Unofficial Installation Guide for the Solaris[tm] OS, x86 Platform Edition

By Alan DuBoff, Angel Camacho, and Michael Riley

Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054
U.S.A.

March 2004

Table of Contents

1. Introduction

Of course, the official location for any Sun documentation is http://docs.sun.com. However, this unofficial guide may prove helpful throughout the process of installing the Solaris Operating System, x86 Platform Edition, on a variety of x86 hardware.

2. Obtaining Media for the x86 Platform Edition

The Solaris Operating System can be purchased or downloaded for a modest fee: Downloading costs less than purchasing the software. If you plan to download the CDs, it is recommended that you have a high-speed Internet connection. If you don't have a high-speed Internet connection, it is recommended that you purchase the media from Sun. You can either download or purchase Solaris x86 from:

http://wwws.sun.com/software/solaris/binaries/get.html

3. Licensing Policies

For the latest information on licensing, check Sun's Binary Code License Agreement web page at http://wwws.sun.com/software/solaris/binaries/bcl.html. As of the writing of this document, Sun's Free Solaris Binary License Program allows an end user to use the software for non-commercial use, for only the cost of the media. You must register to receive the free binary license.

4. Choosing the Hardware

The Hardware Compatibility List (HCL) at http://www.sun.com/bigadmin/hcl comprises hardware that runs on Solaris x86. With the Solaris 9 x86 release, the HCL has been organized into three categories, ranging from systems that Sun certifies to those that members of the community have reported to work. Note that the majority of items listed in the Solaris 8 HCL will also work with the Solaris 9 release.

- Category 1 – Sun Certified Hardware
- Category 2 – Vendor Certified Hardware
- Category 3 – Reported to work

If you are a vendor interested in having your hardware placed on the HCL at Tier 2, please contact the HCL team at http://www.sun.com/bigadmin/hcl/hclFeedback.html.
They can assist you in making that happen.

Any user can submit hardware for Category 3, which only states that the hardware is reported to work with Solaris x86. No matter which level you submit at, please make sure to give accurate information. Sun encourages everyone to submit hardware for Category 3, so others will know if their hardware will run on Solaris x86 or not.

5. Installing the Software

Before doing the installation, you should perform a full backup of your hard disk(s). The install process can destroy the existing data on your hard disks if not done properly. Also, please note that there are no guarantees, implicit or explicit, on the effect that the suggested procedures may have on a given system.

If you want to install Solaris as a second operating system on your laptop or desktop, you will have to do some partition management before installing the Solaris OS. Ranish Partition Manager software is often recommended in the Solaris x86 community. For more information, visit the Ranish Partition Manager web site:

http://www.ranish.com/part/

5.1 Recommendations

It is always recommended that you install from the Install CD whenever possible. It is also recommended that you try default BIOS settings on most systems as well, and only change them if you run into a problem.

If you run into problems and the Web Install drops you to a command prompt, it is recommended to start the install from CD-ROM 1 of 2. This will perform an older version of install where you must answer more questions, such as how to partition your disk. This version of install makes fewer assumptions than the Web Install does about how your disk is configured, which often lets it succeed where the Install CD fails.

If you are having problems configuring the video device to work, you can exit from the first screen labeled `kdmconfig` by using [F4] to bypass configuration of the graphic system. If you are in the "View and Edit" screen for `kdmconfig`, you would use [F3] to quit without saving. This means you won't get the easier graphical environment for your installation, but in some cases, you can install Solaris x86 on a system on which the graphical installer will not work at all. You can always configure the video after you have installed the Solaris OS on the system, and you will be prompted to do so at the first boot after the installation of CD-ROM 1 of 2 is completed.

5.1.1 Device Configuration Assistant

A message on the screen warning you that a secondary boot process, known as *configuration assistant,* is being launched. Press [F2] on your keyboard, which has function keys. If you are using a serial console, you will need to use [ESC] [2]. From here, the program will ask for confirmation using either Function keys or Escape sequences, according to your response.

5.1.2 Identified Devices

A list with the devices reported by the BIOS will be displayed. Press [F2] to confirm, or [ESC] [2]. Note that the list does not report by name the network and disk I/O devices for which no driver is available. Here are some examples of how they are listed:

- "Network controller," "Ethernet controller," and so on, for network interface cards (NICs)
- "SCSI bus controller," "RAID controller," or "Mass storage controller," for disk controllers

5.1.3 Boot Solaris

Now the system will boot the Solaris OS and display the available options, which may look something like this:

```
[   ] DISK -name of your device-
[X] CDROM -name of your device-
[   ] NET -name of your device-
[   ] OTHER -name of your device-
```

Select (with the arrow keys or the return button) the device you want to boot from, and press the [SPACE] bar to make your choice. A capital "X" will mark your choice. Then press [F2] or [ESC] [2].
a) -name of your device- is the name reported by the BIOS to the configuration assistant (for example, MK6411MAT for a Toshiba internal 6 Gbyte disk).
b) OTHER: Here you might find devices like Memory Stick (Sony), or Smart Media (Fujitsu).
c) Use NET if you have access to a network installation server in your subnet; if not, use CDROM.
d) PXE-bootable systems are also supported and can be handled by a network installation server.

5.2. Install Options

5.2.1 Type of Install

Select the kind of installation needed for this laptop or hardware. You will be presented with a screen where you must choose between 1 or 2. After that, press [ENTER].

5.2.1.1 Solaris Interactive

Select this option if you are going to provide all the configuration for the hardware by hand. This is the default option and can be chosen by simply hitting [ENTER] on your keyboard.

5.2.1.2 Custom JumpStart

Select this option if your Solaris JumpStart[tm] software has been configured with JumpStart files (`sysidconfig`) that will provide the configuration for this hardware.

Note: If you select this option, and your JumpStart server does not respond, the system will fail the install. Also, if the JumpStart server is not properly configured to provide the configuration information, it will continue as a Solaris Interactive install. For more information on JumpStart servers, refer to Sun Product Documentation at http://docs.sun.com.

After making your selection as 1 -or- 2, press [ENTER].
This message will be displayed:

```
configuring
```

5.2.2 Language

Language selection will be 0 for English. (Select your desired language for primary install.)
0 English [ENTER]

Select the locale for the language you selected:

53 en_US ISO8859-1 [ENTER]

In this case we select ISO8859-1 instead of ISO8859-15 for compatibility with GNOME. Note that the numbers for these locales can change between different versions of Solaris as we add new locales, so do not assume that the number you used with Solaris 9 12/02 selects the same locale for Solaris 9 04/03. Otherwise you may be in for a surprise and a quick language lesson.

5.2.3 Install Program Information

This is just a confirmation of our previous selections and the information regarding the configuration you have chosen.

5.2.4 `kdmconfig`

The configuration program starts `kdmconfig` to configure the keyboard, display, and mouse. First you are presented with the information that the program could get from the BIOS. Sometimes the program can get all the needed information to start the install, but in case you have the wrong information, you are given the option to select your matching configuration. If you have more problems getting your video configured, you can start a command prompt at the login screen. You will need to be root to configure the screen, once the Solaris OS is installed and booted from the hard disk.

5.2.5 Configure Desktop Devices

This is in case your system was not identified or there is a mismatch.
Use the arrow keys to move the cursor to *Change Video Adapter*, press [SPACE] to mark this option, and then press [F2] or [ESC][2].
Note: Verify that your system is in the HCL to see if your display adapter is in the compatibility list and you can use only the Xsun drivers. In case you see your laptop marked as xf86 or you don't find it, don't panic; choose the VESA and use 800x600 VGA 256 color mode at this time. Later on in the fine-tuning process, we will change the resolution to a nice one.

Select this option moving the arrow keys and pressing [SPACE], in the preferred video driver for your hardware.

5.2.6 XFree86 Porting Kit

If your video driver is not supported by the Xsun drivers, you can still try the XFree86 Porting Kit. This will allow you to use video devices that are currently supported by XFree86. For more information, see:

http://developers.sun.com/solaris/developer/support/driver/tools/video/video-index.html

The XFree86 VESA driver is already in the Solaris OS, x86 Platform Edition, and it works for many types of cards. This may be good enough to install in the graphics environment at least, but a hardware driver will give better performance, and the VESA driver is currently limited to only 8-bit (256) color mode. You can only apply the porting kit after the system is installed.

5.2.7 Testing Desktop Devices

Once you make your selection, you are presented with the option of testing your hardware setup with your new selected drivers. Press [F2] to test -or- [F4] to bypass the test. Bypass the test only if you know that your hardware will work; otherwise when you reboot, your system will seem to hang at the X initialization.

If you test your settings, and you are satisfied with them, click with your mouse on [YES] for the test; if not, click [NO], or wait until the system comes back. If it has been more than 2 minutes and your system doesn't come back from the graphic mode, you will need to restart. If you are unable to come up with a configuration that works, you can use [F3] to exit without saving any configuration and continue in text character (CUI) mode, leaving this until after you have completed installation of the Solaris software on your system.

5.2.8 Successful Test

If you clicked on [YES], the boot process will continue, and you will be in graphical (GUI) mode for the rest of the installation process.

5.3 `sysidtool`

If you are using the VESA driver at a low resolution, you may need to drag the `sysidtool` window to the viewable portion on your screen. Remember, this ugly resolution will get better when we install the patches and the XFree86 drivers. From here, all the configuration will be in graphic mode if you were able to configure it. You will still need to press the function keys or escape sequences. What you will see in this section are the answers that I use most of the time for laptop setup. You might need to change your setup according to your particular needs. Remember that after selecting an option, or answering a question, you will be required to press [F2] or [ESC][2].

5.3.1 Configuration Options

IPv6	NO [F2]
Kerberos	NO [F2]
Name Service	NONE [F2]
Subnet	255.255.255.0 [F2]
Americas	X [F2]
USA	X [F2]
Pacific	X [F2]
Time	xx:xx:xx xx/xx/xx [F2]

Note that your selections will vary according to your particular needs. These selections work well for a laptop that may not be hooked up to a network much of the

time and also may be hooked up to various different networks. For desktop systems or servers, your choice for network options will probably be quite different.

5.3.2 Solaris Interactive Options

If your JumpStart server does not have all the information on your installation, or you are using Solaris Interactive from a CD-ROM or network installation server, you will be required to enter the following input.

5.3.2.1 Type of Installation

You can select from Initial or Upgrade installation.
Selecting Initial Installation will destroy your previous Solaris installation and all the data contained in the target file system.
Initial [F2]
Selecting Upgrade Installation will preserve your current settings and any additional software you may have installed, as well as any data files on your target file systems. This takes a long time to scan for patches you may have installed on your system, but it is worthwhile if you need to preserve files on your hard disk.
Upgrade [F2]

5.3.2.2 Source of Installation

Different sources of installation could include a flash install (using Solaris Flash archives) or a standard install, as in this case. Flash installs are an advanced topic, not in the scope of this project. (Check http://docs.sun.com for information on flash installs.)
Standard [F2]

5.3.2.3 Geographic Location

Select your location [F2]

5.3.2.4 Software Cluster

Here you will select which "pre-configured" Solaris package to use for installation. You have five options:

- Core system
- End User
- Developer
- Entire Distribution
- Entire Distribution plus OEM support

Select whatever is adequate for you. I normally use Entire Distribution plus OEM Support, just to be sure that I will have all the drivers and libraries.
[X] Entire Distribution plus OEM Support [F2]

You might see (depending on whether the machine was previously running Solaris or Linux) a message regarding x86 boot partition. Press [F2] to continue with disk partitioning, and disregard this message.

5.4 Disk Partitioning

Select the disk that you want to be the primary disk (usually the primary IDE, or SCSI), but it can be a secondary disk if you have a boot manager or BIOS that supports booting an OS from multiple disk drives. Be sure and make whichever disk you choose the boot disk, as Solaris defaults this to be the primary disk. These questions are only asked during an initial installation.

Use the mouse to select the disk (or arrow keys + [SPACE] if you are in CUI mode).
c0t0d0 (SCSI) -or-
c0d0 (IDE)

Assuming you are selecting the primary disk, then press [F2]. For the IDE disk, you will have either d0 or d1. For SCSI disks, t# can be from d0 to d15, and d# can be from d0 to d7, although usually it will be d0. If you are not familiar with the conventions and you want to learn more, use the System Administration Guide to learn about disks and controllers.

5.4.1 Edit Disk (`fdisk`)

Once you have selected the disk to be your primary disk, be sure that you have the right partition(s) in place. Please press [F4] to edit the partition table. You will be presented with four partitions, presumable empty or with other operating systems. If you want to build a multi-boot environment, you should leave alone the partitions that you want to keep. If you want to destroy some or all of the data, delete the existing partitions using [F3]. To create a new one, use [F2]. Select the size (it defaults to the entire free space on the disk) and the kind of partition (which defaults to Solaris), and press [F2] to accept. When you are done making changes, press [F2] to confirm the changes.

Warning: After pressing this final [F2], any deleted partition data will be lost!

5.4.2 Preserve Data?

If you decided not to change the existing Solaris slice(s) within the Solaris partition, you will be asked if you want to preserve the existing layout. Press [F2] to continue with a fresh install and destroy your previous layout. “Layout” here refers to the

slices inside your Solaris partition(s).

5.4.3 Automatic Layout

This is a new installation, so we will assume you want to start from scratch: Press [F4] to use your own layout. You can always edit the configuration it comes up with, so using Automatic Layout is highly recommended to get a starting configuration.

At this point you need to choose which file systems you wish to have it lay out for you. I prefer to merge everything into a single root slice, provided the disk is not too large. Put at least `/` and the `/usr` slices in there, as they do not grow too much. Be sure to leave plenty of extra room for these slices, since upgrading to future versions or updates will almost certainly need more space. Leave at least 50 percent over the recommended minimum, or more if you will be adding the Solaris Software Companion CD and other packages later. This will always create an additional slice called `/export/home`, which is supposed to be for user home directories. If this is not needed, you can delete this slice and use the space assigned to it for other slices.

5.4.4 Disk Customization

Select the disk where you want to perform the install; supposedly, it's the one where you change the partition table (FDISK). Fill in the form as best fits your setup. In my case, I used these figures for a 6 Gbyte disk and 128 Mbyte of RAM. The 128 Mbyte of RAM is low, so I compensated by creating a large swap slice.

```
/5336
swap   513
```

Press [F2] to accept this file systems layout.

Note that since only `/` is present, everything will be installed here: This is a very small disk, and it is hard to guess where you will need to have free space available later. Sometimes you will need to create other file systems, so do whatever you need to. You do not have to allocate all your available space right now. You can leave free space for future use after the Solaris software is installed, but it is not possible to expand either an existing slice or your `fdisk` partition for Solaris after installation. The free space can only be used for new slices you will create later.

5.4.5 Remote FS

If you need to configure remote mounts, use this option; if not, press [F2].

5.4.6 Profile

The profile of your system will show. If you agree with the setup as it is displayed, select [F2] to continue and the installation will proceed. If you do not agree, you can go back and make changes by pressing [F3].

5.4.7 Auto Reboot

If you want the machine to automatically reboot when it finishes (as usual), please select this option. If not, you will need to reboot by hand. You use the `reboot` command from a command prompt to reboot the system manually. You might wish to do this if you are going to apply patches or make configuration changes once the initial installation is complete. The root slice of the hard disk being installed is mounted as `/a` if you need to apply any patches to it.

5.4.8 Final Confirmation

For final confirmation to start, please eject the floppy (in case you used one to boot into the Device Configuration Assistant or to apply an Install Time Update "ITU" driver), then press [F2] to start. If the drive is empty and an ITU floppy was used during boot, you will be prompted to insert it at the correct time.

5.5 Reboot

5.5.1 Root Password

During the reboot process, your system will prompt you for a root password. Type your password twice, and press [ENTER] each time.

5.6 Patches

Log in as root, open a terminal, and install the latest patches.

5.6.1 Getting the Latest Patches

Using a web browser (Netscape[tm] is provided at `/usr/dt/bin/netscape`), go to http://sunsolve.sun.com/ and download the latest version of the patches for Solaris 9 x86. Mozilla[tm] is scheduled to be the standard browser in later Solaris versions, but Netscape will also be available. Use whichever you prefer. Create a temporary directory, `/usr/tmp/sw`, and download the file here, then prepare to install.

```
# cd /usr/tmp/sw
# unzip 9_x86recommended.tar.zip
# tar xvf 9_x86recommended.tar
# cd 9_x86recommended
```

```
# ./install_cluster
...
```

Before rebooting, we will do some work to avoid problems in the future, but you will need to change it back to avoid a security breach.
Edit the file `/etc/default/login`, and comment out the line `CONSOLE=/dev/console` by putting a '#' at the start of the line.

Also, please make a note of your IP address, running:

```
# ifconfig -a
```

After this, you can reboot your system so the updated patches are loaded and used. You can delete your downloaded file after you are done with it.

```
# reboot
```

5.7 Additional Software

You might need additional software for your system to work properly and/or enhance its current capabilities.

5.7.1 Obtaining Additional Software

You can get a lot of software from http://sunfreeware.com/ or from the Solaris Software Companion CD for the x86 Platform. Another source of software is http://www.sun.com/downloads where you can find many other items from Sun. A good community web site is http://www.bolthole.com where you can find some cutting-edge open source programs for Solaris systems.

5.7.2 XFree86

Using a web browser, go to this site for information on the XFree86 video drivers: http://developers.sun.com/solaris/developer/support/driver/tools/video/video-index.html. Download them into `/usr/tmp/sw` and type the following:

```
# unzip xfree86??????.zip
# tar xvf xfree86?????.tar
# pkgadd -d xfree???
```

Follow the onscreen instructions to install the drivers. (You need to be root.) The configuration is explained with the `kdmconfig` utility. At this writing, we are working to put these drivers onto the installation CDs, but currently they must be

downloaded and installed separately. Only the 4.2.0 VESA driver is part of the Solaris software at this time.

5.7.2.1 kdmconfig

Run `kdmconfig` every time you want to change something in your desktop hardware setup, like adding a USB mouse or changing your video driver. You will use as the beginning [F2] [F3] to navigate, arrow keys and [SPACE]. This must be run as root, and you should be in text mode. Select text mode at the graphical login screen by selecting Command Line Login from the Options menu list.

```
# kdmconfig
```

You will see your current options or what `kdmconfig` has detected. If nothing has been selected previously, select change video display adapter [X] and press [F2] if you wish to change what is being displayed. Most mouse devices will be automatically detected, except USB mouse devices. At this time, USB mouse devices and XFree86 drivers must be selected manually.

From the list, select your hardware. Remember to verify this from the HCL http://www.sun.com/bigadmin/hcl or http://www.bolthole.com or http://www.solaris-x86.org/ sites. In my case, it's a NeoMagic.

[X] NeoMagic -or- your required driver then [F2]
Display
[X] notebook XGA (or required) [F2]
Resolution
[X] 1024x768 16M colors (or your option) [F2]

If something goes wrong, you will have to wait for it to time-out and go back to character mode. You can then try a different setting.

If your monitor type is not automatically detected, try the various multi-sync monitors listed, or the LCD model for laptops. At the time of this writing, `kdmconfig` does not automatically detect cards supported by XFree86 drivers, nor will it automatically detect USB mice. There are plans for future versions of `kdmconfig` that would auto-detect, but even in that case, new versions of devices often come out, so be aware that you may have to choose your device driver manually.

Also, the XFree86 driver sometimes works better than the older Solaris driver that was selected automatically, so you may wish to experiment.

5.7.2.2 GNOME

If you have a version older than Solaris 9 8/03, you need to go through the same process. Go to http://www.sun.com/downloads and download gnome2.0 to `/usr/tmp/sw` and type the following:

```
# unzip gnome??????.zip
# tar xvf gnome??????.tar
# cd gnome-install
# ./install
```

You will be asked some questions during configuration. I usually select everything but the developer libraries. From Solaris 9 8/03, GNOME has been included as part of the Solaris OS. Once you finished the install, log out, and log in. Remember to select GNOME as your session, unless you prefer one of the other desktop managers. You can find KDE on the Software Companion CD, and CDE is still available, for example.

Note: If you selected your locale as en_US ISO8859-15, GNOME will not be able to start. Change your locale to en_US ISO8859-1, and start again.

5.7.2.3 StarOffice[tm] Software or OpenOffice

If you have a copy of StarOffice software, or you have downloaded a version of OpenOffice, the process is the same. OpenOffice 1.1 is roughly the same as StarOffice 7.0. Since neither is included in the media kit, they must be downloaded at the time of this writing.

First you can clean out all the software you have in `/usr/tmp/sw` by running:
`# rm -r /usr/tmp/sw/*`

Caution: Be careful to run it as written, or you will delete files you need.

Download the software to `/usr/tmp/sw`, and expand it:

```
# cd /usr/tmp/sw
# unzip soffice?????.zip
# chmod +x soffice????.bin
```

StarOffice has a gotcha here: If you are going to be using your laptop as root (which is not recommended), install StarOffice now. But if you are a good root citizen, please create a "working" user for your laptop, and then switch to that user, and start the installation. Otherwise proceed with caution, as you are root!

```
# ./soffice?????.bin
```

Answer the questions regarding your configuration. I always use custom install, because that is the only way you can add GNOME integration to StarOffice; otherwise, you will have to do it by hand, afterward. After the install is finished, you are
ready to use soffice. Log out and re-log in, to see your menus changed with StarOffice integration.

5.7.2.4 SFWgcmn

In order to run Mozilla, you will need this library. Go to http://sunfreeware.com/, click on SEARCH, type in `gcmn` and hit [ENTER]. This will take you to the sun.com web site. Select the download of the x86 version of the library (this is a Solaris 8 version, fully compatible with Solaris 9). Download it to `/usr/tmp/sw` and do the following:

```
# unzip gcmn?????.zip
# pkgadd -d gcmn?????
```

This will add the SFWgcmn library to `/opt/sfw`. You must add to `/etc/profile` the following lines:

```
LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/opt/sfw/lib:/usr/sfw/lib:
/usr/local/lib:/usr/sfw:/usr/lib
PATH=$PATH:/usr/local/bin
export LD_LIBRARY_PATH PATH
```

5.7.2.5 Mozilla

If you prefer to use Mozilla rather than Netscape, which is included with the Solaris distribution, please go to http://www.sun.com/downloads, and search for Mozilla. From that screen, select the `pkgadd` version of Mozilla for x86, download it to `/usr/tmp/sw`, and do the following:

```
# unzip <filename>.zip
# pkgadd -d <package name>
```

This will install Mozilla under `/usr/local/bin`. First, verify that Mozilla is not included in your version of Solaris.

Mozilla.org also provides builds of Mozilla, Firefox, and Thunderbird on http://www.mozilla.org/, and these are standard Mozilla distribution tarballs. To extract them, change to the desired location and type:

```
# gtar zxvf <filename>.tg.gz
```

5.8 Fine-Tuning

By fine-tuning Solaris x86, I'm referring more to loading the right drivers rather than achieving the best performance on your hardware. I have found that some of the "extra" options for your hardware might work if behind the label (brand), the manufacturer uses "well-known" chips and drivers. For example, a D-link wireless card works because Lucent is the manufacturer, but a product from another vendor may not work, if that vendor has three or four different chip suppliers. So, let me present here my own findings, in the hope that this will save you some time.

5.8.1 USB

At the time of this writing, only USB 1.0 UHCI devices are supported. Some USB 2.0 chipsets, which are EHCI, include UHCI compatibility and will work. USB 1.1 uses OHCI. Your system technical specifications should say which type you have. If you use the `prtconf` command with the `-D` option, you can see if one of these drivers has attached. The drivers are (naturally) called `uhci`, `ohci`, and `ehci`.

```
# prtconf -D
```

Most USB devices work without a problem if the USB chipset in your system works. And yes, Plug and Play also works here; I have tried:

- Sony CD-RW
- A USB memory drive
- Mouse devices (yes, multiple USB "mice," but they had to be manually configured using `kdmconfig`)
- Fujitsu Smart Media USB reader/writer
- Sony Cyber-shot USB digital camera
- Various keyboards

All this hardware, except the mouse devices, works like a hard drive. You can see your device as:

```
/dev/rdsk/c1t?d?
```

Of course, if the media was formatted on a non-UNIX® device, you will need to mount it using the right flags:

```
# mount -F pcfs /dev/dsk/c1t0d0 /mnt
```

5.8.2 Driver Problems

Some problems with running PCMCIA cards are well-known, mainly because everybody wants to install wireless cards or other kinds of cards on their laptops.

Most of the time, the solution will be to use third-party drivers. Another solution is to change hardware. Let me present some of my findings from my experiences configuring laptops.

5.8.2.1 PCMCIA Cards

The first challenge is to make your laptop see your PCMCIA devices: Some laptops are able to see the PCMCIA bridge, others aren't. To find out, use:

```
# prtconf -v | more
```

And look for your PCMCIA driver.

If your laptop doesn't see your PCMCIA devices, then you will need to get a set of drivers, available from LynnSoft: http://lynnsoft.com/. You can get a trial version of these drivers and do the following:

```
# cd /usr/tmp/sw
# unzip LS????.zip
# tar xvf LS????.tar
# pkgadd -d LS?????
# tar xvf ?????patch.tar
# tar xvf busra.tar
# tar xvf ?????patch_2.tar
```

They will automatically untar in the right place.

```
# touch /reconfigure ; sync ; reboot
```

While booting, press [ESC] to enter the *Device Configuration Assistant*.
At the first screen, press [F2] -or- [ESC] [2] to go to the devices screen.
At the Devices screen, press [F4] to get into Device Tasks.
Using the arrow keys and [SPACE] bar, select [X] View/Edit Devices, and press [F2].
You will be presented with a list of many devices.
Press [F3] to add an ISA Device.
Using the arrow keys and [SPACE] bar, select [X] PCMCIA controller, and press [F2].
Using the arrow keys and [SPACE] bar, select [X] Port, and press [F2].
Set the port to **3e2-3e3** and press [F2].
Do the same with IRQ and assign interrupt 10.
Press [F4] to accept the device, then [F2] to continue, and [F3] to accept all the changes.
Press [F2] to continue booting Solaris.

Then you should see your "new devices" being configured in your system, and you

will see something like:

```
/isa/pcic@1,3e2/???????????
```

After reboot, you should be able to plumb the interface as
`# ifconfig pcelx0` plumb up (if this is a 3Com card).
If you have a Realtek card, you will need to get the drivers from http://www.realtek.com.tw/. Just follow the instructions, and you will be set.

5.8.2.2 Wireless

Currently there is support for wireless cards from LynnSoft: http://lynnsoft.com/. For more information on the cards supported, please check the company web site.

5.8.3 DHCP Client

If you are planning to use DHCP in your machine, you will need to hack it a little bit, as DHCP usually starts before starting the PCMCIA cards. So please change:

```
# mv /etc/rcS.d/S99initpcmcia /etc/rcS.d/S10initpcmcia
```

Add your DHCP configuration, performing either *sys-unconfig* or *ifconfig* xxx *dhcp*, where `xxx` is your interface name (`pcelx0`, etc.). Now your system should be able to use DHCP as a client system. You can also configure DHCP manually after the system has booted up. The following example will use the `iprb0` interface, as root:

```
# ifconfig iprb0 down
# ifconfig iprb0 auto-dhcp
```

5.8.4 Audio Drivers

Solaris x86 is supported by 4Front Technologies, producers of the Open Sound drivers. You can check the company web site for information on the hardware that it supports: http://www.opensound.com.

Also, a driver that supports limited hardware is available at http://www.tools.de/solaris/audio/.

5.8.5 FireWire

No FireWire® support is available at this time. However, Sun does provide FireWire support on the Solaris OS, SPARC Platform Edition, and this support is planned for Solaris x86 as both platform editions sync up their feature set.

6. Trouble-Shooting

6.1 Where Is My NIC?

Some people will have reached a point where Solaris can be installed, but it won't recognize your network interface card. However, you know your NIC is supported by Solaris x86.

I will now show you how to solve that by adding an entry into `/etc/driver_aliases`, but I warn you that by doing this you can easily prevent your system from booting, so take precautions. I will be showing here an entry for the Intel 10/100 Pro adapter that is onboard my Sony VAIO. The device was not recognized, so I needed to add an entry in `/etc/device_aliases` after the initial install. By executing `prtconf -pv | less` at the command line, I can select the device information from the output and end up with:

```
Node 0x1b6e70
    assigned-addresses:
82024010.00000000.e8200000.00000000.00001000.81024014.00000000.00
004000.00000000.00000040
    class-code:  00020000
    compatible: 'pci104d,813c' + 'pci104d,813c' + 'pci8086,1031'
+ 'pciclass,020000'
    device-id:  00001031
    devsel-speed:  00000001
    fast-back-to-back:
    interrupts:  00000001
    max-latency:  00000038
    min-grant:  00000008
    model:  'PCI: 104d,813c - Intel 10/100 Network Adapter'
    name:  'pci104d,813c'
    power-consumption:  00000001.00000001
    reg:
00024000.00000000.00000000.00000000.00000000.02024010.00000000.00
000000.00000000.00001000.01024014.00000000.0000
0000.00000000.00000040
    revision-id:  00000042
    slot:  00000000
    subsystem-id:  0000813c
    subsystem-vendor-id:  0000104d
    unit-address:  '8'
    vendor-id:  00008086
```

You must be careful when trying to determine which ID needs to be added to the `/etc/driver_aliases` file, since adding the wrong entry can render your system unbootable in many cases. You will probably just see a generic model, such as Ethernet Adapter, rather than the exact vendor and model you have. In the compatible line above, you can see there are two IDs: `pci104d,813c` and `pci8086,1031`. If you were to add in the `104d,813c` device ID for an Intel NIC, you would certainly render your system

unbootable, since many other devices are tied into that ID on the system. You should see an entry in `/etc/driver_aliases` as the following:

```
iprb "pci8086,1030"
```

This ID is very close to the ID that we found with `prtconf`, which is typically a giveaway that this is the ID needed. We can add a line into `/etc/driver_aliases` such as:

```
iprb "pci8086,1031"
```

Newer versions of Solaris x86 will require the longer ID string like:

```
iprb "pci104d,813c+pci8086,1031"
```

This is being used to prevent duplicate single IDs for different devices. Sun has found some vendors that reused IDs for completely different devices, causing the wrong driver to try and attach to that device. In extreme cases, this can panic the system or even damage the device. In general, you should use the vendor ID and device ID in almost all cases. That should match up with what is in the compatible line of the output from `prtconf -pv`.

An additional place to add information is the master file. The text description for devices that you see with `prtconf -pv` comes from this file. It is normally only used when booting Solaris to load realmode boot drivers. Use the editor of your choice to edit `/boot/solaris/devicedb/master` to add this information. The best way is to copy a line for another device ID that uses the same driver and change the device IDs to those for your device. You should then change the text string to describe your particular device.

You will need to reconfigure your devices on your system by booting with the following at the boot prompt:

```
touch /reconfigure ; sync ; reboot
```

After this, it should recognize your Intel NIC, and you should be able to run `sys-unconfig` to reconfigure your system.

Any time you do this you may run into problems that are not immediately obvious. One example was with a new version of the Intel Pro 100 adapters that would go into "sleep" mode. While they worked initially, after a while network traffic would stop for no apparent reason. In this case, an update to the driver to disable this feature was required. Obviously you are adding the ID for a device Sun has not tested with its driver. Use caution when trying this because the new ID may mean that new features are present, which may cause the driver to fail.

You can report such new devices, even ones that fail to work, here:

http://www.pcidatabase.com/
http://pciids.sourceforge.net/
http://www.rom-o-matic.net/5.0.8/src-5.0.8/NIC

7. Further Reading and Resources

- Building a System with the Solaris OS, x86 Platform Edition, for Under $500
  http://www.sun.com/bigadmin/features/articles/build_solaris_x86_sys.html
- Installing Solaris 9 OS, x86 Platform Edition – One User's Experience
  http://www.sun.com/bigadmin/features/articles/install_sol9x86.html
- Implementing the Solaris OS, x86 Platform Edition, on Your Desktop or Laptop
  http://www.sun.com/bigadmin/features/articles/x86_desktop.html
- BigAdmin x86 Collection
  http://www.sun.com/bigadmin/collections/solarisx86.html