing in the $200r range it just isn't worth it anymore to do upgrades. But this is myr opinion so take it for what it is worth. I just save the /etc, /opt,r /local, and /export/home directories and selectively restore ratherr than upgrade.r

r Below is typically what I save before doing an initial upgrade. Don'tr take this for the ultimate system definition of what you should save,r but it works for my system. Your system may be designed very differently.r The first thing I do is mount the filesystem that has a home directoryr with the below critical files and copy them to the appropriater directories. I'm sure it could be automated but. . . What ther advantage of this process is that I can do an initial install in aboutr an hour. My home directories are always on another disk partition.r

r

```
r
Install_Notes   My own release notesr
defaultroute    If you have one for routing to a DNS server.r
df              Save the output of df to keep an idea of my disk usager
dfstab          /etc/dfs/dfstab for shared file systemsr
passwd          /etc/passwd filer
shadow          /etc/shadow filer
vfstab          /etc/vfstab filesystemsr
```

r

r [Modified from Bob Palowoda's Solaris 2.4 x86 FAQ]r

r

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r

r (5.2) My ATAPI CD-ROM or DVDr isn't recognized during install ofr Solaris and it's not in the HCL. What can I do?r

r This used to occur with older versions of Solaris (2.5.1).r The workarounds were to connect the CD-ROM to the primary ATAPIr (not secondary and not the sound card),r to disable DMA for the CD-ROM,r or to use a SCSI CD-ROM.r

r [Thanks to L. E. "MadHat" Heath and others]r

r r

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r

r (5.3) What kind of problems might I encounter installingr my SCSI system?r

r Typical problems with SCSI drives are termination and SCSI IDs. You'llr have flakey behavior if there's no termination resistor on ther drive at the end of a SCSI "chain". Worse are double termination resistors.r Some people mistakenly leave a resistor jumper on a drive when it's not atr the end of a SCSI "chain." This also makes the system flakey.r Carefully read your SCSI adapter manual on termination if you're unsurer about it. A SCSI drive can run for hours with no problems--then boom, your get a panic. Always check cabling, pins, and connections and use ther *shortest* cable possible. The first thing I do when I have a problemr with a SCSI device is to reseat the SCSI cablesr (with the machine powered off).r

r With SCSI IDs, a common problem is that the IDs on the drive, usually set withr dip switches or a button, don't match the settings with your softwarer (Solaris) or it's a duplicate ID. Check the IDs carefully when addingr or upgrading SCSI devices. The boot drive must be ID 0.r

r Other more obscure problems are setting the BIOS address space for the diskr controller the same as the network card address space, and the PCI videor card address conflicting with PCI SCSI disk controller BIOS address space.r SCSI ISA adapter support has been removed in Solaris 8--use PCI.r

r [Adapted from Bob Palowoda's Solaris 2.4 x86 FAQ]r r

r

r

r (5.4) What do I do when the install hangs/panics?r

r One of the most common problems with some mother boards is handling DMAr during the install. Usually, that's the case if you get a hang rightr around configuring /dev/devices. Try turning off the caching--externalr and internal. Slow the system speed down if it allows you to do this inr the BIOS or through the front panel switch. Leave these settings ONLYr for the install: kick it back up after the install.r r

r Warning:r If you already have a OS installed on your hard driver (and that's most of you), the Webstart "Installation" disk will most likelyr *not*r work.r Use type 4, "Solaris Interactive Text (Console session)," for Solaris 10r and the "Software 1 of 2" CD for Solaris 8 or 9.r r r

r If you still have problems,r you can run Solaris boot in debug mode to help isolate the problem.r When asked to make a selection, 1 - 4, type instead "b -kv" (without the quotes)r r

r Another common problem is support for new devices. Use the latest driverr update boot and distribution diskettes, especially with newly-supportedr hardware. Carefully check the HCL to verify your cards are listed. Tryr removing/replacing suspected troublesome cards to isolate the problem.r r

r Sun gives these tips for handling hardware incompatibilities duringr installation (see http://access1.Sun.COM/cgi-bin/rinfo2html?115502.faq):r

> r ". . . Disable external cache, . disable synchronous negotiationr on the CD ROM, and disable ROM BIOS shadowing. These may ber re-enabled after installation. Also, if using an un-supportedr or clone motherboard, slowing the system clock or changing fromr a double-clocked processor to a single-clocked one may help.r Say, for example, a 486DX-50 as opposed to a 486-250 or 486-66."r

r I would also add (temporary) disabling of these BIOS settings to this list:r video cache, BIOS virus detection (boot block writes),r UDMA mode, and, most importantly,r "OS supports PnP" (Plug and Play).r Disabling these settings may not be required for your hardware and BIOS,r but it has helped for some hardware setups.r Remember to reenable these after you installed Solaris.r

r Here's a checklist of typical causes of hangs during installation:r

> r
> • Incompatible CD-ROM drives (or mounting on the secondary ATAPI).r
> • Incompatible SCSI controller (avoid the clones and cheap cards).r
> • Incompatible Motherboard (try changing motherboard settings).r

r r

r "Appendix A Troubleshooting" in the *Solaris Installation Guide: Custom JumpStart and Advanced Installations*r has more tips and extensive documentation on severalr installation error messages.r These errors can occur with any installation, despite the title.r The appendix was based on problems discovered from actual support callsr and is very helpful.r http://docs.sun.com/r r

r [Thanks to Bob Palowoda and Jürgen Keil]r r

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r

r (5.5) I'm trying to install Solaris/x86 on my ATAPIr drive. However, ther installation program says the root partition must end within ther first 1023 cylinders of the disk. What can I do?r

r The root filesystem must be below 1024 cylinders of your diskr The number of cylinders has nothing to do with the size of the disk.r So it is possible to have 1.5GB partitions below 1024 cylinders on somer disks (with more MB per cylinder) and not on others.r Newer BIOSes support LBA, Logical Block Addressing. The BIOS may have tor be edited on bootup to enable the LBA option. This bumps the HD limitr to 8GB. With LBA, Solaris/x86 and other operating systems can be placedr anywhere you want.r For older BIOSes, the 1024 cylinder limit translates tor the first 512 MB on ATAPI.r

r Be sure that the root and the boot slice of the Solaris partition arer within the 1024 cylinder boundary using the BIOS geometry reported forr your disk and you should be fine. That is the cause of the "slicer extends beyond end of disk" message -- exceeding 1024 cylinders.r

r If you're having problems, simply make the rootr filesystem smaller and create an additional /usr filesystem (and, e. g.,r /var, /opt, . . .). For reliability, the root filesystem should be smallr (say 64 MB) with large filesystems mounted on it.r

r I have seen problems with fdisk as well. In those cases I used a diskr editor to adjust the partition so it started and ended on cylinderr boundaries. This seems to happen when Solaris uses the actual geometry ofr a disk, as seen by Solaris at runtime, vs. the geometry reported by ar controller to allow DOS to think it has no more than 1024 cylinders.r Partition Magic reported problems with that partition when I tried it onr systems with Solaris partitions that weren't aligned with the other partitionsr correctly.r

r Update:r Solaris 8 has removed this size restriction for ATAPI drives.r One must reinstall Solaris, not upgrade, to take advantage of this.r SCSI drives have never had the partition size restriction,r although the

boot code in the root / filesystem had to be under ther 1024 cylinder limit.r

r [Thanks to Ronald Kuehn and Mike Riley]r

r

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r (5.6) Does Solaris x86 prefer to have the motherboard BIOSr set to NORMAL or LBA for ATAPI disks?r

r In theory, both work. Leave it up to the BIOS' auto-detect, just as ther Configuration Guide advises.r

r [Thanks to Randy J. Parker]r

r r

---

r

r (5.7) Why does a Solaris install to a disk with valid,r pre-existing fdisk partitions sometimes fail?r

r There is a well known bug that sometimes prevents Solaris fromr installing into an existing partition. Its cause has never beenr identified, or its existence officially acknowledged by filling out ar bug report. It is secretly well known only to Sun's Installationr Support team in Chelmsford, MA., who claim that the workaround isr apparent from the message "slice extends beyond end of disk".r

r I agree that the workaround is simple, but I think some kind of documentr explaining the workaround should be returned by searches of sunsolve.sun.com.r Better yet, the error message could actually describe ther error! Or, how about identifying and fixing the bug so it never happensr to begin with?r

r For those of you too "stupid" :-) to read the error message, I'll decode it:r

```
r
slice   = "disk"r
extends = "is full of fdisk partitions"r
beyond  = "before"r
end     = "installation."r
of      = "Please"r
disk    = "delete at least one of 'em, and try again"r
```

r

r For example: If a disk has three partitions with the following:r 1) FAT,r 2) no filesystem yet,r 3) NTFS, the installation might failr in some poorly understood cases, with the misleading error message.r

r The workaround is to delete the unused partition, leaving a "hole"r between the flanking partitions. The install fdisk, Partition Magic, orr any other fdisk will now see only two partitions: FAT and NTFS.r There will obviously be lots of cylinders between the end of the first,r and the beginning of the second. The Solaris install will spot the hole,r and create a partition according to its own mysterious specifications.r Somehow, this new partition is acceptable, even though a seeminglyr identical one created by a different fdisk isn't. Perhaps the bug is inr *when* it was created: if previous, sometimes balk. Perhaps NORMAL /r LBA is relevant at this point - - it did make a difference in at leastr one case I tested. Oddly, I have also had cases where the offendingr procedure of creating the partitions before beginning to install Solarisr worked fine.r

r However, I once had a case where the Solaris install created a partitionr that left gaps of a few cylinders before and after. I am wary that itr could err on the other side of the boundary, and damage a flankingr filesystem by encroaching across the pre-existing boundary. The safestr approach when dealing with a squirrelly fdisk is to use the dangerousr one *first*. Install Solaris before the other partitions get used, ifr possible. Hopefully the other fdisk-type programs will recognize suchr corruption and allow the encroached-upon partitions to be deleted andr re-created, without hurting the Solaris partition.r

r At any rate, the most-likely-to-succeed procedure is to install into ar hole, or onto an empty disk with no partitions.r

r Thanks to Super-User (asianinter.net), who pointed out cases involvingr modern BIOS' auto-detecting ATAPI disks as NORMAL. Alan Thomas prefersr always to set disks to NORMAL, and once had trouble with a disk that wasr set to LBA.r

r [Thanks to Randy J. Parker]r

r r

---

r

r (5.8) How do I add a 8 GB or greater ATAPI drive tor Solaris 7 or earlier?r

r Solaris 8 has support for large ATAPI drives built-in.r For SCSI drives, there's no such restriction.r However, if you haver Solaris 7 or earlier, there's an 8 GB restriction on large hard drives,r even in LBA mode.r There is a workaround for this limit however, by following these instructions:r

r To add a drive for Solaris 7, you need a BIOS that supportsr drives greater than 8.4GB in LBA mode.r Check with the computer manufacturer. BIOS upgrades may also be available ifr your system currently does not support large drives.r r

r You also need to find out ther total number of sectors available on the drive.r Solaris 7 or earlier cannot read the extended information on the drive,r so the information will need to be obtained from the manufacturer.r If the manufacturer only provides the total number of bytes, thenr divide that number by 512 to obtain the total number of sectors.r NOTE: Ignore the 16383x16x63 (or whatever) listed on the drive --r this equates to an 8.4GB drive and is not applicable to large drives.r r

r To configure the drive:r

    r
1. Set the drive mode to LBA in the BIOS setup.r r
2. Boot Solaris.r
    r WARNING! Continuing will destroy any partitions that are on this drive.r r
3. Create a disk geometry file for Solaris.r
    r WARNING! EXCEEDING 16383 CYLINDERS WILL LOCK-UP YOUR DISK DRIVE.r

    r Our formula: x * y * z = s.r Where x is the number of cylindersr (x cannot exceed (2**14) - 1 = 16383),r y is the number of heads,r z is the number of sectors per track,r and s is the total number of sectors available on the drive.r By setting y = 1, we get the following:r
    r x * 1 * z = s, or x * z = s. By further setting x = 16383,r we get: 16383 * z = s.r

r Solve for z (number of sectors per track): z = s / 16383.r For example:r

r Western Digital AC 418000 (18.2GB) - Total sectors = 35,239,680.r 35,239,680 / 16383 = 2150.99 = 2150r

r NOTE: All results must be rounded down. Solaris reserves threer cylinders, so making x smaller would end up wasting space.r

r Create a file called "geometry" like the followingr (using our example above) where NSECT is the value solved for z (2150):r r

```
r
* Label geometry for device /dev/rdsk/c0d0p0r
* PCYL     NCYL     ACYL     BCYL     NHEAD NSECT SECSIZr
  16383    16383    2        0        1     2150  512r
```

r r r
4. Run fdisk in Solaris using the new geometry file:r

   r `fdisk -S geometry -I /dev/rdsk/c1d0p0`r

   r Replace "/dev/rdsk/c1d0p0" with your raw disk devicer (The trick is to let fdisk ignore the geometry reported by ther BIOS and use the geometry specified in file "geometry" instead).r r
5. From here on, you can format, partition, and make filesystems onr the drive in the usual manner.r

r r

r For details see the fdisk(1M), prtvtoc(1M), and fmthard(1M) man page.r

r [Thanks to Pete Howell and Jürgen Marenda]r

r r

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r

r (5.9)r How do I install or use the "2 of 2" installation CD?r

r For Solaris 8 or 9,r the "2 of 2" CD has the "man" pages and less frequently installedr packages than the "1 of 2" CD.r The "2 of 2" CD is not bootable.r During installation,r leave the "1 of 2" CD in the tray and switch the BIOS from CD tor HD during reboot. The WebStart progress meter is inaccurate andr can catch you unprepared if you are using auto-rebootr (I recommend to not use the WebStart CD and install with the "1 of 2" CD).r The ASCII progress meter, from the "1 of 2" CD is fine.r After rebooting, if the "1 of 2" CD is in the tray then the systemr will eject it and ask for "2 of 2" CD.r r Otherwise use the trivial manualr installation procedure given in the "Release Notes", the little whiter book that came with the CD's.r Or use `/usr/sbin/pkgadd` to install individual packages.r r

r Solaris 10 uses a different method.r Use type 4, "Solaris Interactive Text (Console session)."r r

r [Thanks to Paul Karagianis]r r r

---

r

r (5.10) How do I install or use the documentation CD?r

r The AnswerBook documentation CD that comes with Solaris is is very useful.r To use it with Solaris 8, you have to run the Answer Book 2 Server cd.r To do this, run the ab2cd script on the CD as root. For example:r `cd /cdrom/sol_8_doc/; ./ab2cd`r Then open your browser and enter the URLr
http://localhost:8888/r
r [Thanks to Daniel Chirillo & Dave Uhring]r

r r r

r

r (5.11) Help! I get a "No VTOC" or cannot mountr error installing Solaris.r

r "VTOC" is a disk volume table of contents.r That is, it describes Solaris disk slices and, for Solaris x86, residesr at the start of the Solaris fdisk partition.r The VTOC contains information on Solaris slices within ther Solaris fdisk partition.r r

r If you get a message similar to one of these:r "Can't open -- No VTOC" or "can't open - no hsfs VTOC"r you've probably told the install program the wrong location of ther installation CD.r A common error during installation is answering this question wrong:r "Select one of the identified devices to boot the Solaris kernel."r What it's really asking is the location of the Solaris installation CD,r **not** where you're planning on installing Solaris on the hard disk.r r

r Also, make sure to remove the CD before rebooting.r

r For other installation hints, seer r http://www.execpc.com/~keithp/bdlogsol.htmr r
r [Thanks to Keith Parkansky]r r

r

r (5.12)r Help! Install hangs at "Discovering additional network configuration"r

r Solaris 10 appears to be looking for some a Solaris JumpStart server, whichr isn't there.r It appears to "hang" forever if it can't find one.r One possible cause is if there is another NIC present, with the wrongr NIC being used in booting.r The workaround is to remove or disable all NICs except the one being usedr to install (including NICs integrated in the motherboard).r

r Another workaround is tor wait around for the "Accept Initial Configuration" screen.r Before it times out in 30 seconds, select "Edit the Configuration,"r even if you're not making any changes, and save the configuration.r Do **not** "test" the configuration--that may hang.r Run kdmconfig after Solaris is installed to get X working.r The installation may continue.r

r A last workaround is to install using type 4,r "Solaris Interactive Text (Console session)".r This option does not start X, so avoids any X mis-configuration problems.r Use kdmconfig after installation to get X working orr to change configurations.r r r

r

r (5.13)r Can I just buy a Solaris x86 system instead of installing it myself?r

r Yes, of course—Sun will gladly sell you hardware.r It will save you time, at the expense of money.r I suggest a Sun Java Workstation with a AMD Opteron 64-bit processorr and Java Desktop System softwarer as an entry-level system.r Currently, it's under $2000 US.r Server blades are also available.r See http://store.sun.com/r for details.r r

---

r

r (5.14)r What's the difference between a Solaris HW and Update release?r

r A HW release (for example Solaris 10 HW2) only adds support for specific hardware platforms.r They are only fully tested for the new platforms that's being supported.r A Update release (for example Solaris 10 06/06) contains hardware updatesr along with bug fixes and new features.r If you only want recommended and security fixes, use the Recommended and Security Patch cluster (which requires a service contract) or download individual patches (free).r r

r [Thanks to Alan Coopersmith]r r

---

r

r (5.15)r How can I use GRUB to boot Solaris/x86?r

r Starting with Solaris 10 06/06, Solaris uses GRUB to boot directly.r That means you can have multiple instances of Solaris and other operatingr systems. Note that Linux GRUB cannot yet boot directly to Solaris (although Linux GRUB can chainload to Solaris GRUB).r Also, Solaris GRUB can boot to Solaris or non-Solaris operating systems.r For more info, see ther r Solaris GRUB FAQr atr http://www.sun.com/bigadmin/features/articles/grub_boot_faq.htmlr r

r Here's an example for GRUB's, a GNU bootloader popular with Linux.r To use, add something like this to file `/boot/grub/grub.conf`:r r

```
r
# Solaris 10 FCS, or Solaris 9 or earlier:r
title Chainload from Linux to Solarisr
        rootnoverify (hd0,1)r
        makeactiver
        chainloader +1r
```

r r

r With Solaris 10 Update 1, GRUB is integrated int Solaris x86.r Grub is configured during installation or by bootadm.r The following `/boot/grub/menu.lst` entry can be used withr Solaris GRUB, but not Linux grubr (until it's updated with the new Solaris-specific stuff):r r

```
r
# Solaris 10 U1 or later:r
title Solaris 10U1r
        root (hd0,2,d)r
        kernel /platform/i86pc/multibootr
        module /platform/i86pc/boot_archiver
```

r r Numbers are relative to zero for GRUB.r That means "hd0, 1" is the first hard disk's second partition.r Use "hd0, 0" for the 1st partition, "hd0, 2" for 3rd, and "hd0, 3" for 4th.r "makeactive" tells GRUB to make the Solaris partition active before booting,r as Solaris won't boot if its partition isn't the active partitionr (don't use

"makeactive" with MS Windows, as it will then only boot MS Windows).r

r If the GRUB loader isn't installed or if it's removed after installingr another OS (such as Solaris or MS Windows), run `/sbin/grub-install`r on your boot disk (e.g., `/sbin/grub-install /dev/hda`).r r

r [Thanks to Mariusz Zynel and BigAdmin]r

r r

---

r (5.16)r How can I use GRUB to boot multiple instances of Solaris/x86? *r r

r First, you can install Solaris on multiple times on a Solaris partition.r Each time, use a different slice.r You can have up to 9 slices, 0 - 9 (or a - j).r Slice 0 (a) is traditionally used for root, 1 (b) for swap space,r 2 (c) is reserved for the entire Solaris partition,r and 7 (i) is typically for /export/home.r So, that leaves slices 3 (d) - 6 (h), 8 (j), and 9 (k).r After installing Solaris in another slice, add entries similar to the following (depending on the slice(s) you've used).r Change (hd0,0,a) as appropriate: change hd0 to hd1 if this is the second disk, change ",0," to 1-3 if this is the 2nd-4th disk partition, and change "a" to a through i for the Solaris disks slice:r

r r

```
r
title Solaris Slice 0-Ar
        root (hd0,0,a)r
        kernel$ /platform/i86pc/kernel/$ISADIR/unixr
        module$ /platform/i86pc/$ISADIR/boot_archiver
r
title Solaris Slice 3-Dr
        root (hd0,0,d)r
        kernel$ /platform/i86pc/kernel/$ISADIR/unixr
        module$ /platform/i86pc/$ISADIR/boot_archiver
r
title Solaris Slice 4-Er
        root (hd0,0,e)r
        kernel$ /platform/i86pc/kernel/$ISADIR/unixr
        module$ /platform/i86pc/$ISADIR/boot_archiver
```

r r For Solaris 10 (instead of Solaris Nevada or OpenSolaris), use these lines instead of kernel$ and module$:r

```
r
        kernel /platform/i86pc/multibootr
        module /platform/i86pc/boot_archiver
```

r r r

---

r (5.17)r How do I use Live Upgrade? *r r

r With the lu* commands. Solaris Live Upgrade (LU) allows one to clone the current "Boot Environment" (BE), which in the most simple case is the root filesystem.r Then with LU, you can upgrade the cloned BE without rebooting. Only after LU is complete do you need to reboot—reducing downtime.r Here's a simple example:r r

r

```
lucreate -m /:/dev/dsk/c0d0s4:ufs -n second_rootr
lustatusr
luupgrade -u -n second_root -s /media/SOL_11_X86r
lustatusr
luactivate second_rootr
lustatusr
```

r r First lucreate clones the root filesystem (current BE) to another slice on c0d0s4.r Then luupgrade upgrades the BE "second_root" from a Solaris install DVD.r Then luactivate activates it for the next boot, and lustatus shows the current status of the BEs.r Before running LU, make sure you're up to date on your Solaris patches. See InfoDoc 72099 at r http://sunsolve.sun.com/r For disaster recovery, copy and print the recovery information printed by the luactivate command and save a copy of the /boot/grub/menu.lst file.rr r

r For more information, see:r

> r
- r r http://blogs.sun.com/DanX/entry/simple_live_upgrade_example_forr Simple LU example (my blog entry)r r

> r
- r r http://www.sun.com/software/solaris/howtoguides/liveupgradehowto.jspr Solaris Live Upgrade How-To Guider

> r
- r r http://www.sun.com/bigadmin/features/articles/live_upgrade.htmlr is a BigAdmin article on LU by Amy Richr r

> r
- r

rr r

r

r

r

r

r r r r r r r r r r

r (6.0) POST-INSTALLATION (CUSTOMIZATION)r

r (6.1) How do I add additional drives?r

r First, you must have Solaris scan for the new drive.r Become root and type: "touch /reconfigure; /usr/sbin/shutdown -i6"r This rebuilds the /devices/ and /dev/ directories.r r

r ATAPI and SCSI the drives are already low-level formatted. If you wish tor format a SCSI you can use `/usr/sbin/format` that comes with Solaris.r A second drive install would use format.r

r To create and use a filesystem:r

- r
- Select the diskr
- `/sbin/fdisk` (select the whole disk or partial for format)r
- Write the label with the "label" option partition, check the partitionr arrangementr
- Create a filesystem with `/usr/sbin/newfs` on the drive.r E.g. "`newfs /dev/rdsk/c0t1d0s0`"r creates a filesystem on the the whole drive with SCSI ID 1.r
- Create your mount point directory, if it doesn't exist.r For example, `mkdir -p /local`r
- mount the partition on your favorite mount point directory.r For example,r `mount /dev/dsk/c0t1d0s2 /local`r mounts slice 2 of disk 0 of SCSI ID 1 of SCSI controller 0r at `/local`.r
- Add a line to your `/etc/vfstab` file.r See the vfstab man page for details.r For example:r
  r`/dev/dsk/c0t1d0s2 /dev/rdsk/c0t1d0s2 /local ufs 1 yes -`r

r

r [Thanks to Bob Palowoda's FAQ and Sonny Leman]r

r r

---

r

r (6.2) How do I add or configure users, printers,r serial ports, software, etc.?r

r Use Solaris Management Console (/usr/sadm/lib/smc/bin/smc) from X Windows.r Unfortunately, because of its complexity and dependence on Java,r smc is often broken and can't be accessed.r It's pretty good when it works though.r An alternative are several command line programs in /usr/sbin and /sbin,r such as lpadmin, stty, and useradd.r For "Keyboard Display or Mouse" setup (for the console/monitor) user kdmconfig in single-user mode.r

r r

---

r (6.3) How do I suppress the banner page on my printer?r

r To disable the banner pages permanently perform one of the following steps:r

r

- r
- /usr/sbin/lpadmin -p QUEUENAME -o banner=neverr

- r
- The new Solaris Express printmgr banner selection has a pulldown menu withr "always", "never", and "user selectable"r

rr

r [Thanks to Norm Jacobs]r

r r

r

r (6.4) How do I set up an HP-compatible printer to printr PostScript files?r r

r Solaris 8 has this ability withr Print Manager, `/usr/sadm/admin/bin/printmgr`,r Note that
higher-end HP printers (e.g., LaserJet IV)r support PostScript directly.r Also,r Michael Riley reminds us that
EPP and ECP printer modes are unsupported.r r

r Before you do any of this, try printing a plain text filer (such as `/etc/motd`)r to the printer.r

r r

r John Groenveld provides the following instructions for Solaris 8.r It assumes you have a workingr
Ghostscript with a driver for your printer and that it's attached tor `/dev/lp1` (`/dev/lp0` on some
systems).r With Solaris 8, USB printers are assigned logical device namesr `/dev/printers/[0..N]`r
The printer queue in the example below is called "`lj6l_ps`"r

r r

```
r
# Test your driver:r
# (gs may be in /usr/csw/bin/gs, /usr/local/bin, or /opt/gnu/bin, dependingr
# on who built the Solaris package)r
/usr/csw/bin/gs -q -dSAFER -dBATCH -dNOPAUSE -sDEVICE=laserjet \r
        -sOutputFile=/dev/lp1 /opt/csw/share/ghostscript/examples/alphabet.psr
r
# Create the printer filter definitionr
# (the "Command:" line is 1 line--it may be broken up below):r
cat > /etc/lp/fd/laserjet.fd <<eofr
Input types: postscriptr
Output types: laserjetr
Printer types: anyr
Printers: anyr
Filter type: fastr
Command: /opt/csw/bin/gs -q -dSAFER -dBATCH -dNOPAUSE -sDEVICE=laserjetr
-sOutputFile=- -r
eofr
r
# Test:r
/usr/ucb/lpr -Plj6l_ps -h /opt/csw/share/ghostscript/examples/alphabet.psr
r
# Add the filter name to the filter table:r
chown lp:lp /etc/lp/fd/laserjet.fdr
chmod 664 /etc/lp/fd/laserjet.fdr
lpfilter -f laserjet -F /etc/lp/fd/laserjet.fdr
r
# Configure the printer to use the LaserJet filter:r
lpadmin -p lj6l_ps -I laserjetr
r
# Stop the data stream to the printer from being modified:r
lpadmin -p lj6l_ps -o stty="-opost"r
r
# Enable the printer to accept jobs:r
```

r r r Detailed Contentsr r   39

```
accept lj6l_psr
enable lj6l_psr
r
# Retry (if needed):r
# If something goes wrong (such as using an incorrect command pathr
# in laserjet.fd), try deleting the printer destination and starting overr
# after making your corrections:r
lpadmin -x lj6l_psr
lpadmin -p lj6l_ps -v /dev/lp1 -o nobannerr
```

r r

r After it's working you may want to set the default printer with ther LPDEST and PRINTER environment variables in yourr startup script (~/.login or ~/.profile) and with `"lpadmin -d"`r r

r Update: Norm Jacobs adds:r Solaris 9u6 and later contain a number of open source packagesr including Foomatic, Ghostscript, gimp-print, hpijs,r and some changes to the printmgr to make this considerably easier.r If you turn on "command logging", in the tool from the file menu,r you can see the lpadmin command that is used.r r

r Another solution is Common UNIX Printing System (CUPS), which implements ther Internet Printing Protocol (IPP),r RFC 1179.r IPP standardizes printing of multiple document formats.r CUPS provides System V and BSD (lp & lpr) interfacesr and supports PostScript with a modified version of Ghostscript.r For Solaris x86 binaries and documentation, seer http://www.cups.org/r See also the question below in this section on easy-to-use printing solutions.r For configuring and enabling CUPS with Solaris 10, see my blog article atr r http://blogs.sun.com/DanX/entry/using_cups_print_server_forr r

r [Thanks for additional comments from Mark Francis Villa]r r r

r

---

r

r (6.5) How can I improve disk and graphic performance?r

r Disk Performance (iozone)r

r A typical iozone test with 10 to 20 MB sequential file will give aboutr 2 MB/sec. read/write on a 50 MHz ESIA system on a Maxtor 540SL (8.5 ms)r drive with an Adaptec 2740 controller. You'll get a little betterr performance from a 90 MHz Pentium system. A fully thrashed system willr see writes down to about 1 MB/sec. I noticed that the NCR 810/825, etc.,r seem a little more peaky in the performance specially on the PCI bus.r

r If you're using a fast wider SCSI controller such as the Adaptec 2940, use a wide SCSI drive for ther system drive.r These drives usually have double the throughput of ther normal 8-bit drives, according to the iozone benchmark results, and theyr make the tmpfs fly.r

r Note: If you're using high speed spindle drivers for yourr boot driver, like 5400 and 7200 RPM drives, you may want to user "set maxpgio=60" for the 5400 RPM drive orr "set maxpgio=80" for the 7200 RPM drivesr in your /etc/system file.r This causes the schedpaging to be more efficient.r Enable by typing `"touch /reconfigure; /usr/sbin/shutdown -i6"`r r

[Andrew Gabriel adds for ATAPI: Read about `drive0_block_factor` and `drive1_block_factor` in `/platform/i86pc/kernel/drv/ata.conf` (man -s 7D ata). Even my oldest ATAPI drives support `drive0_block_factor=0x10` without any trouble.]

Starting with Solaris 8, DMA is disabled for ATAPI devices, as it caused installs to fail for several BIOSes. For Solaris 10, it is enabled, at least for me. It can be enabled with the "ata-dma-enabled" property from the GRUB menu (`-B ata-dma-enabled=1`) After installation, you can also change this line in file `/boot/solaris/bootenv.rc`:

`setprop ata-dma-enabled '1'`

If you do this and you have a buggy motherboard chipset, your system won't boot. This happened to me. You can recover by booting in recovery mode and mounting the root filesystem (see the answer in this FAQ about recovering from forgotten root passwords). Buggy chipsets include those with the VIA chipset and ASUS PA5 motherboards. For more details, see the Solaris 8 Intel *Release Notes*.

Graphic Performance (xstone) Xstones is a little more of a subjective measurement of graphics performance. The comp.unix.x.i386 newsgroup keeps up on the latest xstone performance on graphics cards for PC's.

[From Bob Palowoda's Solaris 2.4 x86 FAQ]

(6.6) + How do I get Solaris to recognize a NE2000 compatible NIC card?

NEI is the driver name for the Novell/Eagle 2000-compatible family of NIC cards. The driver is disabled by default because probing for it causes problems with other cards (it sometimes locks the system up). If this card is "Plug and Play," you should first disable it and configure the card manually, if possible. Don't use DCA probing for ne2000: it may disrupt recognition of or access to other devices (in my case, it was keyboard :-). So, you have to modify file `/kernel/drv/nei.conf` to include I/O ranges, interrupts (1 line per card). For example:

```
name="nei" parent="isa" reg=1,0xf600,0x1f interrupts=11;
```

Where name, "`nei`," is what will show up in /dev. The parent, "`isa`," is what bus type to use. The term ISA is misleading as it includes PCI bus (To Solaris, it's either "`sysbus`," the SPARC system bus, or "`isa`," meaning not SPARC sysbus). The "`1`" is a flag meaning that I'm going to specify I/O port ranges, rather than memory offsets, 0xf600 indicates the beginning I/O address, in hex, and 0x1f is the size of the I/O range, in hex. The "`interrupts=11`" indicate IRQ 11, in decimal. Thus, I have a PCI NE2000-compatible card, set to base I/O addresses 0xf600-0xf61f, IRQ 11. As an exercise, decode this example for a real NE2000 card:

```
name="nei" parent="isa" reg=1,0x220,0x10 interrupts=10;
```

r You have to add a `/etc/hostname.nei0`r file with the IP address or hostnamer (if you use IPv6, also add `/etc/hostname6.nei0`).r Add a line to `/etc/hosts`.r For example:
r

```
r
10.1.1.1        foo.bar.com foor
```

r

r Check the settings, as root, with "`/usr/sbin/drvconfig -i nei`".r Next, as root, type "`touch /reconfigure; /usr/sbin/shutdown -i6`"r After rebooting, typer "`ifconfig nei0 plumb`"r to make sure the device was recognized.r It should show up in the output from typing "`prtconf`".r For further details see Sun FAQ 1105-02 atr r http://access1.Sun.COM/cgi-bin/rinfo2html?110502.faqr and the Solaris System Administrator Guide, available atr http://docs.Sun.COM/.r

r The NE2000 driver is not included with Solaris 8r (perhaps Sun thought it was ISA-card only),r but the driver files for Solaris 7, nei and nei.bef, can be used instead,r as follows (although it's not officially supported for Solaris 8):r r

- r
- You do not need the real-mode driver file, nei.bef,r unless you want to install with the NIC enabled.r File nei.bef is available by downloading the DOS-format DCA disketter for Solaris 7 fromr r http://www.sun.com/bigadmin/hcl/drivers/dca_diskettes/r and copying file /solaris/drivers/nei.bef file from the DOS-format DCAr diskette.r
- File `/kernel/drv/nei` is available fromr r ftp://ftp.sun.drydog.com/pub/solaris/nei-i86pc-solaris5.7.zipr Download in binary mode and extract with unzip.r r
- You must also create a `/kernel/drv/nei.conf` text file,r even if it only has #-comments or empty linesr (see above for an example).r
- Add the driver with: "`add_drv /kernel/drv/nei; devlinks`"r

r r

r If you have a Realtek RTL8139 or 8130 10/100 NIC,r which is one of the more popular and low-cost PCI NICs,r you can get a Solaris x86 driver from the manufacturer atr http://www.realtek.com.tw/r (click on "Download", "Network ICs").r r r

r [Thanks to Iram Peerbhai, Martin, Youri Podchosov, Alex Selck,r and Vincent Cheng]r

r r

r

r (6.7)r How do I get Solaris to recognize generic network cards withr well-known chipsets?r

r r

r There are many new ethernet cards available at major retailers for under $20r using well-supported chipsets. Unfortunately, the cards on the Solaris HCLr have been out of production for quite some time -- particularly the Intelr cards.r I was amazed how difficult it is to find hardware on the Solaris HCL.r r

r First, save yourself a lot of trouble and see if there's a driver for yourr card somewhere.r See if the card is listed on the Hardware Compatibility List (HCL)r for the latest Solaris Maintenance Update (MU).r The HCL is atr r http://www.sun.com/bigadmin/hcl/r I've had good luck with Intel NICs.r Check for new and third-party drivers atr http://www.Sun.COM/io_technologies/.r Also check to see if there's a patch supporting your card atr http://sunsolve.Sun.COM/r r

r A list of third-party drivers (mostly from hardware vendors) for Solaris x86r is atr r http://www.sun.com/io_technologies/ihv-drivers.htmlr r

r If you have a Linksys LNE100TX or other NIC card, it may be supportedr by one of Garrett D'Amore's Ethernet drivers.r See r http://sol-enet.sourceforge.net/r r

r More free Solaris NIC drivers are provided by Masayuki Murayama atr r http://homepage2.nifty.com/mrym3/taiyodo/eng/,r r r

r If there's no driver found above, here's what to do:r r

r

r

1. Install the card and watch the computer boot. Look for the list ofr devices in the BIOS summary screen. Write down the two 4-digit numbers.r For the Intel card it was 8086 1030, the PCI/PnP vendor and device ID forr the InBusiness card.r r
2. Boot into Solaris. Open the `/boot/solaris/devicedb/master`r file and look for the vendor ID you wrote down.r In this example, the vendor ID is 8086 for Intel.r Look through the file for devices that closely fit ther description of your device under the vendor ID. One of them for this cardr happens to be iprb for the Intel 82559 chipset which is listed as:r
   r `pci8086,1029 pc8086,1029 net pci iprb.bef "Intel Pro 100/B Fast Ethernet"`r r
3. If you're confident that you have a reasonable match, add a new line tor this file that uses the vendor ID and device that you wrote down:r `pci8086,1030 pc8086,1030 net pci iprb.bef "Intel 82559 You Bonehead"`r r
4. Open the `/etc/driver_aliases` file and add a line for the card:r
   r `iprb "pci8086,1030"`r r
5. Type `"devlinks"`. Type `"touch /reconfigure"`. Restart.r Hit ESC in ther the Device Configuration Assistant phase of the boot process and ask it tor scan for new devices. It should find your device and display the name your typed in in step (3) above. This step is crucial--the DCA step in the bootr process is where some important magic happens.r r
6. Once the system is finished booting, note the magic appearance ofr `/dev/iprb` (or whatever your device is called) and experience joy.r Type `"ifconfig iprb0 plumb"` to wake it up. Edit a file calledr `/etc/hostname.iprb0` and put your hostname into it.r (if you use IPv6, also add `/etc/hostname6.iprb0`).r Type `"touch /reconfigure"`r just for good measure and restart a final time.r If you are using OpenSolaris ("Nevada") with the hostname.* files,r make sure servicer network/physical:default is enabled and network/physical:nwam is disabledr with svcadm(1M), otherwise the hostname.* files are ignored.r Or you can leave NWAM enabled and configure your interface with filer `/etc/nwam/llp`. Here's a sample llp file:r

   r iprb0 static 192.168.88.111r
   iprb1 dhcpr

   r r

r r

r As another example, these entries (in `/etc/driver_aliases` andr `/boot/solaris/devicedb/master`) support both the 905C and 3C980 card,r using the elxl driver:r

```
elxl "pci10b7,9200" elxl "pci10b7,9800"r
pci10b7,9200 pci10b7,9200 net pci elxl.bef "3Com 3C905C-TX-M El XL 10/100"r
pci10b7,9800 pci10b7,9800 net pci elxl.bef "3Com 3C980-TX El Server 10/100"r
```

r r

r Finally, here's a partial list of the sub-$20 cards and their chipsets, butr I am still looking for the proper driver for the super-cheap 100baseTr chipsets from Realtek and Macronix as used by some Dlink, Hawking, Netgear,r and Linksys cards.r r

   r
- **dnet:** SMC, Sohoware, "tulip"r
- **iprb:** Intel (most)r
- **nei:** 10baseT NE2000 clones on the PCI bus (Linksys, AT/LANTIC)r

r r

r Another good set of instructions, particularly for newer generationsr of supported NICs, is atr r http://solaris-x86.org/documents/tutorials/network.mhtmlr which is based on Keith Parkansky'sr r http://my.execpc.com/~keithp/bdlogsol.htm#installr r

r [Thanks to Casper Dik, Bruce Adler, and Kriston]r

r r r

---

r

r (6.8) How do I change the IP address or hostnamer or both on Solaris/x86?r

r See the instructions in "`man sys-unconfig`"r Basically, sys-unconfig unconfigures the machine to make it ready tor be configured again on reboot. It's a lot easier and less error prone thanr the usual dozen or so steps required to purge the old IP address.r

r Solaris 8 FCS: sys-unconfig is seriously broken for Solaris 8 FCSr (2/2000) and will make your system unbootable.r If you use it make sure you have a later HW update of Solaris 8 orr that you apply x86 patch 109319.r Use "`showrev -p`" to confirm you have this patch.r

r For the thrill-seekers among us, you can also do it "by-hand"r by editing these files (possibly more?) with your fav. editor:r

r

```
r
/etc/defaultdomain      Set the default NIS domain name, if any, if it changed.r
/etc/defaultrouter      Set the default router's IP address, if it changed.r
/etc/hostname.le0       (change le0) Update if the hostname changed.r
```

```
/etc/hostname6.le0      (change le0) Ditto, if you use IPv6.r
/etc/dhcp.le0           (change le0_ Touch [or remove], if [not] using DHCPr
/etc/hostname6.ip.tun0  Update if you use a IPv4/IPv6 tunnel (e.g., 6bone)r
/etc/nodename           Update if the hostname changed.r
/etc/nsswitch.conf      Update if your name resolution method/order changed.r
                        Copy /etc/nsswitch.dns to /etc/nsswitch.conf if your
                        use DNS instead of (rarely used) NIS.r
/etc/resolv.conf        Update if your name servers/domain changed (DNS only).r
/etc/inet/hosts         Make sure your IP address is updated or added here.r
                        List your FQDN is first, before the short hostname.r
                        E.g., "192.168.128.64 foo.bar.com foo"r
/etc/inet/ipnodes       IPv6 version of hosts file (Solaris 8+).r
/etc/inet/netmasks      Set your network number & netmask, if it changed.r
/etc/inet/networks      Set your network name, if it changed.r
/etc/net/ticlts/hosts   For the streams-level loopback interface.r
/etc/net/ticots/hosts   For the streams-level loopback interface.r
/etc/net/ticotsord/hosts For the streams-level loopback interface.r
```

r r

r Finally, use the `hostname` to set the hostname until the next reboot.r To verify you changed all the files, type this as root:r `find /etc -type f -print|xargs grep \`hostname\``r

r

r Note that for OpenSolaris (Nevada), `/etc/hostname.*` files are ignoed if NWAM (Network Automagic) is enabled, SMF service, `svc:/network/physical:nwam`). NWAM uses svc:/network/location:<interface> to specify the hostname or IP adress. To use the old hostname.* files, disable nwam with `svcadm disable` and enable r tt>svc:/network/physical:default instead.r

r

r [Thanks to Parthiv Shah, Vijay Brian Gupta, Michael Wang, and Igor Sobrado,r Chad Treece]r

r r

---

r

r (6.9) How do I configure another serial port, /dev/ttyb-ttydr (COM2-4)?r

r Solaris 2.6 and above configures the second serial port automatically.r If you just added a serial port type the following:r
r `touch /reconfigure; /usr/sbin/shutdown -i6`r

r If the serial port isn't present after rebooting,r follow these instructions:r

r For Solaris 10, use `sacadm`.r For Solaris 7 - 9, use `admintool`r and select "Browse-->Serial Ports."r r

r If the steps above don't work,r perform the following as root to add the second serial port.r For other serial ports and internal modems follow the same steps butr change the appropriate line in ther `/kernel/drv/asy.conf` file.r r

    r
- r Save a copy of filer `/kernel/drv/asy.conf` to, say,r `/kernel/drv/asy.conf.orig`r

- Edit file `/kernel/drv/asy.conf` to read:

```
interrupt-priorities=12;
name="asy" class="sysbus" interrupts=12,4 reg=0x3f8,0,0 ioaddr=0x3f8;
ignore-hardware-nodes=1;
name="asy" class="sysbus" interrupts=12,3 reg=0x2f8,0,0 ioaddr=0x2f8;
```

  and save.

- Type "`touch /reconfigure`"
- Type "`/usr/sbin/shutdown -i6`" to restart the system.
- After you get a message saying syncing file systems and no more [N] characters appear, turn your machine off and then turn it on again.
- Verify the device is present with "`ls -l /dev/ttyb`"
- For details and for COM3 and COM4 instructions, see http://access1.Sun.COM/cgi-bin/rinfo2html?228402.faq

[Modified from Bruce Riddle's Solarisx86 2.5/Dialup PPP Configs FAQ; updates from Michael Wang]

(6.10) How do I disable Solaris/x86 from probing the UPS on COM2?

With the following command, ran as root:

```
# eeprom com2-noprobe=true
```

This (undocumented) option to the eeprom command disables boot-up timer probing of COM2 (apparently done to detect modems). The eeprom command alters the Solaris boot sector. If the UPS is connected to a serial port during boot-up time, the UPS may go into self-test or shutdown or recalibrate. An alternate solution is to disconnect the serial cable during booting. With the obvious change, this also works for COM1. See also BugID 4038351.

[Thanks to Andy I. McMullin and John D. Groenveld]

---

r r

r (6.11) How do I configure and use pppd?r

r PPPD has shipped with Solaris since Solaris 8.r For older versions of Solaris, ther binary and source is available from Peter Marelas atr http://www.phase-one.com.au/solaris-x86/pppd/r PPPd 2.3.5 is compiled for Solaris 7 but works for more recent Solaris versions.r More recent versions of PPPd are not required but are availabler (source only) fromr r ftp://cs.anu.edu.au/pub/software/ppp/r Follow instructions in file README.sol2 to compile.r r

r To use PPPD follow the instructions in ther *System Administration Guide: Resource Management and Network Services*r atr http://docs.sun.com/r or follow these directions below.r r

r PPPD Configurationr

r To configure, you set up a chat script to handle the ISP dialog andr enter the phone number and other parameters in the pppd options file.r Examples I use are below (files are in /etc/ppp unless otherwise mentioned).r

r I removed files chap-secrets and pap-secrets, as I don't need them forr my ISP. File connect-errors has error output, if any, from bad connections.r r

r File `/etc/ppp/ip-down`:r

```
r
#!/usr/bin/shr
# Turn off IP forwardingr
/usr/sbin/ndd -set /dev/ip ip_forwarding 0r
```

r r r

r File `/etc/ppp/ip-up`:r

```
r
#!/usr/bin/shr
# Turn on IP forwardingr
/usr/sbin/ndd -set /dev/ip ip_forwarding 1r
```

r r r

r File `/etc/ppp/ppp-on`:r

```
r
#!/usr/bin/shr
# Set up a PPP linkr
PEER=myispr
LOCKDEV=ppp0r
#PPPDOPTS=-d # uncomment for debuggingr
if [ -f /etc/ppp/$LOCKDEV.pid ] ; thenr
    echo "PPP device $LOCKDEV is locked"r
    exit 1r
fir
/usr/local/bin/pppd $PPPDOPTS call $PEERr
exit 0r
```

r r

r File `/etc/ppp/ppp-off`:r

```
r
#!/usr/bin/shr
# /etc/ppp/ppp-offr
# Shutdown a PPP linkr
LOCKDEV=ppp0r
# If the ppp pid file is present then the program is running. Stop it.r
if [ -r /etc/ppp/$LOCKDEV.pid ] ; thenr
        kill -INT `cat /etc/ppp/$LOCKDEV.pid`r
        # If unsuccessful, ensure that the pid file is removed.r
        if [ ! "$?" = "0" ] ; thenr
                echo "removing stale /etc/ppp/$LOCKDEV.pid file."r
                rm -f /etc/ppp/$LOCKDEV.pidr
                exit 1r
        fir
        # Success. Terminate with proper status.r
        echo "ppp link $LOCKDEV terminated"r
        exit 0r
fir
echo "ppp link $LOCKDEV is not active"r
exit 1r
```

r r

r File `etc/ppp/peers/myisp`:r

```
r
cua1            # modem is connected to /dev/cua1 (cua0 may be a serial mouse)r
115200          # bits per second (use 38400 or 57600 if this doesn't work)r
lock            # Use a UUCP-style lock to ensure exclusive accessr
crtscts         # use hardware flow controlr
noauth          # don't require the ISP to authenticate itselfr
modem           # modem control liner
passive         # wait for LCP packetsr
connect '/usr/local/bin/chat -v  -f /etc/ppp/peers/chat-myisp'r
noipdefault     # remote PPP server must supply your IP address.r
                # Remove if the remote host doesn't send your IP duringr
                # IPCP negotiation and uncomment the next:r
#204.94.88.94:  # our ip address:gateway address (both are optional)r
defaultroute    # use the ISP as our default router
```

r r r

r File etc/ppp/peers/chat-myisp:r

```
r
ABORT "NO CARRIER"r
ABORT "NO DIALTONE"r
ABORT "ERROR"r
ABORT "NO ANSWER"r
ABORT "BUSY"r
ABORT "Username/Password Incorrect"r
"" "ATZ"r
OK "ATDT555-2871"r
CONNECT ""r
"ogin:" "^Updan"r
```

r r r Detailed Contentsr r   48

```
"ssword:" "\qaardvark"r
```

r r

r The last two files require the most modification.r Make sure to remove read permission ("chmod go-r chat-*")r from chat-myisp, as it has your login and password information.r

r Messages go to /var/adm/messages.r A good PPP session should lookr something like this:r

```
r
Oct 24 22:47:49 dan.cts.com pppd[1439]: Connect: ppp0 <--> /dev/cua1r
Oct 24 22:47:50 dan.cts.com pppd[1439]: local  IP address 204.94.88.94r
Oct 24 22:47:50 dan.cts.com pppd[1439]: remote IP address 205.163.84.83r
Oct 24 23:08:52 dan.cts.com pppd[1439]: Connection terminated.r
```

r

r Your "netstat -rn" output should have lines that look similar to this:r

```
r
  Destination          Gateway            Flags  Ref   Use   Interfacer
-------------------- -------------------- ----- ----- ------ ---------r
209.68.192.32        204.94.88.94         UH     1     1  ppp0r
default              209.68.192.32        UG     1     1r
```

r r

r Your "ifconfig ppp0" output should look similar to this:r

```
r
ppp0: flags=10008d1<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST,IPv4> mtu 1500 index 15r
        inet 204.94.88.94 --> 209.68.192.32 netmask ffffff00r
```

r r

r For debugging pppd, add the -d option after pppdr (in file ppp-on),r addr this line in /etc/syslog.confr (fields must be tab-separated):r

r

```
r
daemon.*        /var/adm/pppd.logr
```

r and restart syslogd withr /etc/init.d/syslog stop; /etc/init.d/syslog startr r

r Then, you get the chat script dialog captured to help isolate the problem.r Print out and read the docs mentioned above if you have problems.r

r Once the PPP link is working, you can enable DNS hostnames as follows:r First, Modify this line in /etc/nsswitch.conf to something like:r

r

r

```
hosts:      files dnsr
```

r

r Second, add lines similar to this in `/etc/resolv.conf`:r

r

```
r
search PutYourISPDomainNameHere.comr
nameserver 192.188.72.18r
nameserver 192.188.72.21r
```

r r

r For more information,r See "`man pppd`"r and "`man chat`" and the FAQ and SETUP files provided with pppd.r A helpful step-by-step guide is the Linux PPP HOWTO atr http://www.tldp.org/r The configuration file information is the same for Solaris, except changer tty references fromr

```
/dev/ttyS0 - ttyS4
```

to

```
/dev/cua0 - cua4
```

.r r r r r

---

r

r (6.12) Help! My "WinModem" doesn't work with PPP.r

r If it's a WinModem, you're out of luck--That only works with MS Windozer and then only with special drivers. It's missing critical UART hardwarer that's emulated in proprietary software and hardware interfaces.r WinModems (which run only on Windows)r are less expensive to manufacture because they don't includer a controller. Instead, they include proprietary drivers for Windowsr that offload processing to the CPU.r For some reason (tell me if you know?),r Internal PCI card modems all seem to be WinModems.r

r If you're using aspppd, supplied with stock Solaris, you can either switchr to another PPP product that works with USRobotics Internal Sportster modems,r such as Solaris PPP (not free) or PPPd (free, see above) or try this: (fromr Alan Orndorff's "Solaris x86 Resources,"r r http://www.solarisresources.com/):r r

r Modify your `/etc/uucp/Dialers` file in the following manner:r

r Add `P_ZERO`r to your modem definition string to set it to "no parity." E.g,r

r

```
r
hayes  =,-, ""   P_ZERO  ""r
\dA\pTE1V1X4Q0S2=255S12=255\r\c  OK\r   \EATDT\T\r\c  CONNECTr
```

r

r r

---

r

r (6.13) How do I configure Dynamic IP Addressesr (DHCP)?r r

r Create empty filesr `/etc/hostname.`*interface*r andr `/etc/dhcp.`*interface*r (instead of containing the IP address or hostname)r where *interface*r where *interface* is your Ethernet interface (e.g., `le0`).r for example, as root:r > `/etc/hostname.le0`r andr > `/etc/dhcp.le0`).r r

r If you are using PPP, do not specify an IP address in your pppd options filer and use ppp0 as the interface.r r

r In addition to the IP address, if you want the DHCP server to supply the hostname (normally not needed, as it should be in /etc/nodename), follow the steps in "DHCP Client Hostnames" in the *System Administration Guide* mentioned below.r r

r For more information, seer "DHCP" in the *System Administration Guide* "IP Services" chapter atr http://docs.Sun.COM/r andr r http://www.rite-group.com/consulting/solaris_dhcp.htmlr

r [Thanks to Bruce Riddle, Wyatt Wong, and Ed Ravin]r

r r

---

r

r (6.14) How do I configure my SoundBlaster or other sound card?r

r r

r If you have a SoundBlaster PCI card, downloadr Jürgen Keil's audio drivers atr r http://www.tools.de/solaris/audio/r It includes drivers for Soundblaster,r and Intel ICH and VIA AC97 integrated chipsets.r I've found it easy to use—just install the packages and reboot.r Philip Brown also has a and older version of Soundblaster driver,r which he worked on with Jürgen, which supports fewer devices.r It's atr r http://www.bolthole.com/solaris/sbpci/r r

r A commercial alternative to the above is to use 4Front Technologies'r Open Sound System (OSS). It's available for a free trial for about 10r days. After that, it's $30, but well-worth the savings in time. For cardsr newer than SoundBlaster 16/32/Pro, it's the only choice.r To use, download the tar.Z file fromr http://www.opensound.com/, extract,r and run the install menu ./oss-install and let it auto-detect the soundr card. Reboot (or at least sync), then run "soundon" to enable ther driver manually (see file oss/Readme for how to enable automatically).r OSS supports the widest variety of sound cards on Solaris.r Don't use both Jürgen's driver and OSS at the same time--remove one and reboot before you decide to install the other.r r

r The most difficult procedure is to use the Sun-provided sbpro driver.r It works only for old ISA SoundBlaster cards.r I recommend not doing this.r Instead, buy a sound card supported by Jürgen's, Philip's,r or OSS's drivers, instead of wasting your time.r

r To configure the old Sun sbpro driverr become root and type: `"touch /reconfigure; /usr/sbin/shutdown -i6"`.r If this works, you should see two links under `/dev/sound` andr be able to play .au files with audiotoolr r

r

r
1. Run "prtconf -pv" to print the current system configuration:r

r

r
```
        Node 0xf5a33500r
            compatible: 'pnpCTL,00E4,0' + 'sbpro'r
            dma-channels:  00000001.00000005r
            interrupts:  00000005r
            model:  'Audio'r
            name:  'pnpCTL,0045'r
            pnp-csn:  00000001r
            reg:  8e8c00e4.19f815e8.00000000.00000001.00000220.00000010r
              .00000001.00000330.00000002.00000001.00000388.00000004r
            unit-address:  'pnpCTL,00E4,19f815e8'r
```

r

r The device ID I want is CTL0045. This comes from the name line "pnpCTL,0045".r There were a couple of other 'pnpXXX,DDDD' devices. This was the only oner with the model "Audio".r

r
2. According to old Sun InfoDoc 15830,r I used "CTL,0045" from above and updatedr /platform/i86pc/boot/solaris/devicedb/master as follows (no comma):r

r

r
```
< CSC0000|PNPB002|PNPB003|CTL0031|ESS1681 sbpro oth all sbpro.befr
 "Sound Blaster"r
- ---r
> CTL0045|CSC0000|PNPB002|PNPB003|CTL0031|ESS1681 sbpro oth all sbpro.befr
 "Sound Blaster"r
```

r This is only an example. For Solaris 10, the CTL0045 entry is now present.r

r
3. Rebooted and rebuilt my devices:r

r
```
# touch /reconfigure; /usr/sbin/shutdown -i6r
```

r r

r
4. I also ran the Device Configuration Assistant (DCA) -- press Escape asr soon as the machine boots, it will prompt you -- just to verify that ther Sound Blaster showed up in the device list. It did as "Sound Blaster."r Since I ran the DCA boot will get the -r arg anyways.r

r

5. When I boot /dev/audio was present. Yeah! I am currently listening to ther Sunday Blues on real audio.r

r
6. r For more information, type "man sbpro."r

r r

r [Thanks to Park Byoung-Gi, Steve Krapp, Chris, Dave, Norma, Jürgen Keil,r & Philip Brown]r

r r

---

r

r (6.15) How do I enable the audio output from my CDROM to my SBPRO card?r

r Start audiocontrol then select "Record." Ha ha, "Record" really meansr "Sound Source ;-)." In the audiocontrol record window, selectr "Internal CD" (other choices are Microphone or Line in).r

r You must have audiocontrol running before starting your favorite CD playerr application.r You can use GNOME, CDE, or open source players, such as xmcd.r Robert Muir reports you can use this from the command line (non-X):r
r `audiorecord -p internal-cd /dev/null &`r

r [Thanks to Eugene Bobin and Robert Muir]r

r r

---

r

r (6.16) Can I use Solaris/x86 to setup a "headless" server?r

r The answer is yes, it can be done, but it's BIOS dependent, since manyr BIOS chips won't boot up the system without the keyboard and video card.r The console can be configured to go to serial ports as described below.r Removal of video card is also BIOS dependent.r Setup steps:r

r 1. Set the serial line's Carrier Detect (CD) to HIGH and (for 2.6 only)r set the serial line's Data Set Ready (DSR) to HIGH. If you don't--itr won't boot. This can be done with a NULL modem or with the followingr 25-pin or 9-pin pinouts:r

```
r
     DTE A          DTE Br
     25 (9)         25 (9)r
     ------         ------r
FG    1 (-) ------  1 (-) FGr
TD*   2 (3) ------  3 (2) RDr
RD    3 (2) ------  2 (3) TD*r
CTS   5 (8) -+---- 20 (4) DTR*r
DSR   6 (6) -|  +-  5 (8) CTSr
CD    8 (1) -+  |-  6 (6) DSRr
DTR* 20 (4) ----+-  8 (1) CDr
SG    7 (5) ------  7 (5) SGr
RTS*  4 (7)  (nc)   4 (7) RTS*r
```

r r r Detailed Contentsr r

```
RI   22 (9)  (nc)  22 (9) RIr
* DTE (terminal/computer) drivenr
(nc) = no connectionr
```

r r

r If the NULL modem is "incomplete", the boot process hangs shortly afterr starting the asy driver (after the message `"asy0 is /isa/asy@1,3f8"`r or similar asy1/2f8 message).r For details, seer r http://www.freebsd.org/handbook/hw-io.htmlr r

r 2. Set your the terminal to (9600 bps,8 bits, No parity, 1 stop bit).r r

r 3. Use the eeprom command to specify the console (ttya, ttyb):r `eeprom input-device=ttya output-device=ttya`r (just like SPARC? ;-)r
r Update: Andrew Schwabecher reports that using "ttya" doesn't work.r Instead, he adds these entries to `/boot/solaris/bootenv.rc`:r

```
setprop output-device com1r
setprop input-device com1
```

r r Update2: David Cocking reports that using "ttya" does work,r except with Sun's LX50. For LX50 both ports are set to senser whichever one you attach to under "ttyb".r r

r Steve Rikli adds the following simpler 3-pin alternative, in lieu of the above:r r

r I've found that, while the full NULL modem pinouts work just fine, ar simple 3-pin (TD/RD/SG) pinout scheme will also work in Solaris 8 byr issuing eeprom commands thusly:r r

```
r
eeprom output-device=ttyar
eeprom input-device=ttyar
eeprom ttya-ignore-cd=truer
```

r r

r The kicker is the `"-ignore-cd"` variable,r which doesn't seem to be present by default on a Solaris x86 install,r unlike Solaris for SPARC hardware.r But setting it does work and it does persist across reboot/power-cycle.r In the absence of `"ttya-ignore-cd=true"`r one does indeed need a full NULL modem pinout.r r

r r PC Weasel 2000, at http://www.realweasel.com/intro.htmlr is a PCI board that emulates VGA cards over a serial line.r This provides a serial console interface for PC-class computersr transparent to the operating system.r This is useful for BIOS configuration andr the Solaris Device Configuration Assistant (DCA) remotely.r Of course, you can't run CDE with it, but once Solaris is up,r you can use a regular serial port.r Herb Peyerl, one of the company founders, adds:r "I've tested this card under 2.8 and it works fine. There isn't ar Solaris Watchdog driver for the Weasel yet and sometimes the textr attributes are a little funky, but it's certainly usable."r r

r [Thanks to John Weekley, Scott Wedel, Kenneth Wagner, Andy Spitzer,r Kai O'Yang, Michael Wang, David Page, Andrew Schwabecher, Steve Rikli,r Richard Shuford, and Herb Peyerl]r

r r

r

r (6.17) Can I get a Sun-style keyboardr (Ctrl & Caps Lock reversed) for S/x86?r

r Yes, from PFU, now part of Fujitsu,r sells it's "Happy Hacking Keyboard" for $69.r r http://www.pfu.fujitsu.com/en/hhkeyboard/r It's Sun type 5 keyboard with only the essential 60 keys.r r

r You can order a Sun USB keyboard and mouse that worksr quite well with Solaris x86.r They are available fromr Sun Store, http://store.sun.com/,r with the following part numbers:r

    r
- US/Unix Type 6 USB Keyboard: 320-1273 ($65)r
- 3-button "crossbow" USB Mouse: 370-3632 ($35)r

r r r

r If you don't want to buy any new hardware, you can use just softwarer to switch Control_L and Caps_Lock keys.r Create file $HOME/.xmodmaprc with:r

```
r
remove Lock = Caps_Lockr
remove Control = Control_Lr
keysym Control_L = Caps_Lockr
keysym Caps_Lock = Control_Lr
add Lock = Caps_Lockr
add Control = Control_Lr
```

r and add "xmodmap $HOME/.xmodmaprc" to your $HOME/.dtprofile file.r r

r For the adventurous electrician,r there's a web page to show how to build and program a PCBr to to drive a Sun Type 5/6 keyboard from a PC.r This includes a PCB mask, source code, and instructions. Seer r http://www.buzzard.org.uk/jonathan/r r

r [Thanks to Don Christensen and Ian Hall-Beyer]r

r r r

r (6.18) Can I run multiple terminals on the console ofr Solaris x86 like those supported on Linux, FreeBSD, Interactive Unix, and SCO?r

r No.r Starting with Solaris/x86 2.4, they are no longer configured.r Starting with Solaris 8, the functionality was removed.r r

r [From Casper Dik's Solaris 2 FAQ]r

r r

r

r (6.19) How do I upgrade my video graphics card?r

r First see if you have the driver installed. They are listed when your run kdmconfig. If the driver is present, configure with kdmconfig.r If it's a new card, see if it's listed in the latest driver updatesr for your Solaris release on http://access1.Sun.COM/drivers/r If listed, install the update. kdmconfig is ran automatically at the end ofr the update installation. Before changing cards, choose, from kdmconfig, ther 16-color 640x480 VGA setting, which is the lowest-common denominator forr VGA video cards. After switching cards and rebooting (verifying the VGAr setting works for the new card) choose a higher setting with kdmconfig.r

r See the Update Guide that comes with the update on specific installationr instructions for the update. Generally, it's done as follows: (assuming ther image downloaded from access1.Sun.COM is named vdu11image.Z and is in /tmp),r type as root:r

```
r
    # cd /tmpr
    # uncompress du11vid2.Z ; cat du11vid1.bin du11vid2 | cpio -icvdumr
    # zcat vdu11image.Z | cpio -icvdumBr
    # ./installdu.shr
```

r

r r

r

r (6.20) How do I burn a CD-R or CD-RW with Solaris?r

r Use cdrecord (free) or commercial software.r SCSI CD-R (Record once) and CD-RW (Read-Write many times) drivesr tend to be better supported than ATAPI drives.r For details, see the Sun CD-ROM FAQ atr r http://www.pimpworks.org/sun/cdrom.htmlr andr Jörg Schilling's cdrecord page at:r r http://www.fokus.gmd.de/research/cc/glone/employees/joerg.schilling/private/cdrecord.htmlr

r r

r

r (6.21) Is IPv6 available for Solaris/x86?r

r Yes, starting in Solaris 8.r Seer http://www.Sun.COM/solaris/ipv6/.r r For general IPv6 information, seer http://www.ipv6.org/.r If you wish to connect to the 6bone, an experimental,r mostly tunneled IPv6 network, seer http://www.6bone.net/r

r r

r

r (6.22) Is IPsec available for Solaris/x86?r

r Yes, for Solaris 8.r See volume 3 of the *System Administrator's Guide* atr http://docs.Sun.COM/r for more configuration information.r Solaris 8 IPSec supports AH (authentication) and ESP (encryption) headers,r and "shared secrets" (manual keying),r but not automatic (ISAKMP or IKE) keying.r Solaris 9 supports IKE.r r

r Adam Barclay adds these comments:r

r

- The ESP portion is not installed by default. You have to downloadr supplemental encryption packages (SUNWcry, SUNWcryr, etc) from Sunr r http://www.sun.com/software/solaris/encryption/r
- ipseckey is broken under Solaris 8 10/00 and at this point there doesn'tr appear to be a patch. In the meantime, I use an earlier release.r
- ndd queries may give misleading results if ipseckey hasn't been run.r

r r

r As a reminder, some countries (e.g., Russia)r prohibit the use or possession of encryption software.r r r

---

r

r (6.23) Is Kerberos 5 available for Solaris/x86?r

r Yes, for Solaris 8.r See volume 3 of the *System Administrator's Guide* atr http://docs.Sun.COM/r for more configuration information.r The configuration files reside at /etc/krb5 and /var/krb5r and the binary files at /usr/krb5 and /usr/lib/krb5.r Make sure you answer "y" to whether you want Kerberos duringr your Solaris install.r Then, install SEAM (Sun Enterprise Authentication Mechanism,r what Solaris calls Kerberos) from the Solaris 8 Admin Pack,r freely downloadable fromr r http://www.Sun.COM/software/solaris/easyaccess/sol8.htmlr r

---

r

r (6.24) Does Solaris x86 support multiple processors?r

r Yes. Solaris x86 automatically detects multiple processors.r The limit is at least 8 according to the HCL and by observation.r The theoretical kernel limit (_ncp) is 21.r Due to bus conflicts, there's diminishing returns as you increase ther number of procs.r psrinfo(1M) will print the status of your processors,r mpstat(1M) will report the CPU usages, andr psradm(1M) can be used to take processors offline.r

r Some people have had problems with Solaris "seeing" the extra processors,r with at least one type of motherboard (HP/Compaq?).r They had success with going into the BIOS utility and setting OS type tor "other" for "Solaris".r With most motherboards no special BIOS settings are required.r Likewise, Solaris x86 also supports Intel's Hyperthreadingr (multiple logical processors).r This is because most or all of the additional support required is in ther motherboard and not Solaris.r However, psrinfo -pr will still display 1 processor (as it's not true multi-threading).r

r [Thanks to John Groenveld, Jürgen Keil, Bob Palowoda, Bruce Alder,r and Michael VanLoon]r

r r r

---

r

r (6.25) How do I uncompress a .gz file?r

r With "gzip -d" (or gunzip, which is gzip linked to gzip).r Solaris 8 has gzip. Solaris 7 or earlierr does not come with gzip (it doesn't have zip either--only unzip).r Gzip isr available as a pre-compiled package fromr http://www.sunfreeware.com/r (use "pkgadd -d packageFileName" to install)r and also as a tar file (to extract, typer "uncompress gzip*Z; tar xvf gzip*.tar") atr

ftp://ftp.netscape.com/pub/unsupported/gnu/gzip-1.2.4.x86-sun-solaris2.4.tar.Zr

r r r

---

r

r (6.26) Why doesn't `/usr/bin/cc` work?r

r Because it's just a front-end "stub" for the unbundled Sun C compiler,r Oracle Solaris Studio (Sun Studio)r r

r However, you can download Sun Studio 11 for free. Seer http://developers.sun.com/prodtech/cc/r r

r You can also get the free GNU C compiler, gcc, in pkgadd formatr from various locations.r It is bundled with ther the "Solaris Software Companion CD" and can be downloaded fromr http://www.sunfreeware.com/.r If you install gcc, I recommend that you rename or compressr `/usr/bin/cc` and softlink (ln -s) `/usr/local/bin/gcc`r (or `/usr/sfw/bin/gcc` or wherever it is) to `/usr/bin/cc`.r

r By default, Solaris comes with support tools (such as make and libraries)r in `/usr/ccs/bin`, `/usr/ccs/lib` and usr/include.r If not, add the appropriate packages.r For more information, see the "Software Development" section inr Casper Dik's Solaris 2 FAQ.r r r

---

r

r (6.27) How do you connect Solaris to my cable modem?r

r See also the next question on RoadRunner.r r

r At least for the the East Brunswick, NJ, servers, I had the easiest timer with DHCP (not the static setup):r

```
r
/etc/hosts:r
       127.0.0.1    localhost    CCxxxxx-A  # where CCxxxxx-A is your hostnamer
       24.x.x.x     CCxxxxx-A    loghost   # where 24.x.x.x is your assigned IPr
r
/etc/nsswitch.conf:r
       hosts:        files dnsr
r
/etc/resolv.confr
       domain ebnsk1.nj.home.comr
       nameserver 24.3.196.33r
       nameserver 24.3.196.33r
r
/etc/dhcp.elx0 (empty file)r
r
/etc/hostname.elxl0 (empty file)r
       NOTE: replace "elxl0" with your NIC device namer
```

r r r No `/etc/defaultdomain`, `/etc/defaultrouter`,r or `/etc/netmasks` files are used.r This info is handled by DHCP.r Reboot and you're hooked up.r Here's my (partially disguised) netstat -rn and ifconfig -a outputs:r r

```
r
$ netstat -rnr
```

r r r Detailed Contentsr r   58

```
Routing Table:r
  Destination         Gateway           Flags  Ref   Use   Interfacer
-------------------- -------------------- ----- ----- ------ ---------r
24.x.x.0              24.x.x.x             U      3     2     elxl0r
224.0.0.0            24.x.x.x             U      3     0     elxl0r
default              24.x.x.1             UG     0     44r
127.0.0.1            127.0.0.1            UH     0     236    lo0r
r
$ ifconfig -ar
lo0: flags=849<UP,LOOPBACK,RUNNING,MULTICAST> mtu 8232r
        inet 127.0.0.1 netmask ff000000r
elxl0: flags=4843<UP,BROADCAST,RUNNING,MULTICAST,DHCP> mtu 1500r
        inet 24.x.x.x netmask ffffff00 broadcast 24.x.x.255r
```

r r

r [Thanks to Alan Lucero.]r r

---

r

r (6.28)r How do you setup Solaris to use RoadRunner's cable modem service?r r

r RoadRunner uses General Instrument's SURFboardr or other cable modem hooked up to a coax cable on one side andr a straight-through Ethernet cable on the other side.r The real throughput is about 6-MB/sec. on downlinksr and 768KB/sec. on uplinks.r The cable modem looks like a router to your computer.r r

r RoadRunner configures home systems withr Dynamic Host Configuration Protocol (DHCP),r which provides the IP address, default route, and name servers.r RoadRunner only supports Windows and Macs, but it works finer with Solaris (they just won't help you setup or diagnose Solaris DHCP).r You need Solaris 2.6 or higher for DHCP.r To set it up for Solaris, follow these steps, as root:r r

    r
1. `"touch /etc/dhcp.iprb0"` (replace the `".iprb0"`r with whatever the ethernet interface for your system might be, as shownr by `"ifconfig -a"`)r r
2. `"cp /dev/null /etc/hostname.iprb0"`.r You need to make *SURE* that this filer is EMPTY - otherwise, DHCP configuration won't work.r r
3. Make sure that `/etc/inet/hosts` only has one line in it, the oner containing `"127.0.0.1 localhost"`. Any other lines will ber ignored, and any additional necessary lines will be added by the DHCPr client at boot time.r r
4. `"touch /etc/notrouter"` -r this creates a file to tell Solaris thatr your system will not be performing routing or packet-forwardingr duties (if that's the case in your situation).r If it already exists, good. Leave it be. 8-)r r
5. `"cp /dev/null /etc/defaultrouter"`r - since the DHCP client software willr automatically put the needed entries in this file, we just need tor make sure that it exists as an empty file. If it alreadyr exists, rename it and create the empty file in its place.r r
6. `"cp /dev/null /etc/resolv.conf"`r - again, the necessary entries will ber added by the DHCP client. If you already have this file, rename itr and create an empty file in its place.r r
7. Copy /etc/nsswitch.dns to /etc/nsswitch.conf tor enable your machine to resolve addresses using DNS, the Domain Name Systemr (instead of NIS).r Or edit the file /etc/nsswitch.conf, and look at the `"hosts:"` line.r By default, it reads `"files"`; change it to readr `"hosts: files dns"`.r

r r Once you've performed these steps, your machine is ready to get itsr networking information via DHCP. The easiest way to do this is to rebootr your machine. You will see status messages during boot about the

DHCPr client, this is normal.r r Once the machine is booted type the "`ifconfig -a`" command.r You will see output similar to this:r r

```
r
        $ ifconfig -ar
        lo0: flags=849 mtu 8232r
        inet 127.0.0.1 netmask ff000000r
        iprb0: flags=4843 mtu 1500r
        inet 24.93.53.4 netmask ffffff00 broadcast 24.93.53.255r
        ether 8:0:20:1b:1:72
```

r r

r The entry we're concerned about is `iprb0`r (`lo0` is the dummy loopback interface);r just make sure that its configured via DHCP, and that an IP address andr broadcast address was assigned. You can also check the /etc/resolv.confr and /etc/defaultrouter files to make sure they were configured by ther DHCP client.r r

r Type "`nslookup sun.drydog.com`" to test that `/etc/nsswitch.conf`r and `/etc/resolv.conf` are setup correctly for DNS lookups.r If not, they may need to be hand-edited with values provided by your ISP.r These files are documented in nsswitch.conf(4) and resolv.conf(4).r The resolv.conf needs to have "domain" and "nameserver" lines.r

r Type "`netstat -rn`"r to see if there's a "`default`" destination configuredr in /etc/defaultrouter and type "`ping sun.drydog.com`" to verify routingr is OK. Use "`traceroute sun.drydog.com`" to diagnose routing problems.r r

r Type "`hostname`" to see if it says "unknown."r If so, DHCP did not provide a hostname.r One workaround is to editr `/etc/init.d/network` and replace all occurrences of "unknown"r with your real hostname.r r

r This information is adapted from Bill Bradford.r Some (older) RoadRunner setups may still require a RoadRunner login program.r This is explained in that link.r

r RoadRunner information is atr http://www.rr.com/r and help is atr http://help.rr.com/r The Unofficial RR FAQ is atr r http://members.tripod.com/~tlarrow/rrfaq.htmr

r For generic cable modem information,r see the e-zine article "xDSL and cable modems" referenced in ther previous question on @Home service.r The article covers instructions on enabling Solaris with a cable ISP.r r

r

---

r

r (6.29)r How do I force the speed and/or duplex of my network interfacesr (ndd(1M) doesn't work)?r

r No x86 driver can be interfaced via ndd(1M).r The only way to set speed/duplex is via the NIC's driver.conf(4).r iprb(7D) on Solaris 8 suggests that you can specify speed/duplex forr multiple instances via ForceSpeedDuplex option.r For other drivers, you'll need to specify each instance per driver.conf(4).r Finally, for most people, auto-negotiating works as expected.r Having to hard-code values may indicate cabling or switch problems.r r

---

r

(6.30) Why can't I create a home directory under /home?

For Solaris, `/home` is not an on-disk file system, it is a file system under the control of the automounter, and only the automounter can create directories/files in it.

If you don't want the automounter to manage /home, then remove the "`/home`" entry from `/etc/auto_master` (and issue the command "`automount -v`" to force the file to be reread, or reboot).

However, the typical setup for Solaris is to locate user's home directories in `/export/home`.

/home is intended to be where all users' home directories appear regardless of which machine they are really located on--by virtue of the automounter and auto_home map. This makes your home directory always appear in the same place regardless of which machine your login to, and regardless of which server the sysadmin decides to move your home directory.

If you are not part of a network with workstations and servers, this may look strange. If you want to, as a demonstration, you can set up a standalone workstation to operate this way, as follows. (I'm assuming you still have the default setup of /home under the control of the automounter.)

Create a user with a home directory in `/export/home`, say, `/export/home/andrew`, so that the directory is correctly created with `.profile`, `.login`, etc in it.

Put the following line in `/etc/auto_home`:

```
andrew  cucumber:/export/home/andrew
```

(substitute your user name for 'andrew' and your hostname for 'cucumber'). If there is an "+auto_home" entry in there, comment it out. Make the automounter reread the files: "automount -v".

You should now be able to "ls /home/andrew" and see the files there which are in `/export/home/andrew`.

If you issue the command "`/usr/sbin/mount -p`", you will see that `/export/home/andrew` has been mounted on `/home/andrew` (by the automounter). Normally this would be an NFS mount to a remote server, but in this case the system has spotted that is it attempting to NFS mount itself and uses the loop-back filesystem instead (lofs) which avoids the NFS overhead when the filesystem is on the same machine.

Finally, to complete the use of `/home`, you should change Andrew's entry in the `/etc/passwd` file such that the home directory is `/home/andrew`.

In a networked environment, you also need to add `/export/home` to the `/etc/dfs/dfstab file` so that it is available for other clients to mount. Also, the `/etc/passwd` file and `/etc/auto_master file` (and much more besides) would be obtained using naming services from a single networked copy, so you would only need to set this up once whatever the size of your network, not once per workstation.

[Thanks to Andrew Gabriel]

r (6.31) Is Veritas file system available for Solaris x86?r

r Only through NCR Corporation.r
r [Thanks to Bob Palowoda]r r r

---

r

r (6.32) How do I use Zip and Jazz Drives for Solaris x86?r

r Iomega's Zip and Jazz Drives are supported by the Solaris 8 volume manager.r For example, with a ATAPI Zip100 or Zip250 drive,r run "volcheck" and it gets mounted as `/rmdisk/zip0`r If that doesn't work, see if you can mount it manuallyr (if DOS formatted). For example:r r

```
r
# Master on second ATAPI controller:r
/usr/sbin/mount -F pcfs /dev/dsk/c1t0d0p0:c /mntr
# Slave on first ATAPI controller:r
/usr/sbin/mount -F pcfs /dev/dsk/c0t0d0p0:d /mntr
```

r r

r Note that external drives with the parallel port connection are notr supported. This requires a specialized driver.r r

r [Thanks to Chase for the s8 update]r r r

---

r

r (6.33) How do I use Linux NIC drivers for Solaris x86?r

r r Sun has released (9/2000) a free network driver porting kitr to port Linux PCI-based network drivers to Solaris x86.r The kit includes, as examples,r ported Linux drivers for the Intel EEPro100r and the Digital "Tulip" 2104x/2114x chipr (a reliable chip used by the Netgear FA-310-TX,r SMC EtherPower, Kingston EtherX, D-Link DFE, and other lower-cost cards)r For legal reasonsr (the Linux driver authors complained aboutr use of these drivers in a commercial Product--Solaris),r this kit was pulled and is no longer available.r

r r r

---

r

r (6.34) How do I add color to "ls" or "vi"?r

r For "ls" you need the GNU "fileutils" version of ls.r Obtain the binary fromr http://www.sunfreeware.com/r or compile it yourself from source fromr http://www.gnu.org/r I only use "ls" out of all the utilities in the package andr install it in /usr/local/bin/ls.r I then use this alias:r alias ls='/usr/local/bin/ls --color=auto'r (remove the "=" for *csh shells).r r

r For vi, I use vim (or gvim for X Windows).r It is also available fromr http://www.sunfreeware.com/r or directly fromr http://www.vim.org/.r You may need to add "syntax on" in your $HOME/.vimrc filer to enable syntax coloring.r r

r If color output still doesn't appear, for either of these,r make sure your terminal emulator supports colorr (e.g., dtterm, xterm, and gnome-terminal)r and that your $TERM is set correctly.r To verify you can display color, copy, paste, and execute this liner in your shell prompt (you should see the lettersr "**blue**" highlightedr in **blue**):

r `/bin/echo '\033[0m\033[01;34mblue\033[0m'`r r

r You can also get color from the tcsh builtin ls, if you use ther tcsh shell (included in Solaris 8 and later), by simply doing:r

r `alias ls ls-F ; set color=ls-F`r
r See the tcsh man page for details.r r r

r

---

r

r (6.35)r How do I move the disk containing Solaris from the ATAPIr primary master controller to the secondary controllerr or slave connector (or both)?r

r

    r

- Move the disk with Solaris to the new locationr (secondary master controller or primary or secondary slave controller).r
- r For Solaris 8 or 9, do not use the Installation CD.r Use the "Software 1 of 2" CD.r
- Boot with "`b -s`"r (without the quotes) instead of "1" or "2"r when asked for the installation typer
- mount the root boot partition at /mntr
- Reconfigure the device tree for Solaris 7 or earlier:r

  ```
  r
  drvconfig -r /mnt/devicesr
  devlinks -r /mntr
  disks -r /mntr
  ```

  r
- Verify that the linksr `/mnt/dev/dsk/c1d0s*` to `../../devices/*`r exist.r
- Type "`rm /etc/path_to_install`"r (or remove all lines but comments in this file)r
- Edit file `/mnt/boot/solaris/bootenv.rc`.r For example if you're moving from the primary master tor secondary master, change "ide@0" to "ide@1":r
  r `setprop bootpath '/pci@0,0/pci-ide@4,1/ide@0/cmdk@0,0:a'`r tor
  r `setprop bootpath '/pci@0,0/pci-ide@4,1/ide@1/cmdk@0,0:a'`r
  r These paths are similar for SCSI.r If an x86 boot partition was used, then /boot is in the listr and it should be mounted first.r
- Remove the CDROM and type `/usr/sbin/shutdown -i6`r
- If you removed `/etc/path_to_install` then, at ther "`Booting Solaris`" prompt, type "`b -a`"r
- After reboot, if all went well, the `/dev.old/`r and `/devices.old/` directories can be removed (be careful).r

r r

r Once Solaris is on the secondary master, you must enable booting to it.r Here's three methods:r

r
- Change the BIOS settings to boot to D: (the secondary master)r
- Boot from the DCA diskette on A: and choose the secondary master device.r
- If you have Linux LILO on the primary master, you can add an entryr to `/etc/lilo.conf` similar to the followingr (and type `/sbin/lilo` on Linux to re-read the new lilo.confr file):r

```
r
# Solaris 2.7 in secondary master booted by Linux Red Hat 6.1r
# /boot/chain.b simply starts the boot sector on the specified partition.r
# /dev/hdc1 is the first partition on the third (hdc) disk.r
other = /dev/hdc1r
loader = /boot/chain.br
label = solarisr
```

r

r r

r [Thanks to Michael Wang, Alexander Yu, and Laurent Blume]r r

r

---

r

r (6.36)r I've installed Solaris using Sun's brain-dead disk slice defaults.r How do I modify my slices?r

r You don't.r It's too late now, but you should have read the recommendations onr disk partitions and sizes in section 4 of this FAQ.r Solaris (unless you're running under Veritas) doesn't supportr modifying slices without destroying data on the entire slice.r Your options are (in order of ease):r

r
- Reinstall and choose your own custom layout.r
- Create softlinks or local mounts to filesystems with more free spacer and move the files. E.g. for `/opt`:r
  r `"mv opt/export/home"` andr
  r `"mount localhost:/export/home/opt /opt"`r or `"ln -s /export/home/opt /opt`r
- Backup, boot install media,r and run `format`, `newfs`, & `restore`r
- Make some free space after the Solaris partition,r increase the partition size, run format, then growfs. Details follow.r

r r

r Instructions for resizing the Solaris partition and filesystem.r These instructions may not be easy and may not succeed.r Backup your files and verify the backup first.r

r
- Make some space after the Solaris fdisk partition, if needed.r This is possible with PartitionMagic.r r
- Increase the size of the Solaris fdisk partitionr (also possible with PartitionMagic).r r
- Use `format` to increase the size of your filesystemr (e.g., / or /opt).r To do this, boot from the install CD or DVD and run format.r r

- Run `growfs` on the filesystem.r Also do this while booted from the install CD.r If your filesystem isn't at the end, then it's trickier.r You can still use growfs, but it's going to trash any slices that followr the filesystem (which usually include other filesystems).r So you need to backup and restore these other filesystems.r It might be just as easy to backup your data,r reinstall Solaris and restore.r

r r

r [Thanks to John D. Groenveld and Paul Floyd]r r

r

r

r (6.37)r How do I mirror root with Disksuite when /boot is a separate fdisk partition?r

r You don't. Disksuite only supports mirroring ufs filesystems, so in orderr to mirror /boot, it should be part of the root (/) slice inside Sun's fdiskr partition. Sun's default install will create a separate 10MB "x86 Boot"r fdisk partition which is mounted as pcfs. If you already have Disksuiter running the solution is as follows:r r

r Start with all the mirrors in place except for the :boot partitionr and had identical layouts on both disks.r r

    r
1. Back up all my important stuff.r
2. Use metadb to delete the state db's on the Disk 1 and Disk 2 (I haver Disk 3 and Disk 4 for the time being).r
3. Get a tar backup of /boot directory and save it in / (root)r
4. metadetach and metaclear all the Submirror's from the Disksuiter db's on disk 2.r
5. Recreate Disk 2 Partition table (using fdisk) to be 100% Solaris andr rebuild Solaris Partition(Slice) table (using prtvtoc/fmthard)r
6. Re-mirror Disk 2 So it's almost identical to how it was at ther beginning, except the x86 partition table is now one big Solaris partition.r I.e., starting at the very beginning of the disk.r This is very important, otherwise the bootblock installation won't work.r
7. Untar the boot directory tar file so now i've /boot ufs mirrorr under the / mount.r
8. Do step 4 on Disk 1.r
9. Do step 5 on Disk 1.r
10. Do step 6 on Disk 1.r
11. Run 'installboot' on Disk 1 and Disk 2 (hint: the man page is ambiguous onr this, but the Sunsolve doc says it must be run on slice 2r [it's obvious if you think about it]).r
12. Add state db's using metadb on Disk 1 and Disk 2.r
13. Edit `/etc/vfstab` and took out the `:boot` entryr because it's now in the / fs.r
14. Reboot with `/usr/sbin/shutdown -i6`r
15. Test boot in single-user mode from either drive.r

r r

r [Thanks to "Nick" via John D. Groenveld]r r

r

r

r (6.38)r Is ISDN supported for Solaris x86?r

r ISDN is hard to setup and slow compared to cable-modem servicer or even DSL. However, ISDN is popular and available in Europe.r Some old SPARCstations had ISDN support built in.r However, there are no Sun-supplied drivers other than for these machines.r There are third-party drivers for Solaris x86 from:r

r
- Brooktrout Technology,r http://www.brooktrout.com,r for it's T1/E1 WAN Controllerr
- http://www.teles.de/,r Teles for its ISDN cards.r
- Digi has ISDN drivers for itsr DataFire Sync 570i.r

r I'm sure other drivers exist. Before buying ISDN hardware, check if theyr have a driver for Solaris first.r r

r

---

r (6.39)r Is there a substitute available for PRNG /dev/random for Solaris x86?r

r Yes.r /dev/random and /dev/random are pseudo-random number generators (PRNG).r /dev/random will wait if the entropy pool of random bits is empty untilr more bits are available. /dev/urandom will not wait and may repeat bits.r PRNGs are used to implement encryption software,r such as GPG, OpenSSL, and OpenSSH.r The /dev/*random pseudo-devices are available with Solaris 9, or,r for Solaris 8, with patch 112439-01 for Intel Solaris.r This patch is free and is part of the recommended patch cluster.r

r Free PRNG substitutes include egd and prngd.r Enthropy Gathering Daemon (egd), a `/dev/random` replacement,r outputs randomness to a socket at `~/.gnupg/entropy`.r Pseudo Random Number Generator Daemon (prngd),r a `/dev/urandom` replacement,r outputs randomness to a socket at `/var/run/egd-pool`.r Source and binary packages for these are available atr http://www.sunfreeware.com/r r r

r

---

r (6.40)r What are some good, easy-to-use printing solutions for Solaris?r

r A writeup by Carl Ehorn, below, provides a good summary.r

r r

r I don't know if anyone has the same problems I did, but Ir recently went looking for a good printing solution that didn'tr require that I roll my own using Ghostscript and a bunch ofr scripts. I've done that before, and it gets old fairly quickly.r

r I have a HP Deskjet 1220C, which is a color wide-carriager printer with fairly high resolution capabilities. It can printr at 600x600 DPI color in normal modes, and can support up tor 2400x2400 DPI color with HP software. However, that softwarer only works on Win machines, and I don't really need that high ar resolution in Solaris, as I do my graphics processing on Winr machines anyway.r

r My printer is hanging on an ethernet print-server box, whichr allows it to be shared by any machine on the network. Thisr works very well, and has always worked in text modes fromr Solaris. But I was looking for a Postscript solution, so that Ir could print PDF files, Postscript files, and take advantage ofr some of the advanced formatting capabilities that Postscriptr provides. It's also nice to be able to print from a browser.r

r So I took a look at what's available on the web. Of course,r there is Ghostscript, Gimp-print, and other similar packages,r but they require a fair amount of work to make a seamless printr solution (at least on Solaris). So I also looked at Vividata'sr P-Shop, CUPS, and ESP Print Pro. These last three are fairlyr low-cost solutions for a single server, and I felt that ther prices they charge would be acceptable to me, considering ther time and effort they would save.r

r **Vividata**r I tried the Vividata package, and while it works fine, it didr not support any of the higher resolution modes the printer wasr capable of. I should point out that Vividata is the onlyr package I found that had Color profile management available asr an option. I didn't try this, but it would be important if your were doing pre-press graphics work. Vividata had a genericr driver for my printer, but had not updated it in some years,r and does not seem to be interested in providing furtherr development for the more recent printers that have been made.r They seem to feel that if a generic PCL driver works, that'sr good enough. Vividata provides Postscript Level 2 support.r

r **CUPS**r I then tried the CUPS package, which is free on the web. Therer is a lot of support for this system from the internet community,r including driver generators from the Gimp project. The Gimpr drivers have been reported to provide very high quality outputr compared to the standard drivers, but require that you build andr install a lot of dependent packages in order to make use ofr these better drivers. Again, this was looking like a lot of workr to get a good package working, and I wanted to avoid that.r

r The standard CUPS package had very disappointing output, and ar generic install using the recommended driver resulted in solidr black pages. Using an older, lower quality driver, I was abler to obtain 300 DPI 8-bit output. While this is OK, it's not good.r 8-bit color results in a very noticeable dither in both colorr and grayscale output, and while the 300 DPI text output wasr fine, I found that some PDF files did not print text very well.r There were artifacts, and some aliasing in the outlines ofr letters. Enabling debug output from the driver resulted in somer very confusing data. It appeared that the PS-2-raster conversionr was done at 100 DPI, then the raster to PCL was scaled up tor 300 DPI. While the support staff for CUPS says that's impossible,r it sure looks that way from the debug output, and would alsor explain the poor text quality from some applications.r

r CUPS is supported by the newsgroups and some of the same folksr who make ESP Print Pro. It supports Postscript Level 3 output.r

r **ESP Print Pro**r Last of all, I tried the ESP Print Pro package. This is anr enhanced product based on CUPS, but has considerably morer printer-specific drivers available, including one for myr printer. It installs just like CUPS, and also like CUPS, is ar replacement for the LP print system that comes with Solaris andr other UNIX variants. While I had some misgivings aboutr replacing the LP system, both CUPS and ESP Print Pro installedr easily, and with no problems.r

r I'm pleased to say the ESP Print Pro worked the best of allr these packages for me. I was able to set the defaults tor 600x600 DPI, using CMYK color modes, and got a very noticeabler increase in the print quality. Text is crisp as any 600 DPIr laser, and I printed a 24-bit color scan of a photograph thatr resulted in a very nice print. On plain paper, the colors arer not true, but are perfectly acceptable for a draft print. Noter that Windows also is unable to print accurate colors on plainr paper. This is not a fault of the software, but a limit in ther printer technology. Printing to coated photo paper wouldr probably provide a much more accurate print, but I did notr bother to test the ESP package in this mode, as I do photo workr on Windows. HP-supplied drivers work very well in Windows, andr has full support for the 2400 DPI mode.r

r With ESP Print Pro at 600 DPI, and using the CMKY color model,r the supplied Postscript test page printed well, and all signs ofr dithering were gone, in both color and grayscale areas of ther page. Note that CUPS uses the same test page, so these can ber compared directly to see the differences between the packages.r

r I found that the native Imagetool program supplied with Solarisr crashed when trying to print my 24-bit TIFF test image, butr when I loaded the image into StarOffice's drawing program, itr printed perfectly, scaled exactly as it should have been.r StarOffice sees the new printing system with no problems, andr will print to the default printer without any required setup.r While I have not done much testing with StarOffice, I'd ber surprised if it had trouble, since the TIFF image printedr correctly. As the TIFF image was a 70MB file, this certainly isr one of the more stressful ways to test, and I encountered nor problems at all.r

r Both CUPS and ESP Print Pro provide printer and class managementr using graphic interfaces. CUPS uses Netscape, or any GUIr browser, and all administration tasks can be done from ther browser, except for editing the daemon config files. ESP uses ar supplied program that presents a GUI interface in a compact,r simple to understand way, and is also easy to use. Like CUPSr (which it is based on), it does require manual editing of ther daemon config files. Any text editor will work fine for eitherr package.r

r Both CUPS and ESP Print Pro provide replacements for 'lpstat'r and associated programs, which would very much like the oldr ones, but tie into the new driver system. Vividata's P-Shopr uses the standard lp system, and does not replace the existingr native programs. Vividata is the only package that I foundr that supports printing through SCSI interfaces, so if you haver a SCSI printer, you should certainly look at their productr first. They also support SCSI scanners, which neither CUPS orr ESP Print Pro provide.r

r Vividata, CUPS, and ESP Print Pro all provide "try & buy"r downloads from the web, so you can check out any package your are interested in for a trial period at no cost. Vividatar allowed me to download and install their package twice, whichr was nice of them. They also provide students will the packager for free, but don't provide support on the free version. CUPSr is also free for download, and support has been handed off tor the community through a number of newsgroups. ESP providesr support for a fee, which can get expensive in a corporater environment, but is probably in line with any other commercialr package that provides similar features.r

r Each of these packages has it's strong points, but for me ther ESP package seems to be the best match with my needs. Yourr mileage may vary, based on your needs, the interface yourr printer uses, and the drivers available for your specificr printer.r

r I hope this information will save you time and trouble, and ifr you have not already installed some kind of printing solution,r will encourage you to take advantage of these products. Therer seems to be something for every budget, and the free packagesr available, while not perfect, will at least get your printerr functioning under Solaris.r

r r r

r

r (6.41)r What is the Solaris Data Encryption Supplement?r

r It contains kernel modules to support more flavors of encryption forr IPsec and Kerberos.r Currently, this is AES (192 and 256 bit keys),r Blowfish (128 to 448 bit), and ARCFOUR (2048 bit) for IPSec/IKEr and GSS-API for Kerberos.r A writeup by Carl Ehorn, below, provides a good summary.r This is available for both SPARC and Intel.r For Solaris 10 it's atr r http://javashoplm.sun.com/ECom/docs/Welcome.jsp?r StoreId=8&PartDetailId=Sol10-GA-Encryption-G-F&TransactionId=tryr (combine URL into one line)r Some countries (not the U.S.)r restrict importing or exporting this encryption software.r

r By default, Solaris comes with 128 bit encryption.r r

r (6.42)r How do you mount a Solaris ISO image (with UFS filesystems) in Solaris?r

r It's much easier to just burn the ISO image on a CDROM burner.r But if you don't want to go through that trouble or don't have a burner,r try this:r

r To access the first filesystem on the ISO image, you can justr mount the ISO image filer (specify the ISO filename instead of a device in the mount command).r For subsequent filesystems on the ISO image,r use the /usr/sbin/lofiadm(1M) command.r This is explained in Philip Brown's note at:r r http://www.bolthole.com/solaris/mount-cdrom.html r Note that you can only mount SPARC UFS images on SPARC hardware,r and Intel UFS images on Intel hardwarer UFS filesystems, unfortunately,r are not architecture (byte sex) independent :-(.r To mount DVD, add `"set hsfs:nhsnode=7256` to `/etc/system`r to workaround a filesystem driver bug.r r r

r [Thanks to Philip Brown]r r

r

r (6.43)r Is noexec_user_stack supported in Solaris x86?r

r Yes, but only for AMD64 (Operon) on Solaris 10 or higher.r For 32 bit x86, you can set it but it won't do anything.r On SPARC and AMD64, it prevents execution of code that was placed on the stack.r This is a popular technique used to gain unauthorized root access to systems,r locally or remotely, by executing arbitrary code as root.r This is possible with poorly-written programs that have missing overflow checks.r To enable stack protection, add the following to `/etc/system`r
```
set noexec_user_stack = 1r
set noexec_user_stack_log = 1r
```
r and reboot with `/usr/sbin/shutdown -i6`r

r Unfortunately the flag is ignored on Intel 32-bit architecture,r because it doesn't have the concept of pages having execute permissions.r (SPARC and AMD's Opteron and Athlon support it though).r r

r [Thanks to Alan Coopersmith]r r

r

r (6.44)r How do I setup zones with Solaris?r

r First, you must have Solaris 10.r Solaris Zones (aka Solaris Containers)r is partitioning software that's sort of like an enhancedr chroot jail—one kernel.r It's software-based, not hardware-based, yet lighter-weight thanr virtualization software, such as VMWare.r I find it useful for testing and development as I can easily set up a zoner and not worry about destroying my Solaris installation.r It's also good for serving several instances of software, say, a web server,r each securely running separate from another.r r

r Here's how I setup a zone on Solaris x86.r Basically, all I need to setup a zone is a separate filesystemr and a new IP address.r The Ethernet network device is shared with the root (or "global") zone.r I created a dedicated 6GB filesystem for use by the zone by using a loopback file.r Loopback filesystems avoids repartitioning or adding disks.r Loopback filesystems are inefficient and shouldn't be done for production use:r use raw disk instead.r If you want to use a `etc/sysidcfg` file to set the timezone,r name service, locale, etc., place it,

for this example, inr `/zones/danszone/etc/sysidcfg`r The following is from my session log (most output removed):r

```
r
# mkdir -p /zones/danszoner
# mkfile 6g /zones/dansloopbackfiler
# lofiadm -a /zones/dansloopbackfiler
/dev/lofi/1r
# newfs /dev/rlofi/1r
# mount /dev/lofi/1 /zones/danszoner
# chmod go-rwx /zones/danszoner
# zonecfg -z danszoner
zonecfg:danszone> creater
zonecfg:danszone> set zonepath=/zones/danszoner
zonecfg:danszone> set autoboot=truer
zonecfg:danszone> add netr
zonecfg:danszone:net> set address=10.100.100.20r
zonecfg:danszone:net> set physical=e1000g0r
zonecfg:danszone:net> endr
zonecfg:danszone> infor
zonecfg:danszone> verifyr
zonecfg:danszone> commitr
zonecfg:danszone> exitr
# zoneadm -z danszone installr
# zoneadm -z danszone bootr
# zoneadm list -vr
  ID NAME             STATUS        PATHr
   0 global           running       /r
   2 danszone         running       /zones/danszoner
# zlogin -e @ -C danszoner
(the first time the zone is booted, it takes you through ther
usual setup menus.)r
(type "@." to exit zlogin)r
```

r r

r If you use a loopbackfile (again not recommended for production use),r you need to create a startup script to run lofiadm, mount, and zoneadm boot.r If you use a regular filesystem (for production use),r zones start automatically.r r

r For more information on zones, seer r http://www.sun.com/bigadmin/content/zones/r andr r http://www.opensolaris.org/os/community/zones/faq/r r

r

---

r (6.45)r How to change the audio beep frequency?r

r r If you have a working sound card or supported USB audior output device, add option `-audiobell` to Xsun. Copyr `/usr/dt/config/Xservers` to `/etc/dt/config/Xservers`r and editr the last line.r Use `xset b` or `dtaudio -beep` to configure it.r Without a supported sound card or for the console, pu, for example,r the following lines in some /etc/rc2.d/ startup script:r

```
r f=400 # beep frequency in Hzr
echo "beep_params+4?W0t$f;.+c?W0t$f" | mdb -kwmr r
r r
```

r [Thanks to Markus Gyger]r r r

r

---

r (6.46)r Is Adobe Acrobat Reader available for Solaris x86?r

r Yes. Adobe now has native Acrobat Reader 9 for Solaris x86 (as of March 2009).r It's available from r
http://www.adobe.com/r It installs inr `/opt/Adobe/Reader9/bin/acroread`r

r r

r Alternative PDF readers for S86 include Evince, gpdf, ggv, and XPDF.r Evince seems to be the best and is included in OpenSolaris.r The (old) XPDF viewer is available on the Solaris Companion CD and atr r
http://wwws.sun.com/software/solaris/freeware/r The Evince viewer,r http://www.gnome.org/projects/evince/ binary is atr http://www.blastwave.org/r and Solaris Express.r

r r r r

r

---

r (6.47)r Are RealPlayer and other audio and video players available for Solaris x86?r

r Yes.r Solaris 10 06/06 and above comes with SUNWrealplayer.r The Helix Community atr
https://helixcommunity.org/r ported RealPlayer 10 to Solaris x86.r

r For older versions of Solaris,r the Unixware RealPlayer 8 is now playable on Solaris x86.r For details, seer Jürgen Keil'sr r "Using Unixware RealPlayer 8 on Solaris x86"r atr http://www.tools.de/solaris/realplayer/r An old version of RealPlayer is atr r ftp://ftp.sun.drydog.com/pub/solaris/r r

r Johan Hagman'sr r Solaris Helpers Page atr http://home1.swipnet.se/~w-10694/helpers.htmlr describes other players, such as for MPEG,r but seems to have disappeared off the web.r Also, some of these players are SPARC-only.r Apple QuickTime is available only for Mac and MS Windows.r r

r Macromedia Flash Player comes with Solaris 10.r It is also available for Solaris x86 atr r
http://www.macromedia.com/software/shockwaveplayer/r
r (download from Solaris x86 with your preferred browser to ensurer you get the correct version).r Or check Jürgen's Solaris x86 Flash page atr r http://www.tools.de/solaris/flash/r r

r Windows Video (WMV) GStreamer plugins are available fromr Fluendo atr https://shop.fluendo.com/r r

r [Thanks to Johan Hagman and Jürgen Keil]r r

r

---

r (6.48)r How to I find the battery status for a laptop under Solaris?r

r You can run Casper Dik's batstat CLI or acpipowertool GUI,r and if you're using GNOME, you can optionally run Darren Moffat's port of the gnome-battery program.r Neither are integrated into Solaris, at least yet. Here's how to install:r

r

- Download Casper Dik's r [APCI Driver from r](http://opensolaris.org/os/community/laptop/downloads/acpidrv.tar.gz) r (see his blog entry at r [r http://blogs.sun.com/casper/entry/first_installment](http://blogs.sun.com/casper/entry/first_installment))r

  r
- Extract with `gzcat apcidrv.tar.gz | tar xvf -`r

  r
- Install with `cd apcidrv-2006-01-04; ./install; ./postinstall`r This creates the `/dev/acpidrv` device, the `batstat` CLI,r and `acpipowertool` GUI.r

  r
- I use GNOME and miss the battery icon that's in Linux. Fortunately,r Darren Moffat ported batstat to Solaris, which uses the above `/dev/acpidrv` device driver. Downloadr [r Solaris GNOME Battery Monitor from r http://blogs.sun.com/roller/resources/darren/gnome-battery.tar.gz](http://blogs.sun.com/roller/resources/darren/gnome-battery.tar.gz)r (seer [r Darren Moffat's blog entry at r http://blogs.sun.com/darren/entry/gnome_battery_status_meter_for](http://blogs.sun.com/darren/entry/gnome_battery_status_meter_for))r

  r
- Extract with `gzcat gnome-batery.tar.gz | tar xvf -`r

  r
- Install with `cd gnome-battery; ./install; ./postinstall`r

  r
- You can now add a battery status applet by right clicking on the GNOME toolbar, and selecting Add to Panel --> Utility --> Battery Charge Monitorr

  r
- The battery status is displayed on the taskbar and you get a pop-up window when the charge goes below 15%r

rr r

r

r (6.49) *r How to I boot into 32-bit mode on a AMD64 box?r

r Normally Solaris boots into 64-bit mode on AMD64.r You may want 32-bit for, say, a device driver that's 32-bit only.r To boot into 32-bit mode, copy the Solaris entry in `/boot/grub/menu.lst`r and add "kernel/unix" as the first argumentr on the multiboot line. For example:r r

```
r
title Solarisr
        root (hd0,2,d)r
        kernel /platform/i86pc/multibootr
        module /platform/i86pc/boot_archiver
r
title Solaris 32-bitr
        root (hd0,2,d)r
        kernel /platform/i86pc/multiboot kernel/unixr
        module /platform/i86pc/boot_archiver
```

r r

r [Thanks to Casper Dik]r r

r

---

r (6.50) *r How to I shutdown or reboot from GDM?r

r Add these two lines to `/etc/X11/gdm/gdm.conf`:r

```
r
RebootCommand=/sbin/init 6r
HaltCommand=/sbin/init 5r
```

r r

r [Thanks to Bernd Schemmer]r r

r

---

r

r Copyright © 1997 - 2009 Dan Anderson. All rights reserved.r
r http://sun.drydog.com/faq/r r r

r

---

r

r r r r r r r r r r

r (7.0) TROUBLESHOOTINGr

r (7.1) What can I do if Solaris won't boot?r

r You need to boot from your install CD.r Insert the Solaris Software CD in your CDROM drive.r If your CDROM drive/BIOS isn't bootable, first insert ther "Device Configuration Assistant" (DCA) diskette.r At the "Boot Solaris" menu, choose "CD."r

r At the "Type of Installation: Interactive or JumpStart" menu,r type "`b -s`"r

r Or, after the video configuration, network, time and date you'll noticer one of the menu's has a button: [Exit] Select Exit and, when it asksr you again "do you want to exit?," just say yes.r

r Once you're at the UNIX root prompt #, you can mount the boot drive withr "`mount /dev/dsk/c0t0d0s0 /mnt`"r and view anything wrong with the boot drive (omit the "t0" for ATAPI).r r

r [Modified from Bob Palowoda's Solaris 2.4 x86 FAQ]r

r r

r r r Detailed Contentsr r   73

r

r (7.2) How do I restore the Solaris boot blockr without reinstalling?r

r This may happen when installing a boot manager that comes withr another operating system (such as LILO from Linux) or an after-marketr multi-OS boot manager. These sometimes trample's active partition,r which in our case is Solaris. Also, moving the Solaris partition withr a partition manager program such as Partition Magic requires reinstallingr the Solaris boot block. Before taking these steps, first verifyr the Solaris partition is active. If it isn't, just make the Solarisr partition active and reboot. Otherwise follow the steps below.r

r 1. Boot from CD-ROM and get the root prompt, #, as described inr the previous question, 7.1.r

r 2. Determine the controller, disk number, and partition.r The boot disk is /dev/rdsk/c?t?d?p?r where ? is the controller #, target ID, and disk #, and partition #.r Omit "t?" for ATAPI E.g., /dev/rdsk/c0d0p0r

r 3. Verify it's the correct device correct with prtvtoc for the drive:r This is VERY important; if it's wrong, you you may hose another partition:r `prtvtoc /dev/rdsk/c0t0d0p0`r (omit "t0" for ATAPI, always use p0, which means the "entire drive").r The prtvtoc prints out the map for the Solaris partition on the hard drive,r if found.r The partitions shown on the output are actually "slices" within ther Solaris partition.r

r 4. Restore the boot block as follows:r

r
```
   /sbin/fdisk -b /usr/lib/fs/ufs/mboot (raw disk dev)r
```

r E.g., for SCSI it might be:r

r
```
   /sbin/fdisk -b /usr/lib/fs/ufs/mboot /dev/rdsk/c0t0d0p0r
```

r (omit "t0" for ATAPI)r

r 5. Finally, remove your CDROM and diskette media and typer "`/sbin/shutdown -i6`" to reboot.r The Solaris Multiple Device Boot Menu should appear after rebooting.r If not, you can always to an upgrade (re-)install.r r

r Note:r This procedure does NOT make your Solaris partition active againr (sometimes needed after installing another operating system, such as Windows,r on the same disk),r it just writes to your bootblock IN your Solaris partition.r To learn more about the Solaris boot process, read the boot(1M) man page.r r r

r

r

r (7.3) What can I do during the Solaris/x86 booting sequence?r

r Starting with Solaris 10 06/06, Solaris now uses GRUB to boot,r making the answer below obsolete.r That means you can boot to multiple partitions, with multiple instancesr of Solaris and other operating systems (such as Linux and Windows)r r

r Step #1: Boot loaderr

r If you have multiple partitions, the boot loader in the Solarisr partition will come up and ask you which partition you want to boot.r This partition must be the active partition, or at least be markedr active by a third-party boot manager before this boot loader receivesr control (not all boot managers have this feature). If you don'tr answer in so many seconds, it boots Solaris.r

r This boot manager is pretty basic. It has no customization. Your can't change the default boot partition to one other than Solaris, your can't change the timeout value, and you can't change the partitionr descriptions. But it gets the job done.r

r Step #2: Device Configuration Assistant (DCA)r

r This will ask you to press ESC if you want to change stuff. This is tor make up for the fact that x86 machines don't have a nice OpenBOOT chipr to sort out REAL "Plug and Play".r

r Basically, in Solaris x86, the Device Assistant seems to set upr certain things in `/boot/solaris`. This is so the "real" OS hasr some common format to examine for devices, instead of having lots ofr nasty x86 hardware specific stuff. That way, Sun can keep the main OSr somewhat hardware independent, and keep it very close to the Sparcr version.r

r The "Assistant" can actually been of assistance. If you selectr "partial scan", then "Device tasks", and then "View/Edit Devices", itr will tell you what Solaris THINKS your devices are, and where they arer at. Quite useful, when Solaris gets completely lost, and you'rer wondering if it's your fault, or what.r

r Otherwise, it can give you a warm fuzzy feeling, if you select "Fullr Scan", and you see all your devices properly recognized.r

r Step #3: OS Bootr

r Well, actually, the "Boot Assistant". The interface is similar,r but not identical, to SPARC Solaris' OpenBoot 'boot' command.r The main differences I notice are:r

r

> r
> - It's "`b -r`", not "`boot -r`",r if you want to force reconfiguration.r Why would you want to do that? Well sometimes, if your devices haver changed a LITTLE, you might want to do this. You can also invoke itr with a "touch /reconfigure" as root before rebooting withr "`/sbin/shutdown -i6`".r
>
> r
> - You don't have nice device aliases like you do with Sparc hardware.r That being said, if you do nothing, it should autoboot into the actualr OS in a few seconds. Or you can type something quickly within 5r seconds, and force a "reconfiguration boot", as mentioned earlier.r
>
> r
> - The "Driver Assistant" or whatever, really looks for major changes,r like adding or removing a card. However, if, say, you add another diskr drive, you'll probably want to just do "`b -r`". Note that the Devicer Assistant will itself trigger a "`b -r`", after it has autodetectedr hardware changes.r

r

r Step #4: The Main OS: Solarisr

r You made it (I hope)!. Hopefully, you should now see a line withr "SunOS5.8" or similar in it, and a little twirly text characterr spinner starting. You are now really in the classic Solarisr environment. From here on in, your experience is almost identical tor your brethren who work with SPARC Sun equipment.r

r To learn more about the the Solaris boot process, read the boot(1M)r man page.r

r [Thanks to Phil at http://www.bolthole.com/solaris/]r

r

---

r

r (7.4) How do I logon as root if the password doesn't work anymore?r

r Regaining control of a Solaris x86 system where the root password hasr been lost can be accomplished by the following steps. Note thatr any savvy user can do this with the proper CD-ROM and diskette.r Therefore, of course, physical security of a system is important forr machines containing sensitive data.r

    r
1. Insert installation boot diskette and installation CD-ROM forr Solaris x86.r
2. Boot system from the installation floppy and select the CD-ROM asr the boot device.r
3. Type "b -s" (instead of typing 1 or 2 from the menu) and it'llr drop you straight to a root shell, #, (and you'll be inr single-user mode).r
4. At the root prompt, #, key in the following commands, which willr create a directory called hdrive under the /tmp directory and thenr mount the root hard drive partition under this temporary directory.r

```
        mkdir   /tmp/hdriver
        mount   /dev/dsk/c0t0d0s0  /tmp/hdrive #SCSI; for ATAPI, omit "t0"r
```

    r r
5. To use the vi editor, the TERM variable must be defined. Key inr the following commands.r

```
        TERM=at386r
        export TERMr
```

    r
6. Start vi (or some other editor) and load /tmp/hdrive/etc/shadow file:r

```
        vi /tmp/hdrive/etc/shadowr
```

    r
7. Change the first line of the shadow file that has the root entry to:r

```
        root::6445::::::r
```

    r

8. Write and quit the vi editor with the "!" override command:r

```
        :wq!r
```

9. Remove the floppy installation diskette, and reboot the system:r

```
        /sbin/shutdown -i6r
```

10. When system has rebooted from the hard drive, you can now log inr from the Console Login: as root with no password. Just hit enterr for the password.r
11. After logging in as root, use the passwd command to change ther root password and secure the system.r

r r

r Andreas Pfaffeneder has a simpler suggested to recover the password:r
r Choose the Failsafe-Boot option (which results in kernel/unix -s), answerr "Yes" when you are prompted if / of the installed system should ber mounted.r r Chroot into the system and change the password:r

```
r
# chroot /a /bin/bashr
# passwdr
# /sbin/shutdown -i6r
```

r rr r

r [Thanks to Lynn R. Francis of Texas State Technical College and Andreas Pfaffeneder]r r

r

---

r

r (7.5) My licensed software fails because the host ID is 0. What's wrong?r

r Intel processor machines don't have an IDPROM, so Sun generates a serialr number, hostid command or sysinfo()'s SI_HW_SERIAL, pseudo-randomly duringr installation. The number is stored in /kernel/misc/sysinit,r whose only function, it appears, is to provide the serial number.r If serialization information is tampered or sysinit fails to load,r the host ID will be 0.r If you reinstall Solaris, sysinit will be regenerated and your host IDr will change. So be careful about reinstalling Solaris if you haver licensed software that depends on your host ID. Backup your sysinit file.r

r To preserve the same ID (and therefore licenses), copy filer /kernel/misc/sysinit to the replacement system. I understand ther Sun Workshop/Sun ONE compiler manualr says this is allowed twice per calendar yearr (please verify this yourself).r

r For more information, see the Sun NVRAM/hostid FAQ, available atr http://www.squirrel.com/squirrel/sun-nvram-hostid.faq.htmlr and elsewhere. This also has tools to fake hostids.r

r

---

r

r (7.6) How can I fix Netscape Communicator to render fonts correctly onr S/x86?r

r This problem occurs with Solaris 2.6 and Netscape Communicator 4.0x, andr has since been fixed. Apply patch 106248, which I'm told fixes this problem.r A workaround is to add the following two lines to your ~/.xinitrc file:r

r

r

```
      xset +fp /usr/openwin/lib/X11/fonts/75dpi/r
      xset fp rehashr
```

r

r Another workaround, if you don't have these fonts, is to go into Netscaper Preferences and change the font faces.r

r [Thank's to Alan Orndorff, Jeffrey Cook, and John Riddoch]r

r r

---

r

r (7.7) Why doesn't Netscape run as root?r r

r This is a bug in Netscape.r Due to a Netscape 4.x bug (it thrashes the $HOME environment variable)r the X11 library cannot find root's .Xauthority file in the root dirr unless your current directory is /.r

r Large, complex programsr (especially those taking input from & to the Internet)r should not be run as root.r Experienced users and Administrators run as root only for essentialr sysadmin tasks.r

r If you must run as root, try one of these tricks:r

  r
  • Make sure you run Netscape with a current directory of /r (so that the relative pathname '.Xauthority' works)r
  • Or start Netscape with HOME="/."r (so that Netscape doesn't thrash the $HOME variable)r
  • Or start Netscape with an environment variable XAUTHORITY="/.Xauthority"r

r

r [Thanks to Jürgen Keil via John Groenveld]r r r r

r

---

r

r (7.8) I moved my PCI host adapter to another slot and the system won't boot!r

r Don't move the adapter. It isn't a supported feature in Solaris andr isn't easy to recover from. If you have any choice in the matter, mover the controller back to it original slot.r

r The PCI device number is part of the device's basic ID, including itsr child disks. If you change slots, you've effectively removed thatr controller and its disks, and added an unrelated controller and disks.r You need to fix up all of the references to the old disks to point tor the new disks.r

r I've never come up with any strategy better thanr "boot, observe failure, fix failure, reboot"r for recovering from this kind of change. For simpler cases (single controller, in particular) it can be helpful to clearr /dev/dsk/* and /dev/rdsk/* and run "disks", but that is perilous too.r

r Incidentally, changing motherboards is likely to trip exactly thisr problem, because motherboards generally number their slots differently.r

r To conclude, it's difficult and dangerous, and the general guidelinesr involves fixing:r

r

    r
1. /etc/vfstab or /dev or bothr
2. /devices to match one anotherr
3. possibly removing lines from /etc/path_to_inst in order to maker the right /devices nodes show upr

r

r The ultimate goal is to get back the same controller numbers as before.r

r [Sun FAQ 2576-02 at http://access1.Sun.COM/cgi-bin/rinfo2html?257602.faq]r r

r

---

r

r (7.9)r Why is Solaris always booting into the Device Configuration Assistant (DCA)?r

r This is usually caused by one of the following:r

    r
- You installed Solaris onto a disk other than the primary boot disk.r
- You didn't remove your DCA boot diskette orr if you didn't remove your installation CD-ROM if it's in a bootable CD-ROMr drive.r
- File `/boot/solaris/bootenv.rc` is corrupt or truncated,r usually after a hard reboot or reset.r This file is setup and used by DCA.r It should contain several lines.r

r r

r To change or set your default boot device,r See Sun FAQ 2271-02 atr http://access1.Sun.COM/cgi-bin/rinfo2html?227102.faqr for instructions.r To summarize:r r

r
- From the "Boot Solaris" screen, press F4 (Boot Tasks).r
- On the "Boot Tasks" screen, press Enter to place an "X" inr front of "View/Edit Autoboot Settings."r r
- In the "View/Edit Autoboot Settings" screen, note that ther Default Boot Device will not be set to any valid device.r Place an "X" in front of Set Default Boot Device and pressr F2 (Continue).r
- On the Set Default Boot Device screen, place an X in front of ther correct disk and press F2 (Continue).r
- Arrow up to the Accept Settings and press Enter to mark with an "X".r Press F2 (Continue) to return to the Boot Tasks screen.r
- Press F3 (Back). It will load appropriate drivers after which your will be at the Boot Solaris screen. Press F2 (Continue) to continuer booting.r

r r

r

---

r

r (7.10)r What is the equivalent of STOP-A for Solaris x86?r r

r >I don't think so, because Stop-A allow you to go into open boot prom ofr >the SUN and on a x86 it's a different thing (BIOS)r r Unlike Solaris on Sparc (where STOP-A gets you the OpenBoot prompt),r there is no PROM firmware to drop into on x86.r You can boot your system under kadb and then use a similar keystroke tor drop into kadb and obtain debugging information.r To boot under kadb, type `eeprom boot-file=kadb` and then:r r

r
- Prior to Solaris 8, type CTRL-ALT-d to jump into kadbr
- On Solaris 8 or later, type F1-a to jump into kadbr
- At the Solaris x86 Boot Assistant prompt type "`b kadb`"r

r r You can then type, for example:r
r `$<systemdump`r
r r to force your system to panic and generate a crash dump (the equivalent ofr "sync" at the ok prompt on SPARC).r r

r The Device Configuration Assistant (DCA)r portion of the Intel boot process can be interrupted byr hitting escape (when prompted). This (I feel) is the Intel version of ther Boot Prom Monitor. Of course, all the commands cannot be equated apples tor apples because of the hardware differences!r r

r If your console is a terminal, you can type "shift-break" or "ctrl-break"r or "ctrl-\" (ctrl-backslash)r or "<enter>" followed by "~" and "ctrl-break" on Solaris Sparc,r but this, too, is not available for Solaris x86.r r

r With Solaris 8 SPARC (but not Intel), there's a new feature tor allow keyboard sequences to generate a break (bug 4147705).r The 3-character sequence is <RETURN>, ~ (tilde), ^b.r Each character must be entered between 0.5 to 2 seconds.r This is enabled with the "`kbd -a alternate`" command.r

r Similarly a soft reset is <RETURN>, ~ (tilde), cntl-shift-R,r XIR is <RETURN>, ~ (tilde), cntl-shift-X,r andr Power Cycle is <RETURN>, ~ (tilde), cntl-shift-P,r I believe these commands are also available only on SPARC.r r r

r [Thanks to Ramit Luthra and Mike Shapiro]r r

r

---

r

r (7.11)r How can I reboot Solaris x86 without it asking me tor to "press a key" before rebooting?r r

r This works for me: become root and typer "`shutdown -i6 -g0 -y`".r Or: "`/sbin/shutdown -i6`r This is most useful when the system is remote with no console keyboard access.r don't use `reboot,` `halt,` or `poweroff`r as they bypass the shutdown scripts.r r

r [Thanks to Charles J. Fisher]r r r

r

---

r

r (7.12)r Help! I'm stuck in the "Boot Assistant" and can't boot. What do I do?r r

r If you get a message similar to:r `Run Error: File not found. could not run s`r You probably typed "`reboot -- -s`" or "`reboot -- -r`"r or similar.r This works for Solaris SPARC, but not for Solaris on Intel--it's disastrous.r It changes your "boot-file" eeprom variable to "-s", which errors outr and puts you in an endless loop in B oot Assistant.r

r To undo this, type the following at the Boot Assistant prompt:r "`b kernel/unix`"r This boots with file `/platform/i86/kernel/unix`.r If this doesn't help, your filesystem may be hosed.r In that case, you have to reinstall.r But make sure this is the case first.r r

r

---

r

r (7.13)r Help! I get error 2 or error 8 while applying patches. What do I do?r

r Don't do anything.r Error 2 means you already have the same or newer code.r Error 8 means you can't patch some optional packages thatr haven't been installed, even if you did "everything plus OEM"r during the original installation.r Other errors, usually from lack of disk space, are explained in ther patchadd(1M) man page.r r

r [Thanks to Paul Karagianis]r r r

r

---

r

r (7.14)r How do I prevent kdmconfig from running on boot up when I know myr keyboard, display, and mouse configuration has not changed?r

r Mike of Sun has this response (9/2002):r

r I recognized this as a bug that was fixed a while back, for one instancer with older ATI cards.r I mentioned it to the video developer that fixed the ATI bug and her mentioned that there is a workaround if you see this:r

r This problem occurs with certain hardware (keyboards, mice, video devices).r During booting, a checksum is calculated based on some info obtained forr each device. The checksum is compared to a checksum recorded in ther OWconfig file. If the checksums don't match, kdmconfig thinks the devicer may have changed, and asks the user to check it.r

r On systems that exhibit this problem, the device info that is checksummedr seems to change from boot to boot even though no hardware has changed. I'ver seen this happen with some old ATI video cards and some keyboards.r

r The easy workaround for the problem is to run kdmconfig and test and acceptr the desired configuration by clicking on the "Yes" button of the testr display. Then edit the last line of the OWconfig file inr /etc/openwin/server/etc. Change the "1" to "2", so that is says:r `TestedByUser="2";`r This will cause kdmconfig to ignore checksum differences.r

r If you are upgrading from Solaris 8 or older to Solaris 9,r check the ddxHandler line. It should sayr "ddxSUNWx86mouse.so.1", not "ddxSUNWmouse.so.1".r Otherwise, X Windows won't start (no graphics).r

r [Thanks to Mike Riley]r r r

r

---

r

r (7.15)r I get this error message: "can't get local host's domain name"r or "The local host's domain name hasn't been set."r What do I do?r

r This is a NIS message. The easiest way to fix it is to type the followingr as root:r
r `domainname abc.com; domainname >/etc/defaultdomain`r
r (replace `abc.com` with your NIS domain name,r which is usually the same as the DNS domain name).r r

r

---

r

r (7.16)r My system doesn't boot due to superblockr problems with the root filesystem.r What do I do?r

r r

r Normally, you reboot in single user mode and run /usr/bin/fsckr as root and everything is OK.r If you get a message about errors/problems on /dev/dsk/c0d0s0,r are told to run fsck manually in single user mode, and get this message:r
r `BAD SUPER BLOCK: BAD VALUES IN SUPERBLOCK USE ANr ALTERNATIVE SUPERBLOCK to SUPPLY NEEDED INFORMATION e.g. fsck -F ufs -b=# [special].`r
r then you may be able to recover from this if the disk isn't entirely corrupted.r The superblock stores important information about the file system.r Because it is so important it is duplicated in several places.r Hopefully one of the backup superblocks isn't corrupted.r To see duplicate locations of superblock, use `newfs -Nv`.r For example, if your rootr slice is at /dev/dsk/c0d0s0, run this command:r

r # newfs -Nv /dev/dsk/c0d0s0r You must specify -Nv so you don't clobber your root slice with a new filesystem.r Your output should look like this:r r

```
r
# newfs -Nv /dev/dsk/c0d0s0r
mkfs -F ufs -o N /dev/rdsk/c0d0s0 614880 63 16 8192 1024 16 10 60 2048 tr
0 -1 8r
7 nr
/dev/rdsk/c0d0s0:        614880 sectors in 610 cylinders of 16 tracks, 63r
sectorsr
        300.2MB in 39 cyl groups (16 c/g, 7.88MB/g, 3776 i/g)r
super-block backups (for fsck -F ufs -o b=#) at:r
 32, 16224, 32416, 48608, 64800, 80992, 97184, 113376, 129568, 145760,r
 468576, 484768, 500960, 516128, 532320, 548512, 564704, 580896, 597088,r
 613280,r
```

r r Note the numbers following "super-block backups."r Use one of the numbers in fsck (e.g., 32) and use it with ther fsck -F -o b=r option:r

```
r
# fsck -F ufs -o b=32r
```

r r You may get a messager `FREE BLK COUNT(S) WRONG IN SUPERBLOCK SALVAGE?`r orr `FILE SYSTEM STATE IN SUPERBLOCK IS WRONG; FIX?`r In either case, type "`yes`" and press return.r You should get a `FILE SYSTEM WAS MODIFIED` message.r Reboot your system. If system complainsr about shutdown not being found do a `halt -q`.r Now, hopefully, your system will boot up with out any problems.r r

r [Thanks to Kevin Smith.]r r

r

---

r

r (7.17)r My system doesn't boot because the boot archive is corrupt.r What do I do?r

r The boot archive contains the kernel modules and configuration files that are required to boot your machine.r Boot up in Solaris failsafe mode. Your Solaris image should be mounted on /a.r Type the following:r r r `rm -f /a/platform/i86pc/boot_archive; bootadm update-archive -R /ar`r r

r [Thanks to Pradhap Devarajan.]r r

r

---

r

r

---

r

r r r r r r r r r r r

r (8.0) X Windowsr r

r (8.1)r How do I find a Solaris video driver for my graphics card?r

r First look in the HCL for your release of Solaris to see if yourr graphics card is supported.r Having a supported graphics card on the HCL is very important--more importantr than a supported motherboard.r If the adapter's not listed, look for a driver from these sources:r r

- r
  Solaris 10 comes with both X.org Xserver software and the original XSun software.r Xorg is open source software available for multiple UNIX/BSD/Linux-basedr platforms.r Xorg supports more video adapters and supports them better than XSun.r r

- r
  r [r http://developers.Sun.COM/r](http://developers.Sun.COM/) may have newer drivers for your release.r r

- r
  r Some video drivers may ber bundled (hidden) with Solaris Recommended Update Patches.r r

- r
  r Consider 3rd-party drivers.r [XiGraphics, http://www.xig.com/,](http://www.xig.com/)r is especially recommended if you have a laptop.r The nVidia video drivers are atr [r http://www.nvidia.com/object/unix.html](http://www.nvidia.com/object/unix.html)r r

- r
  r Finally, if all else fails, see the question below on installingr Xorg on Solaris. Personally, it's a lot easier to use a cardr supported by Xsun than to install Xorg.r

r r

r During installation, if you have a unsupported video card,r be sure to bypass kdmconfig with the F4 key.r Use type 4, "Solaris Interactive Text (Console session)," for Solaris 10r and the "Software 1 of 2" CD for Solaris 8 or 9.r

r r

r [Thanks to Paul Karagianis for NVida info]r

r r r

r

r (8.2)How do I install the Xorg video drivers?r

r Beginning with Solaris 10, all Xorg drivers are included with Solaris.r The old "Video Drivers Porting Kit" is no longer needed.r Xorg drivers are also available with the current Solaris 9 Update release.r r

r

r

r (8.3) How do I configure Xorg on Solaris?r

r First use `/usr/openwin/bin/kdmconfig` to select Xorg instead of Xsun.r Run `/usr/X11R6/bin/xorgconfig` to configure Xorg,r which asks questions and creates file `/etc/X11/xorg.conf`r View errors, if any, in `/var/log/Xorg.0.log`.r Try the generic "VESA driver" (which uses the BIOS)r if the driver you picked didn't work.r You may also (carefully) edit `/etc/X11/xorg.conf` directlyr (save the original file first).r To start the X server manually, use `/usr/X11R6/bin/xinit`r r

r r

r

r (8.4) How do I configure 64K colors for XSun/CDE?r

r Solaris' `kdmconfig` offers only a choice of 256 or 16M colors for yourr graphics board with XSun. To configure XSun to use 16-bit color, configure usingr `kdmconfig` for the desired resolution in 256 color mode. Note the boardr line from file `/etc/openwin/server/etc/OWconfig`.r Look in the referenced file in directoryr `/usr/openwin/share/etc/devdata/SUNWaccel/boards` to seer if there is support for 16-bit color mode for your card.r

r If your board is listed, edit file `/etc/openwin/server/etc/OWconfig`r and change `defdepth="8"` to `defdepth="16"` in it.r Also, values for MaxPClk for some cards are way too low in 16-bit and 24-bitr modes in file `/usr/openwin/share/etc/devdata/SUNWaccel/boards`.r But if you want to change this, you are doing it on your own risk.r Some applications hang on 16-bit colors.r

r The CDE logo that is displayed after one logs in is a bit-mappedr grayscale image(!?), but everything else should work just fine.r

r [Thanks to Aleksandar Milivojevic, by way of John Groenveld]r

r r

r

r (8.5) How do I Add KDE, FVWM, or other non-CDE/GNOMEr Window Mangers to the dtlogin screen?r

r **KDE**r The easiest way to add substitute KDE for CDE is to add anr `"exec /path/to/kde"` statement in yourr `$HOME/.dtprofile` file.r

r To add a KDE selection to the dtlogin screenr (in addition to the usual command-line, OpenWindows, or CDE choices),r follow one or both of these links:r r

r
- r r http://www.tiem.utk.edu/~peek/solaris/r written by Michael Peekr
- r r http://twirl.mcc.ac.uk/~zzassgl/wm.htmlr written by Geoff Laner

r r

r **FVWM** The instructions are for FVWM, but apply to any window manager,r such as KDE, AfterStep, WindowMaker, or Enlightenment.r Be aware that these new WMs usually take a bigger memory footprint.r r

r

---

r

r (8.6) Where can I get GNOME or KDE packages for Solaris/x86?r

r GNOME is available with Solaris 9 and above.r KDE is available with the Solaris Companion CD.r They are also available on the web for download.r

r For information about GNOME on Solaris or for a free download, seer r http://www.sun.com/gnome/r For information on GNOME, seer http://www.gnome.org/r

r r

r For general KDE information, seer http://www.kde.org/r When installing KDE, make sure to install the QT library first,r which is required by KDE.r r

r Which is better?r "Religious" wars could be fought over this question.r KDE has a more familiar M$ windows-like interface, and I used to use it.r I use GNOME now since it's most easily available on both Solaris and Linux.r KDE is more mature than GNOME and more tightly integrated,r but some say GNOME is catching up.r GNOME and Mozilla both use the C-based GTK library.r The C++-based QT library, required by KDE,r used to have stricter licensing restrictions,r but now it's licensed under GPL (not LGPL).r KDE is endorsed and supported by IBM, Caldera, and SuSE.r GNOME is endorsed and supported by Sun (and RedHat and HP).r I recommend installing and trying out both GNOME and KDE for a test drive.r You can have both installed at the same time and select which one to user with dtlogin. You can also run KDE apps under GNOME and vice versa.r

r Sun picked GNOME over KDE because of Qt licensing issues,r CORBRA in GNOME, andr because GNOME uses C and KDE uses C++ (the latter causes name manglingr problems which prevents using different C++ compilers).r r

r

---

r

r (8.7) After upgrading to Solaris 9 or installing GNOME,r GNOME does not appear in the dtlogin menu. How can I fix this?r

r Check what your `LANG` variable is set to (AFTER logging in to CDE).r If it's not "C",r you need to copy the GNOME dtlogin resource files to your current locale.r Type this command, as root (1 line):r
```
r cp /usr/dt/config/C/Xresources.d/Xresource.Sun-gnome-2.0*
/usr/dt/config/$LANG/Xresouces.d r
```
r (where $LANG is you current locale)r For example:r
```
r cp /usr/dt/config/C/Xresources.d/Xresource.Sun-gnome-2.0*
/usr/dt/config/en_US.ISO8859-15/Xresouces.dr
```

r If you have trouble AFTER logging into a GNOME session, check these:r

r

- If you define $LD_LIBRARY_PATH, make sure `/usr/lib`r and `/opt/sfw/lib` are at the beginning. E.g.,r `/usr/lib:/opt/sfw/lib:/usr/local/lib`r
- Rename your `~/.xinitrc` file to something elser (e.g., `~/.xinitrc.old`).r
- Erase your GNOME configuration files:r `/usr/bin/gnome-cleanup`r
- For more tips, see ther *GNOME 2.0 Desktop for the Solaris O. E. Troubleshooting Guide*r at http://docs.sun.com/r

r r

r

---

r

r (8.8) Are TrueType fonts supported in Solaris?r

r r Yes, Xsun supports them. Use the Font Administrator GUI,r /usr/dt/bin/sdtfontadm, to add them to the server's list of fonts.r See alsor r http://www.bolthole.com/solaris/verdana.font.txtr r

r [Thanks to Tran Tran]r r

r

---

r

r r (8.9)r After installing and booting Solaris I get this message:r `"The X-server can not be started on display :0"`r

r Your video or mouse settings are probably incorrectr or a video card or mouse was not detected at all.r Check the log files to be surer (`/var/log/Xorg.0.log` if using Xorg or `/var/log/Xsun.0.log`r if using Xsun with a XF86/Xorg driver).r First login in text mode andr check `/var/dt/Xerrors` for error messages.r If nothing obvious is there, runr `kdmconfig`r and try a simpler video settingr (plain VGA, low resolution).r Once that works, try higher-resolution settings and other drivers.r Also try using the Xorg video drivers instead of XSunr (see a previous question on configuring with Xorg drivers).r r

r

---

r

r r r (8.10)r How do I disable CDE auto-start upon booting multi-user?r

r Boot single-user and run `dtconfig(1)`.r That is, at the booting Solaris prompt, type `"b -s"`r After entering your root password, mount `/usr` andr run `"/usr/dt/bin/dtconfig -d"`r r

r [Thanks to John Groenveld]r r

r

---

r

r r r (8.11)r How do I su(1) to another user and run an X application?r

r You need to set your $DISPLAY and allow others to use your console.r If you don't, you get a message like
"`Can't open display`".r By default, only the user who logged in on console can connect to ther
display.r r

r To allow another user to connect there are two ways - one easy and oner secure (unfortunately, you can't
have both):r r

r **Easy:**r As user logged in on console run "`xhost +LOCAL:`"r (This gives permission to connect to the
display to anyoner logged in on the machine—this includes being able to openr windows, read your
keystrokes, send keystrokes, etc. Obviouslyr not a good idea if you have other users on the system you don'tr
trust completely.)r Starting with Solaris 10, you can also use this safer, more-restrictive format:r `xhost`
`xhost +si:localuser:username`r For example: `xhost +si:localuser:root`r

r As any other user logged in on the box, run "`setenv DISPLAY :0`"r or "`DISPLAY=:0; export`
`DISPLAY`", depending on your shell type.r This all assumes you're connecting from the same host, for a
remoter host, change to "`xhost +other-hostname`" andr "`setenv DISPLAY`
`PutYourHostnameHere:0`"r r

r **Safe:**r As user logged in on console run "`xauth list`"r Look for the line for your hostname followed by
":0" and copy it.r As the user you want to grant access to run "`xauth`" and at ther `xauth>` prompt type "`add`
" and paste the line you copied. Nowr "`setenv DISPLAY hostname:0`", making sure you match the
way itr was listed in the line you copied and pasted.r r

r Easier variation of safe method for special cases:r If the other user you want to access your screen is root,
and yourr home directory is either local or on an NFS filesystem exported withr root permissions, just have
root do this:r
r `setenv XAUTHORITY /home/myuserid/.Xauthority ; setenv DISPLAY :0`r
r (replace "`/home/myuserid`" with your actual home directory).r r

r [Thanks to Alan Coopersmith]r r

r

---

r

r r (8.12) Does Solaris x86 support multiple heads?r

r Yes, with Xorg.r Xsun supports multiple heads only for Sun Ray workstations.r A commercial X server
fromr Xi graphics, http://www.xig.com/r also supports multiple heads.r

r [Thanks to John Groenveld, Alan Coopersmith]r r

r

---

r

r r (8.13) How do I get my 2-button mouse to emulate 3 buttons?r

r In Solaris 8, `"kdmconfig"` will autodetect a two-button PS/2 mouse, sor you may never look in the "change pointing device" section.r You need to go in there, and change it fromr `"PS/2 Mouse (2 Button)"` tor `"PS/2 Mouse (2 Button+100ms 3 Button Emulation)"`r r

r [Thanks to Philip Brown]r r

r

---

r

r (8.14)How do I get some older Solarisr GUI's to run with Xorg?r

r Some applications are configured to use Sun's proprietary F3 fonts.r The work-around is to run Sun font server, xfs(1), and to prefix Xorg'sr `FontPath` with it.r r r

r

---

r

r (8.15)r Can I use an old Sun monitor with a 13W3 connector with a VGA adaptor card?r

r Yes. You need an adaptor. Get a 13W3 female to DB-15HD (VGA) male adaptorr to connect a Sun monitor to a PC VGA adaptor port.r Make sure to get the 13W3 female adaptorr (the more-common male adaptor is for connectingr PC-style VGA monitors to Sun video ports).r

r r r

r

---

r

r Copyright © 1997 - 2009 Dan Anderson. All rights reserved.r
r http://sun.drydog.com/faq/r r

r

---

r

r r r r r r r r r r

r (9.0) INTEROPERABILITY WITH OTHER OPERATING SYSTEMSr

r (9.1) Can I install Solaris x86 on a system that already hasr MS Windows 9x/ME/NT/2K/XP/2003r (among other systems)?r

r When you run the Solaris install program, it will ask you which partition your wish to use. On your boot disk all you need to do is to create anotherr partition on your existing disk. You use GRUB to boot to choose to bootr to Solaris or another operating system, such as MS Windows.r

r To shrink an existing MS-DOS/MS Windows partition, if you need to make room,r use something like Partition Magic or Linux ntfsresize.r ntfsresize is also available for Solaris fromr FSWfsmiscr r

r [Thanks to Barry Katz, Brandon Hume, Joseph A. Faracchio, Joelle Nebbe,r Eugeny Kuzakov, and Sean M. Kelley]r

r r

---

r

r (9.2) How can I user MS Windows' NT/2K Loader to boot Solaris/x86?r

r The general idea is that you copy the first sector of your native rootr Solaris/x86 partition into a file in the DOS/MS Windows NT/2K partition.r Assuming you name that file something like `c:\bootsect.sun`r (inspired by `c:\bootsect.dos`)r you can edit file `c:\boot.ini`r (after saving `boot.ini` to `boot.old`):r to come up with something like this:r

r

```
r
[boot loader]r
timeout=30r
default=multi(0)disk(0)rdisk(0)partition(1)\WINNTr
[operating systems]r
multi(0)disk(0)rdisk(0)partition(1)\WINNT="Windows NT"r
multi(0)disk(0)rdisk(1)partition(1)C:\BOOTSECT.SUN="Solaris/x86"r
C:\="DOS"r
```

r

r The "multi(0)" means that it's an ATAPI drive and so for the ATAPI drives,r the "disk(0)" is ignored.r The "rdisk(1)partition(1)" means Solaris is on the first partition of ther second drive on the first IDE channel.r

r This procedure assumes that DOS and NT have been installed onto the firstr ATAPI disk and Solaris/x86 or whatever have been onto the second diskr (use scsi(0) and place the SCSI ID in disk(x) for SCSI drives).r Note that in order to use the Windows NT boot loader, the NT partition mustr be the active boot partition. Solaris/x86 must also be the active bootr partition, so must reside on another disk (This may be another reasonr to use a commercial product, System Commander--see question below).r

r In Solaris,r mount a DOS-formatted floppy (if you've converted C: to NTFS, which isn'tr easily readable from Solaris/x86) or a HD FAT partition (see question below),r under, say, /mnt. Type:r

r

```
r
dd if=/dev/rdsk/c0d0p0 of=/mnt/bootsect.sun bs=512 count=1r
# (Note: The above is for ATAPI; use /dev/rdsk/c0t0d0p0 for SCSI.)r
```

r r

r If the Solaris partition is on a separate drive (as in this example),r you need to modify file bootsect.sun to tell it the boot drive.r The instructions below are for Solaris 7 or earlierr r The bootsect.sun code assumes the drive ID is preloaded into ther x86 DL register before the bootsect.sun is executed.r This is done by the BIOS,

but not the NT loader.r The easiest way to fix this is to modify the bootsect.sun code with ar binary file editor.r The first instruction is a jumpr over the next 4 bytes, the ASCII version ID ("P2.0" in this case).r Use a binary editor tor overwrite this with ar `"MOV DL,0x81"` instruction and some `NOP`s.r I.e., I changed the first six bytes in my bootsect.sun fromr `"eb 04 50 32 2e 30"`r to `"b2 81 90 90 90 90"`r (in hex)r and saved it in file bootsect.sun.r Another person's bootsector began with `eb 79 . . .`r and he changed the first 4 bytes to `b2 81 eb 77` to get it to work.r Some useful drive IDs are: 0x00 for the floppy drive, 0x80 for ther 1st hard drive, and 0x81 for the 2nd hard drive.r

r Reboot into NT.r Copy the bootsect.sun file from the floppy to C:\, if you haven't done so yet.r Modify the DOS/NT attributes (permissions) on boot.ini with:r

r

r
```
attrib -s -r c:\boot.inir
```

r

r Edit to add the appropriate entries from the example boot.ini above,r and restore the system and read-only file attributes:r
r `attrib +s +r c:\boot.ini`r

r

r An alternative to the Solaris "dd" command above is tor use the "postcard-ware" program BootPart 2.2 fromr r http://www.winimage.com/bootpart.htm.r E.g.,r the following displays the partitions, thenr creates a boot sector file bootsect.sun and adds "Solaris" to the NTr loader menu. Edit bootsect.sun as above.r

r

r
```
C:> bootpart.exer
C:> bootpart.exe 1 bootsect.sun Solarisr
```

r

r [Thanks to Krejcarek Brian Grant, Louis Lam, Matt Gillen, and Indego Thorn]r

r r

---

r

r (9.3) Can I mount Solaris ZFS filesystems on Linux or Mac?r r

r ZFS is Zettabyte Filesystem, a modern, flexible, integral filesystem describedr atr http://www.opensolaris.org/os/community/zfs/r r Experimental, unsupported, read-only support for Linux is available fromr Ricardo Correia, a berliOS developer, atr http://zfs-on-fuse.blogspot.com/r as a user-space filesystem.r ZFS filesystem support will be on Mac OS X 10.5 "Leopard."r r

---

r

r (9.4) How can I mount MS Windows NTFS filesystems in Solaris? +r

r Mounting NTFS in Solaris is supported by mount_ntfs, by Martin Rosenau,r and packages FSWfsmisc and FSWfspart, by Moinak Ghoshr (and based on Martin Rosenau's work and part of Moinak's BeleniX work).r I use and recommend FSWfsmisc/FSWfspart as it allows mount directly from ther mount(1M) command and `/etc/vfstab`, supports extended partitions,r and supports NTFS.r Both are explained below and bothr work with Solaris 10 and OpenSolaris ("Nevada").r

r Download the package file for FSWfsmisc/FSWfspart fromr r http://www.belenix.org/binfiles/FSWpart.tar.gzr andr r and install the two packages (pkgadd).r Use `prtpart` to display the partitions and mount to mount the NTFS partition. For example, I use this command:r
r `mount -F ntfs /dev/dsk/c0d0p1 /c`r
r If you have this line in `/etc/fstab` you can mount with just `mount /c`r
r `/dev/dsk/c0d0p1 - /c ntfs - no ro`r
r (change the mount point, /c, and partition c0d0p1 for your system).r Here's the output from mount and FSWfsmisc's xlsmounts:r

```
r
# mount |grep '^/c'r
/c on 127.0.0.1:/ remote/read only/setuid/devices/port=33249/public/vers=r
2/proto=udp/xattr/dev=4700004 on Sun Nov 26 19:42:29 2006r
# xlsmountsr
  PHYSICAL DEVICE    LOGICAL DEVICE     FS    PID        ADDR Mounted onr
  /dev/dsk/c0d0p1    /dev/dsk/c0d0p1    ntfs  3354  127.0.0.1:/ /cr
```

r r r

r Martin Rosenau's program mount_ntfs, also mounts NTFS filesystems,r but with a separate program, mount_ntfs.r Download the binary (and source, if desired) fromr r http://sourceforge.net/projects/mount-ntfs/r Determine what disk and partition your NFS filesystem resides on.r
r `/usr/local/sbin/mount_ntfs /dev/rdsk/c2d0p1 /c`r
r Type mount_ntfs for usage information.r Unmount with umount.r r

r [Thanks to Martin Rosenau and Moinak Ghosh for mount_ntfs and FSWfsmisc]r r

---

r

r (9.5) Can I install Linux and Solaris on the same drive?r

r Yes.r If you use Solaris 10 or greater, it's no problem--as they use differentr partition IDs (0x82 for Linux and 0xBF for Solaris).r Unfortunately, Solaris 9 and earlier and Linux swap partitions use the same ID,r 0x82, so be careful.r

r For the most part, both Linux and Solaris use GRUB to boot load the OS.r Linux and Solaris GRUB both liver at the beginning of the partition and in the /boot/grub/ directory.r Solaris GRUB can boot to either Linux or Solaris directly.r Linux GRUB can't boot to Solaris directly, as it doesn't have ther Solaris modifications (at least yet). But Linux GRUB can "chain load"r to Solaris GRUB.r The following is a sample entry to chain load Solaris GRUB from Linux GRUB:r r

```
r
# Boot from Linux GRUB to Solaris GRUB at the 3rd partition, /dev/hda3r
title Sun Solaris GRUB Boot Loaderr
    rootnoverify (hd0,2)r
```

```
    chainloader +1r
```

r r

r The following is a sample entry for booting Linux from Solaris GRUB.r It can just be copied and pasted from your Linux GRUB menu.lst file:r r

```
r
# Boot from Solaris GRUB to Linux at the 4th partition, /dev/hda4r
title SUSE Linux 10.1r
    root (hd0,0)r
    kernel /vmlinuz root=/dev/tahoma-suse10.1/root-tahoma-suse10.1 vga=0x31ar
    initrd /initrdr
```

r r

r

---

r

r (9.6)r Help! Mount of a Linux NSFv4 fails with "Not owner"r

r If you get this error message mounting a NSFv4 filesystem from a Linux serverr on a Solaris client:r
r `nfs mount: mount: /netdrive: Not owner`r
r then the problem is NFSv4 support is broken in Linux.r There's two solutions for this:r

    r
* Add this line to Solaris file /etc/default/nfs:r
  `NFS_CLIENT_VERSMAX=3`r

    r
* Another solution, on a mountpoint basis is:r
  r `mount -o vers=3 server1:/netdrive /netdrive`r
  r Here's my /etc/vfstab line:r
  r `server1:/netdrive - /netdrive nfs - no`
  `nosuid,rw,soft,rsize=4096,wsize=4096,vers=3`r

rr r

---

r

r (9.7)r Emptyr

r r

---

r (9.8)r Emptyr

r r

---

r

r (9.9)r How can I boot both Solaris/x86 and Win XP/2000/NT on the same disk?r

r With Solaris 10 Update 1 and above, GRUB is the boot loader for Solaris.r GRUB allows you to boot to one out of multiple operating systems on yourr disk, whether Solaris or non-Solaris.r The Windows partition is automatically recognized and added tor your GRUB menu. For example, here's my entry:r r

```
r
title Windowsr
        rootnoverify (hd0,0)r
        chainloader +1r
```

r r Active partition:r You must set the Solaris partition to be ACTIVE in order to make it boot tor Solaris. MS Windows doesn't have to be active to boot. If you make ther Windows partition active, it will only boot to windows and not use GRUB.r

r r

---

r

r (9.10) How do I mount a DOS partition from the hard drive?r

r

```
r
mount -F pcfs /dev/dsk/c0t0d0p0:1 /mnt # SCSIr
mount -F pcfs /dev/dsk/c0d0p0:1   /mnt # ATAPIr
```

r

r

```
r
Where c0 is the controller number.r
      t0 is the target (SCSI ID number) (omit for ATAPI)r
      d0 is always 0 for SCSI, the drive # for ATAPIr
      p0 is the partition (p0 is the entire disk, or p1 - p4)r
      /mnt is the mount pointr
      :1 is the logical drive (c - z or 1 - 24)r
```

r

r Omit the Solaris "slice" number (e.g., "s0") for DOS partitions.r You can use the normal UNIX commands to copy files, 'cp', etc.,r after that to move the data. DOS filenames are in ther long filename format (mixed case, with optional lower case only)r for Solaris 7 and higher.r DOS 8.3 names are in UPPER case unless you user the "-o foldcase" option, which folds all UPPER case and mixed caser names to lower case (see man mount_pcfs(1M) for details).r r

r Note: The "mount -F pcfs . . ."r command won't mount a FAT16 partitionr if it was fdisk-ed and format-ted withr MS Windows 9x/ME/NT/2K/XP/2003r (at least for Solaris 2.6 and earlier.r Any reports with Solaris 7/8?).r Use DOS 6.x. HPFS (OS/2), FAT64 (Win NT), or NTFS (Win NT/2K/XP/2003)r partitions are not mountable under Solaris at all.r FAT32 (Win 9x/ME/2K/XP/2003)r are mountable with Solaris 7.r There's some reports of not being abler to mount FAT32 partitions if it's not the first partition.r

r To mount the partitions automatically, put something like this inr /etc/vfstab:r

r

```
r
#device          device          mount     FS    fsck  mountr
#to mount        to fsck         point     type  pass  at bootr
/dev/dsk/c0d0p0:1 -              /c        pcfs  -     yes      -r
/dev/dsk/c0d1p0:1 -              /d        pcfs  -     yes      -r
```

r

r This mounts the DOS partitions (assuming it's the first partition) on /cr and /d, respectively, on startup. For more info, see "man pcfs"r

r [From Bob Palowoda's Solaris 2.4 x86 FAQ]r

r Note: p0 refers to the first primary partition and p1, p2, . . . refersr to the logical DOS partitions found in the extended DOS partition.r Solaris/x86 does NOT support DOS directly in the 2nd, 3rd, or 4th primaryr partition of a disk. See BugID 1170107. Furthermore, Solaris/x86 doesr NOT support more than one Solaris fdisk partition on a physical diskr nor more than 8 Solaris "slices" on a Solaris fdisk partition.r

r [Thanks to Randy J. Parker, Norma Adamson, Rob Duarte, and Danny Huynh]r

r r

---

r (9.11) Does PartitionMagic and BootMagic understandr Solaris partitions?r

r Yes and no.r BootMagic can be setup to boot Solaris partitions, since it dynamicallyr marks the partition as active. The setup, however, doesn'tr automatically recognize these partitions as Solaris (but as Linux Swapr partitions).r r

r PowerQuest's PartitionMagic can copy and move Solarisr Partitions, with a low-level sector-by-sector copy.r It cannot enlarge or shrink the Solaris Partition,r which actually contain multiple "slices" of various Solaris ufs file systems.r Furthermore, after a partition copy, the boot block needs to be restored.r See the question elsewhere in thisr FAQ "How do I restore the Solaris boot block without reinstalling?"r r

r Grant Chivers provides these instructions tor install Solaris on a Windows/Linux system with the PowerQuest Partition Editor:r

  r
- r Before installing Solaris use Ptedit, that comes with PowerQuest'sr Partition Magic, to write out a copy of all the data about the existingr partitions because a Solaris install will change all this.r
- r If there are Linux Swap partitions (type 83) I change them to "Hidden ext2r partitions" (type 93), then reverse this after Solaris installation completed(this is only needed for Solaris 9 and earlier, as Solaris partitions now use type BF starting with Solaris 10).r
- r If installing Solaris to free disk space, I suggest you first create ar partition (any type, such as OS/2) on the free disk spacer to get the hard disk data settingsr that will be used for the Solaris partition.r Then delete the partition to regain free disk spacer (or use the Solaris fdisk when it prompts during install).r
- r Install Solaris.r Ensure that Solaris fdisk chooses the correct partition to format.r

- r Reboot to Solaris again to finish setup, etc.r
- r Reboot to DOS and run Ptedit again and adjust to previous configuration withr the new Solaris partition being type 82.r
- r Change the Linux Swap partition back to 83 if it was changed previously.r
- r Exit System commander and use DOS fdisk to check that the original activer partition is regained.r
- r Configure your bootloader.r
- r I use V-Com's System Commander as a boot menu (lilo or Ntloader could ber used instead but they require a little more configuration).r
- r Reboot and it all should work.r
- r Similarly, if installing Linux with an existing Solaris partition, change ther partition type to another type (e.g., OS/2),r install Linux and then change the Solarisr partition back to type 83.r

r r

r

---

r (9.12) How do I access a DOS-format diskette from Solaris?r

r Using volume management, type "volcheck". This forces Solaris to pollr the diskette drive (and other drives). The diskette drive isn'tr polled automatically (unlike the CD-ROM), as it would quickly wear it out.r You should see something like this typing "mount":r

r

```
r
/floppy/unnamed_floppy on /vol/dev/diskette0/unnamed_floppy read/writer
on Wed Jan 20 09:05:44 1999r
```

r

r To unmount using volume management, type "eject". After a message, your can manually eject the floppy safely.r

r You can also mount the diskette in a similar way to hard drive partitionsr without using volume management (the old way):r

r

```
r
mount -F pcfs /dev/diskette /mntr
```

r

r Don't forget to turn of the volume management before you try tor do this from the command line or you'll get a "device busy"r message. "/etc/init.d/volmgt stop" will stop the volumer manager. To restart the volume manager, "/etc/init.d/volmgt start".r

r [From Bob Palowoda's Solaris 2.4 x86 FAQ and Casper Dik's Solaris 2 FAQ]r

r The GNU mtools package allows access of DOS diskettes without beingr root. The diskette isn't mounted, but instead special commands withr the prefix m, such as mcopy, mdir, mdel, etc. are available.r

r r

r

r (9.13) Does Solaris mount and recognizer MS Windows partitions with long file names (VFAT)?r

r Solaris 2.6 and above uses the "long" (VFAT) file names, but earlierr versions of Solaris use the "short" (DOS/FAT/8.3) file namer (for example, "`progra~1`").r Solaris 2.6 recognizes the case (e.g. "`Program Files/`"),r which may be optionally folded to lower case ("`program files`")r with the foldcase mount option.r Earlier "Solari" folds DOS file names to lower case only.r VFAT refers to the file naming convention and is completelyr separate from FAT16/FAT32 (see a earlier question for that).r

r [Thanks to Nelson Chan]r

r r

r

r (9.14) How can I make my Solaris files easily available tor MS Windows on a network?r

r Solaris PC NetLinkr provides "a complete set of Windows NT Network Services,"r which includes SAMBA-type NT naming, file, print, directory, and securityr services for Windows 3.11/95/98/NT clients.r It is based on Microsoft NT 4 code licensedr via AT&T ("Advanced Server for Unix").r It used to be available for Solaris/x86, but is now available only forr Sun Enterprise servers.r

r In any case I prefer SAMBA for Solaris 10 or earlier, or Solaris SMB for OpenSolaris ("Nevada").r SAMBA is a robust, open source package that providesr SMB services (aka MS Windows networking) from UNIX.r This allows LAN-Manager-type browsing and "Connect Network Drive,"r and provides access to UNIX print servers.r SAMBA can act as a file, print, browser master, and WINS servers, but not asr a domain controller (that's in the works).r SAMBA also serves files faster than NetLink (or Windows, for that matter).r However, NetLink implements SMB better than SAMBA, since it usesr Microsoft-licensed code, while SAMBA must reverse-engineer the code.r SAMBA is provided with Solaris 9 and later.r For the SAMBA FAQ, sources, binaries, and other information,r see the SAMBA web page at:r http://samba.anu.edu.au/samba/r

r OpenSolaris SMB allows files to be shared on MS Windows.r To enable add this line to `/etc/pam.conf` :r

```
r
other password required pam_smb_passwd.so.1 nowarnr
```

r Enable the service and join a MS Windows Workgroup:r

```
r
svcadm enable -r smb/server;r
smbadm join -w MYGROUP # (default is WORKGROUP)r
sharemgr add-share -s /myshare -r myshare -d "My OpenSolaris SMB share" defaultr
sharemgr list -vr
sharemgr show -vpr
```

r Change "myshare" to the name of the root directory you're sharing.r Then use passwd(1) to set any passwords you'll be using in MS Windowsr (old passwords set before pam.conf is modified are not used).r On MS Windows, go to Windows Explorer or My Computer and, from the Tools menu,r select "Map Network

Drive": \\myhostname\myshare. Change myhostname to your OpenSolaris hostname and myshare to the root directory being shared.r Login with the username and password set with passwd, above.r No guest login is allowed.r r r

r Sun has a commercial product, Solstice LM Manager, that works (poorly)r with MS LAN Manager/SMB and links in with NIS/DNS.r

r r

---

r

r (9.15) How can I access files on a remote MS Windows, SMB,r or SAMBA share?r

r You can't use mount or smbmount, as on Linux,r because no Solaris kernel driver is available. You can use smbsh, smbclient,r or Sharity as workarounds. For example,r `"smbclient //servernamehere/sharenamehere"`r then type `"get somefilename` to access a file.r smbsh allows SMB file access through UNIX commands, such as ls or egrep,r from your UNIX shell. The shell must be dynamically linked in orderr for this to work (which is the typical case). To use type `"smbsh"`r then access your SMB files from `"/smb/groupnamehere/servernamehere`r

r If you use GNOME, Nautilus has the ability to browse SMB shares,r but you can't open the file directly. You drag (copy) files from a SMB sharer to your local disk (and vice versa).r

r Another solution is to us NFS instead of SMB. Get a file serverr (Network Attached Storage, NAS) that supports NFS.r If accessing from windows, download MS Windowsr "Services for Unix," which supports NFS, atr r http://www.microsoft.com/windows/sfu/r

r The best solution may be Sharity-Light from Objective Development.r It's open source, GNU licensed that runs in user (not kernel) spacer using the Solaris NFS kernel interface. Seer r http://www.obdev.at/products/sharity-light/r for details. Here's how I mount a SMB share with sharity:r
r `shlight //mazama/d /d -nr`

r Objective Development also has a commercial product, Sharity,r which also provides SMB server functions, atr r http://www.obdev.at/products/sharity/r Sharity works with 32-bit x86, but not 64-bit.r r

---

r

r (9.16) How can I make my Solaris files easily available tor an Apple Macintosh on a network?r

r Upgrade to MacOS X, which has native support for NFS and Microsoft SMB.r

r Or use CAP, an excellent open source AppleTalk server software for UNIX.r The Columbia AppleTalk Package (CAP) implements the AppleTalk protocol stackr on UNIX The main applications provide an AppleShare 2.1 compatible serverr (aufs), a LaserWriter Spooler (lwsrv) and a program to print tor LaserWriters (papif). For more information, see:r r http://www.cs.mu.oz.au/appletalk/cap.htmlr

r r

---

r

r (9.17) Can I use SunPCi on Solaris/x86?r

r No. SunPCi is an add-on card and software for Solaris on SPARC only.r SunPC emulates a PC with the card and Caldera's "DR-DOS" allowingr Windows 3.1/9xr to be installed on top of it.r The card has a 300 MHz K6-2 AMD processor and RAM.r It emulates hard and floppy drives, serial ports,r SuperVGA, mouse, keyboard, etc.r Generally, SunPCi or it's older cousin, SunPC, emulates ther PC environment OK, although it performs more slowly than a straight PCr (your mileage may vary). Software that requires a parallel portr hardware key (dongle) won't work.r

r r

r

r (9.18) Will Linux programs run on Solaris 2/x86?r

r The Lxrun program, originally written forr SCO, is now available on Solaris/x86.r The Lxrun emulator allows one to execute Linux binaries,r both in ELF and a.out Linux formats.r Linux ext2 read-only filesystem support from Solaris (mount/unmount)r is included with either package FSWfsmisc or `ext2fs.tar.gz`.r

r To install, first install package SFWlxrun from ther Solaris Software Companion CD.r Setup or mount a ext2fs filesystem, say at `/linux` (as explainedr in a question below on ext2fs).r

r To use, run programs or shells prefixed with `lxrun`. For example:r

```
r
$ uname -ar
SunOS dany.drydog.com 5.8 Generic_108529-06 i86pc i386 i86pcr
$ lxrun /linux/bin/rpm -q redhat-releaser
redhat-release-6.2-1r
$ lxrun /linux/bin/uname -ar
SunOS dany.drydog.com 5.8 Generic_108529-06 i86pc unknownr
```

r r

r To avoid prefixing Linux filenames with "`/linux/`"r (or wherever your ext2fs is mounted), and setup a PATHMAP filer (to map Linux filenames to Solaris names).r For Sun's SFWlxrun version of lxrun, type this, as root, to set it up:r
r `(cd /usr/sfw/lib; cp -p PATHMAP-style2 PATHMAP)`r
r For other builds of lxrun, PATHMAP may be atr `/usr/local/lxrun/PATHMAP`.r The file location can also be changed with environment variable $PATHMAP.r r

r lxrun has been replaced with BrandZ in Solaris 10, which allows one tor run Linux 2.4-based software on a Solaris "Branded" Zone (or "Container").r The focus is on running Red Hat Enterprise Linux (RHEL) and CentOS.r r

r For more information see the following links:r r

> r
> - The Solaris Lxrun Technical Overview (FAQ) is at:r r
>   http://developers.Sun.COM/solaris/articles/lxrun/r
>
> r

- And another Sun article is at:r http://www.Sun.COM/linux/lxrun/r

  r
- The Lxrun home page is atr r http://www.ugcs.caltech.edu/~steven/lxrun/r

  r
- BrandZ at OpenSolaris,r r http://www.opensolaris.org/os/community/brandz/r

rr

r r

---

r

r (9.19)r How can I get the DOS and UNIX clock to agree on Solaris/x86?r

r After installation, run the command `/usr/sbin/rtc -z $TZ`, where $TZr is your timezone. The default root crontab runs /usr/sbin/rtc -c daily.r That way your clock will give the proper time whether you boot Solarisr or MS-DOS/MS Windows.r

r If you're running Windows NT and find the clock "overadjusted" twice a yearr (that is, it gains or loses an *extra* hour),r you should comment out (with a "#")r the "`rtc`" line in file `/var/spool/cron/crontabs/root.`r r

r [Adapted from Casper Dik's Solaris 2 FAQ]r

r r

---

r

r (9.20)r Is Solaris x86 able to execute Solaris SPARC applications?r

r There's no way to run a SPARC binary on an x86 machine unless your have an emulator for the SPARC CPU.r Transitive, http://www.transitive.com/ has emulation software that runs SPARC software on x86.r

r r

---

r

r (9.21)r Will my old applications from SVR3 or SCO run on Solaris 2/x86?r

r Solaris x86 has an emulation mode that should run the majority ofr well-behaved SVR3 (including SCO UNIX), and SCO Xenix binaries.r Most SVR3 stuff appears to work under Solaris 2.4.r

r Applications from any other vendor's standards-conforming 386/486 SVR4r should also run. The main standard being iBCS (Intel Binaryr Compatibility Standard).r

r However, some vendors have made incompatible changes to theirr SVR4 release and programs linked on those versions may not work.r Future versions of Solaris 2.x for Intel will address some/mostr of those incompatibilities. UNIXWare is one of the offenders.r

r [From Casper Dik's Solaris 2 FAQ]r

r Linux binaries will run with the assistance ofr lxrun (see the lxrun question above).r

r r

---

r

r (9.22)r Will my application from Solaris/SPARC work on Solaris/x86?r I have the source.r

r Yes and no. Generally applications that don't make assumptions aboutr computer architecture will work. That is, code shouldn't depend onr structure or union alignments, or in what order a number appears in ar word ("big endian" SPARC or "little endian" Intel).r Don't use functions labeled SPARC or x86 only in the man pages.r In other words, "well-behaved" C (or otherr language) programs should recompile fine.r r

---

r

r (9.23) Can I access Solaris/x86 partitions from Linux?r

r Yes. Read-only access is available. You need to have Linux 2.1.x orr greater. To see if your Linux kernel recognizes Solaris partitions,r type the following on Linux:r dmesg | grep solarisr

r You should get something like this:r

```
r
 hda: hda1 hda2 <solaris: [s0] hda5 [s1] hda6 [s2] hda7 [s3] hda8r
 [s5] hda9 [s6] hda10 [s7] hda11 >r
```

r

r This says that Solaris lives in the 2nd partition (hda2), slices 0 to 7.r These Solaris slices are mapped to virtual partitions hda5 to hda11.r r

r To mount a partition, type something like this:r

```
r
   mount -r -t ufs -o ro,ufstype=sunx86 /dev/hda5 /mntr
```

r

r This will mount the root slice (s0) on /mnt read-only.r r

r Warning: Softlinks that are relative to rootr (e.g., /usr/local pointing to /local)r will point to the wrong place.r To avoid this problem, change these links inr Solaris to relative soft-links (e.g., /usr/local to ../local).r

r This can be automated with /etc/fstab.r If you don't want the partitions mounted at boot, add ",noauto"r after "defaults,ro" (no space). If you want non-root users to be abler to mount partitions, add ",user" (careful!):r

r

```
r
# /etc/fstabr
```

```
# . . .r
#Device      Mount                     FS                        Fsck Mount atr
#to mount    point                     type Options             pass boot # Slicer
/dev/hda5    /solaris                  ufs  defaults,ro,ufstype=sun 0 0    # s0r
/dev/hda8    /solaris/var              ufs  defaults,ro,ufstype=sun 0 0    # s6r
/dev/hda9    /solaris/opt              ufs  defaults,ro,ufstype=sun 0 0    # s3r
/dev/hda10   /solaris/usr              ufs  defaults,ro,ufstype=sun 0 0    # s5r
/dev/hda11   /solaris/export/home ufs  defaults,ro,ufstype=sun 0 0    # s7r
# Note: slice s2, by convention, indicates the whole diskr
```

r

r If, when you type "dmesg" above, you don't see Solaris partitionsr recognized, you might have to rebuild your Linux kernel. Be surer to specify "y" in /usr/src/linux/.config when you type "make config":r

r

```
      CONFIG_UFS_FS=yr
      CONFIG_SOLARIS_x86_PARTITION=yr
```

r

r Linux 2.2 has experimental write support to Solaris partitions.r If you get this message when mounting in read-write mode:r "... ufs_read_super: fs needs fsck"r r then UFS function ufs_read_super somehow decided the fs isn't clean,r and therefore set the RDONLY bit.r Type something like this to re-mount in read/write moder (replace "hda5" with your file system):r

r

```
   mount -o remount,rw /dev/hda5r
```

r r

r There's another Linux kernel configuration question,r CONFIG_SMD_DISKLABEL, that applies only tor Sparc Solaris disks, which are in yet another format.r The answer to that question doesn't matter for Solaris/x86 filesystems.r

r r

r

r (9.24) Can I access Linux (ext2/ext3) partitions from Solaris?r

r Yes. You can do this wither with Moinak Ghosh's FSWfsmisc/FSWfspartr (for Solaris 10 or OpenSolaris ("Nevada"),r developed as part of Moinak's BeleniX work)r or with the older ext2fs (Solaris 7-10).r I use and recommend FSWfsmisc as it works better with extended partitionsr and also mounts NTFS filesystems.r I use and recommend FSWfsmisc/FSWfspart as it allows mount directly from ther mount(1M) command and /etc/vfstab, supports extended partitions,r supports NTFS filesystems,r and supports 32-bit and AMD64 Solaris.r Both FSWfsmisc and ext2fs are explained below.r r

r Download the package files for FSWfsmisc/FSWfspart fromr r http://www.belenix.org/binfiles/FSWpart.tar.gzr andr r and install the two packages (pkgadd).r Use prtpart to display the partitions and mount to mount the NTFS partition. For example, I use this command:r
r mount -F ext2fs /dev/dsk/c0d0p6 /linuxr
r If you have this line in /etc/fstab you can mount with just mount /cr

r [/dev/dsk/c0d0p6 - /linux ext2fs - no ro](#)r
r (change the mount point, /linux, and partition c0d0p6 for your system).r Here's the output from mount and FSWfsmisc's xlsmounts:r

```
r
# mount |grep /linuxr
/linux on 127.0.0.1:/ remote/read only/setuid/devices/port=33285/public/r
vers=2/proto=udp/xattr/dev=4700005 on Sun Nov 26 20:13:10 2006r
# xlsmountsr
  PHYSICAL DEVICE     LOGICAL DEVICE      FS    PID         ADDR Mounted onr
  /dev/dsk/c0d0p0    /dev/dsk/c0d0p6  ext2fs  3429  127.0.0.1:/ /linuxr
```

r r

r Linux ext2/ext3 read-only filesystem mounts from Solaris (mount/unmount)r is also available with ext2fs.r For Solaris 10, ext2fs supports extended partitions.r r

> r
> 1. Obtain the `ext2fs.tar.gz` file for your version of Solaris.r Note that this software is not supported and may contain bugs.r **Use at your own risk**.r
>
>   r
>   ♦ Solaris 10:r [ext2fs.solaris10.tar.gz](#),r
>   ♦ Solaris 9:r [ext2fs.solaris9.tar.gz](#),r
>   ♦ Solaris 8:r [ext2fs.solaris8.tar.gz](#),r
>   ♦ Solaris 7:r [ext2fs.solaris7.tar.gz](#)r
>   r
>
>   r
> 2. Untar filer `"gzcat ext2fs*.tar.gz | tar xvf -"`,r and either rebuild from source or use the included pre-built binaries (easiest).r r
>
>   r
> 3. Become root and install the filesr by running `"./getext2fs"` as root from the source directoryr downloaded above.r r
>
>   r
> 4. r Make your mount point. For example: `"mkdir /linux"`r
>
>   r
> 5. Find your Linux partition and try and mount it.r For SCSI, mount it similar to this:r
>
>   r
>   `/usr/sbin/mount -r -F ext2fs /dev/dsk/c0t0d0p1 /linux`r
>
>   r For ATAPI, mount it similar to this (no `"t0"`):r
>
>   r
>   `/usr/sbin/mount -r -F ext2fs /dev/dsk/c0d0p1 /linux`r
>
>   r `"c0d0p1"` indicates fdisk partition 1 (2nd partition)r on disk 0 of ATAPI controller 0.r
>   r For an extended partition and ATAPI, it might look like this:r
>   r `/usr/sbin/mount -r -F ext2fs /dev/dsk/c0d0p2:1 /linux`r
>   r where p2 means the extended partition (type 0x05) is partition 2 (out of 1-4) and ":1" is the 2nd

extended partition (:0 would be the first extended partition).r See the question above on mounting DOS filesystemsr and the question below on decodingr `/dev/dsk/c*` device names.r r

r
6. r If you installed the ext2fs correctly and specified the correct partition,r you should see something like this from mount, modinfo, and ls.r (My Linux partition is on the 2nd disk, 3rd partition.)r

```
r
# mount | grep /linuxr
/linux on /dev/dsk/c0d1p2 read only/setuid/dev=1980052 on Sat Mar 31 14:57 2001r
# modinfo | grep ext2fsr
186 fe9688f1  5e98  19   1  ext2fs (Linux Second Extended Filesystem)r
# ls /linuxr
bin        etc        lib        proc       sbin       tmpr
boot       home       lost+found root       var        usrr
dev        include    mntr
```

r r

r
7. Once you found and mounted the correct Linux partition, addr and add an entry to `/etc/vfstab` similar to one of the following.r For SCSI, it might look like this:r
r `/dev/dsk/c0t0d0p1 - /linux ext2fs - no ro`r
r r For ATAPI, it might look like this (no "t0"):r
r `/dev/dsk/c0d0p1 - /linux ext2fs - no ro`r
r (Use "yes" instead of "no" if you want it mounted automatically at boot).r r
r For an extended partition and ATAPI, it might look like this:r
r `/dev/dsk/c0d0p2:1 - /linux ext2fs - no ro`r
r where p2 means the extended partition (type 0x05) is partition 2 (out of 1-4) and ":1" is the 2nd extended partition (:0 would be the first extended partition).r r

r
8. Repeat for other Linux filesystems, if desired.r

r r

r Once you mount a ext2fs filesystem,r you can execute Linux programs using lxrun (see the question on lxrun, above).r r

r You can also backup a ntfs filesystem partition with ntfsclone.r For example, here's how I backup the NTFS partition on my laptop to ar removable hard drive or NFS filesystem:r

```
r
nice ntfsclone --save-image /dev/dsk/c0d0p1 -o - 2>ntfsclone.log \r
       | bzip2 -c >/mnt/backup-drive/ntfs-partition.img.bz2r
```

r r Other ntfs tools in FSWfsmisc are:r ntfscp, ntfslabel, ntfsresize, ntfsundelete, ntfscat, ntfscluster, ntfscmp,r ntfsfix, ntfsinfo, & ntfsls.r r

r For further information, see ther ext2fs(7fs) and mount_ext2fs(1m) man pages you installed above.r r

r Paul Floyd has ext2fs drivers for Solaris 7, 8, 9, and 10 atr http://paulf.free.fr/software.html.r His webpage also has partition tools to resize and edit UFS partitions.r r

r The OpenSolaris Ext3 Project seeks to add e2fs/e3fs filesystem support. Seer r http://opensolaris.org/os/project/ext3/r r

r [Thanks tor Moinak Ghosh for FSWfsmisc (Solaris 10 and OpenSolaris),r Paul Floyd for the Solaris 9 and 10 ports,r and Mike Sullivan for the Solaris 8 port.r Neither I nor they take any responsibility for errors with thisr unsupported software.]r

r r r

r

---

r

r (9.25)r What are some books on Windows NT/Solaris integration?r

r The best book is, IMHO:r David Gunter, Steven Burnett, and Lola Gunter,r r *Windows NT and UNIX Integration Guide*r (Osborne McGraw-Hill, 1997), ISBN 0-07882395-1,r r http://sun.drydog.com/bookstore/#0078823951r

r Also see the question above on SAMBA.r

r r

---

r

r (9.26) How can I view MS Word files in Solaris?r

r Multiple applications support viewing MS Word files.r None are perfect, as MS Word file format is a trade secretr and changes constantly.r r

r StarOffice,r produced by a German subsidiary of Sun,r supports MS Word, basic PowerPoint, Excel files, and other formats.r StarOffice 7 is available for US $79.95 at computer stores andr http://www.Sun.COM/staroffice/r r StarOffice is my preferred word processor because it's available onr multiple platforms, including Solaris x86,r because it has a familiar MS Office-type interface.r Educationalr (.EDU-affiliated) individuals can obtain StarOffice and a number ofr other software packages via the EduSoft program for free.r See "Individuals" atr r http://www.sun.com/products-n-solutions/edu/promotions/edusoft/r r r

r Open Office,r http://www.openoffice.org/r an open-source spin-off from StarOffice, is free.r It doesn't contain some components of Star Officer (such as some fonts, macros, and clip art and a better spell-checker),r but is perfectly acceptable for casual use.r Solaris x86 binaries are available, as are SPARC, Windows, Linuxr and Apple Mac OSx.r r

r AbiWord is also available forr Solaris x86.r AbiWord only does word processing, but I understand it hasr all the basic functionality.r I have no personal experience with it however.r It's available in source form only, so you have to buildr it yourself (download the gcc compiler).r See the question below on building Abiword for Solaris.r r

r Corel WordPerfect 8, although getting a little "long in the tooth"r (outdated), it is still available. WordPerfect for UNIX supportsr WordPerfect, Word (old and new), HTML, RTF, FrameMaker, Applix,r and several other

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document formats.r Price varies and it's not cheap.r There's no Sparc Intel binary available, but some people runr Linux Intel binary on Solaris using lxrun softwarer (see elsewhere in this fax).r Seer http://www.corel.com/wpunix/r r

r The VistaSource's Anyware Office suite can read Word files,r among other formats, as above,r and comes with a spreadsheet and other applications. I still preferr WordPerfect for word processing, but Applix Office offers a broader arrayr of applications.r Applix Office is also getting "long in the tooth."r Seer http://www.vistasource.com/r r

r You can also try wv (free), which converts Word 8 (Office 97), butr not older, Word files to HTML. WordView is available in source formr (mostly Perl and some C) fromr http://www.wvWare.com/r

r For the above software, more complicated Word format files cannot ber converted, especially those saved with "Quick Save" enabled.r Be aware that these office suites seem to require systems with 128MB ofr memory or more to perform reasonably (in my experience).r

r Finally, you CAN'T use Sun's PC File Viewer.r It's available (and free) only for ther SPARC-resident Solaris 2.6 PC File Viewer is Sun's relabeledr version of Inso Corp.'sr (http://www.inso.com/) QuickView Plus.r See r http://www.Sun.COM/desktop/products/software/pcviewer.htmlr r

r

---

r

r (9.27) Where can I get Netscape, Mozilla, Firefox,r or other web browsers for Solaris x86?r

r Netscape comes with Solaris 8 and 9.r For Solaris 7 or earlierr or for the "domestic" version with 128-bit (high) encryption,r you can download it fromr r ftp://ftp.netscape.com/pub/communicator/english/4.79/unix/unsupported/sunos551_x86/r This address changes slightly for each language and version.r Or tryr r http://www.netscape.com/download/r r

r Netscape is available in pkgadd/webstart formats from Sunr (including 128-bit encryption) fromr r http://www.Sun.COM/solaris/netscape/r This seems to be better integrated with Solaris (especially Java),r although they are usually a point release or two behind.r There's also a FAQ here.r r

r Mozilla.r Mozilla is like Netscape 7 (which is based on Mozilla),r but more cutting-edge (and slightly more buggy),r but I prefer it.r Mozilla Firefox is like Mozilla, but with only the web browser.r The email client is split off to Thunderbird.r Mozilla and Firefox allows you to disable pop-up ads,r and has tabs and other modern features.r Mozilla is missing a spell checker.r Solaris x86 binaries are from Sun atr r http://wwws.sun.com/software/solaris/browser/r andr http://www.mozilla.org/releases/r For troubleshooting tips with Solaris Mozilla, seer r http://www.mozilla.org/unix/solaris.htmlr

r r r

---

r

r (9.28) How do I setup Xprint for Mozilla?r

r Some builds of Mozilla for Solaris (unfortunately) require a Xprintr server to be running before you can print from Mozilla.r This is true if you get a message saying no Xprint servers were foundr when you try to

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print.r To enable Xprint, I added these lines in my .profile shell initialization file:r

```
r
MYXPRINTDISPLAY=1956 # Random unused port--change if not working.r
/usr/openwin/bin/Xprt :$MYXPRINTDISPLAY & # Exits if already running on displayr
XPSERVERLIST="localhost:$MYXPRINTDISPLAY" # Let Mozilla know the display #r
export XPSERVERLISTr
```

r Also, change `default-printer-resolution`r from 300 to 600 (or higher) in filer `/usr/openwin/server/etc/XpConfig/C/print/attributes/document`r if the printer output is too small.rr r r

r

---

r

r (9.29)r Can I mount other ufs disks, say from BSDi/FreeBSD, and vice versa?r

r Maybe. First, although Solaris, BSDi, FreeBSD, and NetBSD share ar common-heritage file system, the Berkeley-style ufs, Solaris has mader extensions. The 32-bit UID field has been modified in Solaris to ber a pointer to a parallel "Shadow inode" with Solaris ACL information.r Also, the superblock has an additional inode field in Solaris and 2 fieldsr have different byte swappings.r

r Reportedly, you can mount, say, zip disks from FreeBSD, on Solaris byr doing a fsck on them before mounting. Fsck makes these fields Solaris-r compatible. Your mileage may vary and you should test this (in bothr directions) before trying this on live data.r

r r

---

r

r (9.30) How can I use a disk partition on Solaris 2.xr which was previously dedicated tor MS Windows 9x/ME/NT/2K/XP/2003r (or other OS) as dual boot?r

r On Solaris 2.x, use fdisk to find your disk partition table.r For example, on an ATAPI drive,r
r # fdisk /dev/rdsk/c0d0p0r
r would show something like the following:r r

```
r
Total disk size is 524 cylindersr
Cylinder size is 16065 (512 byte) blocksr
Cylindersr
Partition   Status   Type          Start   End   Length    %r
=========   ======   ============  =====   ===   ======   ===r
1                    Solaris           0   260      261    50r
2           Active   Solaris         261   522      262    50r
```

r r Where "Partition 1" was used for Windows 95. It was deleted and recreatedr with "Solaris" type.r r

r Make a ufs filesystem on the partition. (You can not subdivide thisr fdisk partition into Solaris slices).r r For example,r
r # mkfs -F ufs /dev/rdsk/c0d0p1 4192965r
r where number 4192965 = 261 * 16065 is the total number of blocks onr this partition, calculated as the

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cylinder length on this partitionr (261 from the above partition table) times the cylinder size (16065r blocks as shown in the header of the partition table.)r r

r Mount the filesystem as usual.r For example:r
r # mount /dev/dsk/c0d0p1 /export/homer r

r [Thanks to Michael Wang. Reference: Sun Microsystems INFODOC ID: 13142]r

r r

---

r

r (9.31)r How can I convert a DOS/Windows text file to a Unix text file?r

r Use these Solaris commands:r
r dos2unix <*dosformatfile*> <*unixformatfile*>r
r unix2dos <*unixformatfile*> <*dosformatfile*>r
r The former removes the ^M and ^Z characters and the latter adds them.r See man dos2unix and man unix2dos for details.r

r r

---

r

r (9.32)r Can VMware be used with Solaris x86?r

r Yes.r VMwarer is commercial software to allow one to boot and use multipler operating systems at the same time, such as Linux and Windows 2000.r This is done by creating a "virtual machine" for each OS.r VMware provides graphical (VGA/SVGA) and X displayr capabilities. For networking, VMware providesr for a "virtual disk" for the client O/S. It alsor can provide access to the floppy, CD-ROM, a virtualr NIC and a virtual sound blaster 16. Note, ther CD-ROM is a "virtual" ATAPI CD-ROM.r Networking can be either host-based (private IPr space and TCP/IP + SMB between the host O/S andr the client O/S), or bridged (client uses an addressr on the actual network, host's NIC is bound tor two or more IP addresses).r

r r

r Update 9/2004: Peter Galvin has written an articler "Solaris 10 x86 on VMware" in the October 2004 issue ofr *Sys Admin*.r www.sysadminmag.comr

r r

r VMware doesn't have documentation on installing Solaris x86,r but you can use these notes instead:r

r r

r Please read the other HOWTOs on ther VMware site, http://www.vmware.com/r before installing Solaris x86.r My install of version 7 on the dual PII 300 took about 1 hour.r I have tested Solaris x86 version 7 (11/99 release)r with VMware 2.0.1 with a Linux host. The host is ar dual PII/300 with 128 MB of RAM. Solaris underr VMware seems stable (it has been up for days).r The host was setup with Linux (RedHat 6.2, patches,r and 2.2.16). VMware was installed and bridged networkingr was enabled. Bridged networking allows the

virtualr machine to appear as a host on the local LAN.r The CDROM, Floppy and virtual NIC were enabled.r

r

1. Create a virtual disk for Solaris using VMware.r I used 1GB on a free partition.r When creating a virtual machine, VMware will ask you to select the guestr OS type.r Since Solaris is not currently a selection, use Windows 98.r That has seemed to work best for most folks.`r
2. Insert the Solaris x86 boot floppy and boot CD-ROMr in the host computer. Start vmware and "power on"r the virtual machine. The virtual machine shouldr boot from the floppy and run the Solaris hardwarer detection program.r
3. Follow the normal Solaris install instructions. Letr Solaris find the floppy, CDROM, and virtual NIC.r Partition your virtual disk (I let Solaris do itr for me). Install Solaris normally.r
4. I am using my virtual Solaris as a test NISPLUSr server so I enabled NISPLUS and set the server tor point to this machine. Following install, I setupr NISPLUS on the virtual Solaris and all seems functional.r
5. Setup X as VGA. It appears to work fine. However,r I typically use my virtual Solaris in text mode andr export xterms to my base O/S (Linux). Someoner suggested that you try a Linux or other XF86 serverr but I have not tried this. The vmware serverr for Linux may work. If anyone does this could theyr please mail me instructions on what they did?r
6. Setup files in `/etc` including `/etc/hosts`, etc. Forr example I changed `/etc/netmasks`: `172.16.4.0 255.255.255.0`r

r r

r Problems and issues noted:r

r

1. Sometimes the Solaris install is very unhappy with the VirtualFloppy drive.r Just disable it for your Solaris config if it gives you grief. One of ther symptoms of this may be a VMware panic dialog box during the install.r
2. I recommend you either a) Setup Solaris with an FTP Server ASAP orr b) Insure you have an FTP server on the same network.r This is the quickest way to get files in and out of a virtual machine --r especially until you get DNS working properly.r
3. Solaris x86 currently does not use the HLT instructionr in the idle loop (a post indicated this will changer in the future). This causes the virtual machine tor try to use 100% of your CPU (or on an SMP machine,r 100% of a single CPU as VMware only emulatesr an UP machine). This makes a virtual Solaris onlyr really usable as a server on an SMP machine.r
4. A "volcheck" followed by a "mount" resulted inr a strange "unimplemented" error from VMware. However,r the CDROM appeared to be properly mounted.r
5. There are no VMware tools for Solaris x86. There isr no VMware X server.r
6. r Since there are no VMware tools for Solaris, the best resolution/color combor you can get out of the box is 640x400, 16 colors. However, you can use remoter access programs (VNC is highly recommended) to set up a console "server"r that you can connect to with a remote "client". I have used VNC to access myr Solaris VM at any resolution and a color depth of 32. Accessing the Virtualr Machine via VNC not only looks better because of the color and resolution,r it is faster than using Solaris the native way it comes out of the box.r

r r

r Earl Fernandez has posted an alternate solution using a third-party videor driver byr
http://www.mostlysoftware.com/r His solution is posted atr r
http://miataru.computing.net/solaris/wwwboard/forum/545.htmlr I have a report (and I believe) that his

"Cavaets" #2 and #3 are false.r

r r

r Andrew Wansink mentions that QEMU, a free VMWare clone,r is available for Solaris x86 atr r http://fabrice.bellard.free.fr/qemu/r You will need to download the source and apply the patch from:r r http://lists.gnu.org/archive/html/qemu-devel/2004-09/msg00016.htmlr You will also need the network drivers from:r r http://www.tools.de/solaris/itu/DU.zipr The only real trouble he had was getting the network driver installed,r Run `/usr/local/qemu/bin/qemu -hda solaris.img -fda DU.img` and hitr ESC before the boot starts. The Solaris DCA then pulls in the driversr from the floppy image.r r

r Xen is an open source virtual machine emulator from Cambridge.r It is faster than VMWare, and free, but requires modifications of ther guest operating system.r Solaris x86 does not support it, but may in the future.r According to a CNET article on 2/18/2006, Sun's John Fowler saidr "We think the open-source virtual hypervisor is the way to go."r Future hardware modifications by Intel ("Vanderpool Technology" or VT)r and AMD may permit Solaris to run with no modifications.r Seer r http://www.cl.cam.ac.uk/Research/SRG/netos/xen/r

r r r r

r [Thanks to W. Wade Hampton, Earl Fernandez, Patrick Allmond, and Ian Fitchet.]r

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r (9.33)r Is Solaris on Intel really "Slowaris"--slowerr than other Intel-based operating systems?r

r By default, the other free OS's aren't SMP very capable out of the box--Solarisr is. Solaris handles multiple processes and threads easily in a SMP system.r So, one single CPU system, Solaris has a fair amount on un-necessaryr overhead--which slows it down a bit.r r

r Because the other OSes don't have this capability, or at least don't use it tor full advantage, they have a bit of ar performance advantage on a single CPU machine.r This advantage disappears when you start adding processors.r r

r So, I think Slowaris is a little bit too far, but it is at a bit of ar performance disadvantage.r But on an 2GHz processor, who cares?! Odds are you'll just be idlingr very quickly!r r

r Update: a benchmark test by Tony Bourker ran Solaris x86 9 against Linux 2.4 (RedHat 9).r He concluded Solaris x86 and Linux performed the same,r except with web operations,r where Linux was about twice as fast.r Both systems had the latest updates.r Seer r http://www.osnews.com/story.php?news_id=4867&page=1r r

r [Thanks to Rich Teer]r r

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r (9.34)r How can I remove (uninstall) Solaris from my hard drive?r

r If you have another Operating System installed, boot into the otherr operating system (usually Windows or Linux).r Select the current (non-Solaris) partition asr the "Active" partition. Reboot. If the computer boots into ther other operating system without the Solaris boot menu, you can safelyr delete the Solaris partition.r

r If you have no other Operating System installed, simply install anotherr operating system over Solaris on the hard drive.r Select "Entire disk" or similar during the installation.r

r r

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r (9.35)r I can install Linux on a system with Solaris x86, but why can't I boot it?r r

r One possibility is becauser Linux kernels with UFS filesystem support will rearrange the numbering ofr the extended partitions in certain circumstances.r Look at the following partition map reported by Linux during booting:r r

```
r
      Partition check:r
      hda: hda1 hda2 <solaris: [s0] hda5 [s1] hda6 [s2] hda7 [s7] hda8 >r
            hda3 hda4 < hda9 hda10 hda11 >r
```

r r

r Partition number 4 (hda4) is an "extended" partition, containing threer logical partitions used by Linux. In this particular case, these logicalr partitions were created by the Red Hat Linux 7 installer, and they holdr the Linux root filesystem, swap space, and a filesystem mounted onr /home.r r

r The kernel used by the installer did not include UFS support, so itr perceived /dev/hda4 to logically contain hda5, hda6, and hda7,r and it recorded these settings with LILO and /etc/fstab.r r

r However, when the new Linux installation booted for the first time, itr assigned hda5 to a Solaris partition, then tried to boot with it as ther root filesystem. Under Red Hat Linux 7 with the 2.2.16 kernel, thisr generates the following error:r r

```
r
      Invalid session number or type of trackr
      Kernel panic: VFS: Unable to mount root fs on xx:xxr
```

r r

r To boot this system, provide LILO with something liker "linux single root=/dev/hda9" to force the proper selection of ther root filesystemr (or you could also boot from the install CD with options liker "linux single root=/dev/hda9 initrd="),r then modify the root filesystem parameter in /etc/lilo.confr to reflect the change (and run the "lilo"r command after modifying the file):r r

r
```
        image=/boot/vmlinuz-2.2.16-22r
                label=linuxr
                read-onlyr
                root=/dev/hda9r
```

r r

r Under most Linux distributions, you must also modify `/etc/fstab`r to reflect the new partition layout.r Red Hat Linux 7 now uses "labels" in `/etc/fstab`r (which are maintained with the "e2label" command), which obviates the needr to adjust `/etc/fstab` in this caser (you still may need to adjust the swapr partition in `/etc/fstab`, though).r r

r If the extended partition has a lower number than ther Solaris partition, this renumbering won't occur.r r

r [Thanks to Charles J. Fisher]r r

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r (9.36)r Emptyr

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r (9.37)r What are the `/dev/dsk/` disk naming conventions for x86 disks?r

r The naming convention comes from AT&T SysV/386:r

> r
- `p0` whole physical diskr
- `p1 - p4` Four primary fdisk partitionsr
- `p5 - p30` 26 logical drives in extended DOS partitionr (not implemented by Solaris)r
- `s0 - s15` 16 slices in the Solaris FDISK partitionr (SPARC has only 8)r On Solaris, by convention,r s2 is the whole Solaris partition.r

r r

r For the first part of the name, e.g. `c0t0d2`:r

> r
- "`c`" is the disk controller number as seen by the operating systemr
- "`t`" is the target number on the controller.r That is, SCSI ID for SCSI. Omitted for ATAPI.r controllersr
- "`d`" is the disk on that target.r That is, LUN for SCSI, Master (d0) or Slave (d1) for ATAPI.r

r r

r The precise naming for IDE disks and ATAPI cdroms has varied throughr Solaris x86 releases, and is different on SPARC. On x86, the 't' partr is often missing for IDE disks as IDE doesn't support multipler targets (the Master is the single target and it drives the Slave too,r so these look more like SCSI LUNs). However, the IDE ATAPI interfacer looks more like SCSI, so you can find the Master disk has an IDE typer name, and the ATAPI slave CDROM has a SCSI type of name. On SPARC, Ir think both IDE disks and ATAPI CDROMs are named like SCSI disks.r This area is a bit of a mess, sadly.r r

r The pcfs filesystem also has a pseudo naming scheme it uses. Your always use the p0 (whole disk) device, but you append more info whichr enables pcfs to find the right PC filesystem on the disk. So,r p0:1 is the first DOS drive on the disk, which will be the primaryr DOS partition if there is one or the first DOS drive in the Extendedr DOS partition. p0:2 is the second DOS drive -- if there was a primaryr DOS partition, p0:2 will be the first DOS drive in the Extended DOSr partition, otherwise it's the second DOS drive in the Extended DOSr partition. There's a hack in there in to cope with multiple primaryr DOS FDISK partitions too, but such a disk is strictly illegal.r p0:boot is the Solaris x86 boot partition if you have one, which isr like a primary DOS partition but with a different partition type.r r

r [Thanks to Andrew Gabriel]r r

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r (9.38)r What is OpenSolaris and what distributions are available?r

r OpenSolaris is open source Solaris,r based on the OSI-approved Common Development and Distribution License (CDDL).r It seeks to emulate the Linux distribution model.r Some Solaris software is still closed sourcer (see the Roadmap on the OpenSolaris site).r Seer http://www.opensolaris.org/r for more information.r

r Here's the distributions I know about:r

- r SchilliX, at http://schillix.berlios.de/ The first distribution; live CD supports x86/AMD64/Intel EM64Tr

- r Nextena at http://www.gnusolaris.org/r A GNU and Ubuntu-based distributionr

- BeleniXr atr http://www.genunix.org/distributions/belenix_site/r r Distributed as a LiveCD.r It has several additional open source packages.r

- MarTux at http://www.martux.orgr First SPARC distribution (outside of Solaris Express/Solaris Express Community Release)r

- r r Solaris Express Community Releaser atr http://www.sun.com/software/solaris/solaris-express/r Not really an OpenSolaris distribution, butr the next version of Solaris, and new features.r It's beta-quality, which means expect bugs.r

rr r

r r r Detailed Contentsr r   113

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r (9.39)r How do I compile Abiword for Solaris?r

r Abiword is a basic word processor available fromr http://www.abisource.com/r It can be compiled with Sun's cc and GNU gcc with the following instructions.r The 2.2 and 2.4 versions compile on Solaris, but not 2.6.r r

r Compiling with gcc (gcc-3.4.4)r r

r

- r Set the environment variable CC to gcc.r Change the option -mt to -pthreads (-mt is supported only on cc, I think).r
- r Configure options used are:r r `./configure --with-libiconv="path_of_libiconv" -with-libpng="path_of_libpng" CC=gcc`r r
- r Make the following changes to the source:r ~/abiword/abi/src/af/util/xp/ut_iconv.cpp, line 73-75.r The original definition ofr UT_ICONV is "", which causes g++ to exit with a gmake error.r To fix, change UT_ICONV to "const".r r
- r In file ~/abiword/abi/src/af/util/unix/ut_unixDirent.h,r lines 34-37,r the parameters passed to function int scandir arer
  `r r intr scandir(const char *dirname, struct dirent ***namelist,r int (*select) (const struct dirent *),r int (*dcomp) (const void *, const void *));r r`
  r The problem is with the fourth and fifth parameters. They conflict with ther types described in /usr/include/dirent.h. Setting the fourth and fifthr parameters tor
  `r r int (*dcomp) (const dirent **, const dirent **));r r` in line 37 solves this problem.r r
- r In lines 39-40, the parameters passed tor function int alphasort are:r
  `r r intr alphasort(const void *d1, const void *d2);r r`
  r Change them tor
  `r r intr alphasort(const dirent **d1, const dirent **d2);r r` to solve the problem.r

r r

r Compiling with Sun ccr

r Same as above, but no need to set either the environment or make the changer with pthreads. It is necessary to make the other changes I have listed above.r
`r r ./configure --with-libiconv="path_of_libiconv" -with-libpng="path_of_libpng"r r r`

`r r gmake && gmake installr r` should install abiword.r

r [Thanks to Nagesh Subbanna]r

r r

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r End of the Solaris x86 FAQ.r
r http://sun.drydog.com/faq/r
r Maintained by Dan Anderson, San Diego, California, USA.r

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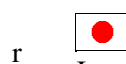r r r r r r r r r r r

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r r **9. Interoperability With Other
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r   **r r Detailed Contentsr** ^r

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Solaris x86 FAQ

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r r If you have questions or comments,r please send a message tor <u>Dan Anderson</u>.r rrr r

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