

Installing SUSE on Genesi Pegasos

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This application note describes the process of obtaining and installing the SUSE Linux System on a Genesi Pegasos computer, which is a PowerPC™ computer released with Debian and Yellow Dog Linux operating system (OS). Any PowerPC Linux distribution consisting of a kernel and Root File System can be installed on this computer. This paper describes one such system, the SUSE distribution installation, owned by Novell Corporation.

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1 Hardware and Software

The target hardware includes a Genesi Pegasos computer with a 1GHz PowerPC MPC7447A or MPC7448 processor, 1GB of memory, a CD/DVD drive, no floppy, an ATI Radeon VGA card, a 40 GB hard drive, and motherboard sound and USB ports. The ps2 mouse is not supported, and the two front USB ports are not supported.

A USB mouse must be plugged into one of the two rear USB ports. A USB mouse is preferred, but a PS/2 mouse works with a little tweaking, as described in the openSUSE wiki entitled *How to Get PS/2 Mouse/Mice Working on Pegasos2 Boards*, which is available at http://opensuse.org/PowerPC_X11_configuration. Refer to the following example only after reading the wiki:

```
Run modprobe psmouse
```

To load mouse support at boot time, create `initrd`, including the `psmouse` module or add `psmouse` in a file (as root): `/etc/sysconfig/kernel` in the string `MODULES_LOADED_ON_BOOT`.

1.1 Graphics Mode Versus Text Mode

The SUSE installer, named Yet Another Setup Tool (YaST), starts in graphics mode, but you can force text mode by excluding the `video=` parameter, specifying the boot command as follows:

```
boot cd suseboot/inst32
```

In graphics mode, you make selections with the mouse and indicate acceptance with the mouse-sensitive back, abort, or next keys. All buttons are mouse-sensitive. If the mouse is not available in graphics mode, you cannot make any selections and the installation cannot proceed. In text mode, the graphical user interface (GUI) looks similar to the graphics mode, but the functionality differs as follows:

- Use the tab key to move between selections.
- For a choice that requires a mark (x or yes or no), press the space bar to produce the mark.
- Press the Return key to perform the selected action.
- Press the **F1** function key for help, which displays as follows:
 - **F8** go back
 - **F9** abort
 - **F10** proceed (usually performs the same function as the Return key)

1.2 Preparing the Hardware

To prepare the hardware, perform the following steps:

1. Plug a USB mouse into either of the two rear USB ports.
2. Verify that the monitor supports 1024 × 768 resolution at 75 MHz or greater:
For a low resolution monitor, you can specify the lower resolution; otherwise, the installation proceeds in text mode (see step 4 under [Section 2.2, “Install the First CD, CD1”](#)).
3. The hard drive is configured as shown in the following printout from the partition editor, which is called Parted:

```
Using /dev/hda
```

```
(parted) p
```

```
Disk geometry for /dev/hda: 0.000-76351.570 megabytes
```

Disk label type: amiga

Minor	Start	End	Filesystem	Name	Flags
1	7.844	956.997	ext2	boot	boot, hidden
2	956.997	1913.994	linux-swap	swap	hidden
3	1913.994	7632.443	ext3	debian	hidden
4	7632.444	13350.893	ext3	ubuntu	hidden
5	13350.894	19069.343	ext3	gentoo	hidden
6	19069.343	24787.792	ext3	ydl4	hidden
7	24787.793	32632.031		extra	hidden

(parted)

The software is a SUSE distribution, including the Linux kernel and the root file system.

2 Installation Steps

While following the steps presented in this section, use the **NEXT** button to go to the next step unless explicitly instructed otherwise.

2.1 Obtain the Distribution

The distribution is available via download for free from the Novell web page. It is not necessary to create a login or register with Novell, but you may receive more support if you do. This paper does not describe how to create a login, and it describes how to obtain and build the distribution without logging into the Novell site. Alternatively, the distribution is available on CD from Novell for a price.

There is an official distribution of Novell SUSE, version 9.3, which does not support the PowerPC architecture (PPC). However, the installation process described in this document uses the open version of Novell SUSE, version 10.0, which is available for both x86 and PowerPC. Perform the following steps to download open SUSE version 10.0 for PowerPC:

1. Navigate to the `www.opensuse.org` web site.
2. Click on the following line and navigate to the Development build:

```
Get the last released version, or current development build of SUSE Linux
```
3. Choose the link under the SUSE 10.0 version, which has PowerPC, PPC, code.
4. Download each CD iso file individually, in the order shown in the table and burn them onto individual CDs, as follows:
 - a) Click on each CD in the table and download each of the five iso files individually. The md5sum is currently not available.
 - b) Burn each iso file onto a blank CD using the iso9660 option on the burner software.
 - c) When you have a total of five CDs, number them from 1 to 5 in the order downloaded and shown on the download web page in the table.

2.2 Install the First CD, CD1

Before installation begins, boot into the firmware and then boot from the CD, as follows:

1. Boot the Pegasos into the firmware, as follows:
 - a) Press the power or reset button.
 - b) If the firmware starts with a menu, press the <esc> key to remain in the firmware.
OpenFirmware uses the ok prompt to await commands.
2. Insert the first CD, CD1, into the CD/DVD drive on the Pegasos.
3. Boot from the CD with this command:


```
boot cd suseboot/inst32 video=radeonfb:1024x768@75
```
4. The Pegasos has an ATI Radeon video card. Ensure that your monitor can display a resolution of 1024 × 768 at 75 MHz. If not, modify this command for your monitor's characteristics. The default resolution for YaST is 800 × 600, and a monitor that supports this resolution can be used in graphics mode. The boot command is `boot cd suseboot/inst32video=radeonfb:800x600`.
5. The YaST installer begins running in either graphics or text mode.
While the installer runs, it prompts you to take several actions. At any time, you can press the abort key to stop the installation. When the abort key is pressed, no change is made to the hard drive, and the installer shuts down. In fact, the hard drive is not changed until the final installation step, when you are prompted to specify whether to proceed or not. Actions that you take as the YaST installer runs are as follows:
 - a) Choose English.
 - b) There is an option to perform media check. If the results are wrong, ignore it.
 - c) Agree to the license.
The installer now analyzes the hardware.
 - d) Choose `New Installation`.
 - e) In the next multi-purpose screen, make the following selections:
 - Region, such as USA.
 - Time Zone, such as Central.
 - Optionally, change the local time.
 - f) Choose KDE or Gnome.

2.3 Create Partitions

The Genesi Pegasos computer currently has seven partitions as follows:

Minor	Start	End	Filesystem	Name	Flags
1	7.844	956.997	ext2	boot	boot, hidden
2	956.997	1913.994	linux-swap	swap	hidden
3	1913.994	7632.443	ext3	debian	hidden
4	7632.444	13350.893	ext3	ubuntu	hidden
5	13350.894	19069.343	ext3	gentoo	hidden
6	19069.343	24787.792	ext3	ydl4	hidden
7	24787.793	32632.031		extra	hidden

The extra partition `/dev/hda7` is unformatted and has a size of 7 GBs. It is available for any use. For the SUSE installation, we use it for the root partition, that is, `'/'`.

As the YaST installer runs, it offers you a chance to create partitions. Do not change the partition table from YaST, which can only create an MS-DOS partition table, destroying all previous partitions on the disk that are based on the Amiga partition table. Changes to the YaST partitions therefore result in severe data loss. Use YaST only to format partitions and set mount points. Auto install attempts to guess what changes are needed, and it attempts to delete `/dev/hda4`, which is the ubuntu partition. Select the expert tab to see all the recommended changes. This tab may be selected by default. The overview tab shows an abridged set of changes.

Selecting the change key allows you to change the partitioning scheme, as follows:

1. Click on the **CHANGE** button.
2. Choose partitioning.
3. Choose create custom partition setup.
4. Choose custom partitioning (for experts).

A display of all the partitions on the hard drive appears, similar to [Table 1](#). This is the display for the default Genesi Pegasos distribution. Choose any partition to format for the SUSE system. However, if the partition is already in use for another distribution, the installation destroys it.

Table 1. Partition Table for SUSE

Device	size	F	Type	Mount	Used by	Label
<code>/dev/hda</code>	74.5 GB		SAMSUNG			
<code>/dev/hda1</code>	949.1 MB		Linux Native			
<code>/dev/hda2</code>	956.9 MB		Linux native	swap		
<code>/dev/hda3</code>	5.5 GB		Linux Native			/
<code>/dev/hda4</code>	5.5 GB		Linux Native			/
<code>/dev/hda5</code>	5.5 GB		Linux Native			
<code>/dev/hda6</code>	5.5 GB		Linux Native			
<code>/dev/hda7</code>	7.6 GB		Linux Native			

Since every partition, except `/dev/hda7`, is used for other distributions on the Genesi Pegasos computer, we perform the following steps to choose `/dev/hda7`:

1. Click on `/dev/hda7` to select it.
2. Click on the **EDIT** button.
3. Change to Format, set the file system as ext3, and designate the mount point as root (/).
4. Click on **OK** to end the edit
5. Click on the **FINISH** button.

A message appears to indicate that there is no boot partition. In fact, it is `/dev/hda1`, but no change should be made to it at this time. Therefore, select **NO**.

6. Do not change any of the six existing partitions.

A display of the `/dev/hda7` formatting operation with a progress bar is shown. This bar fills up as formatting progresses. The installation summary shows when `/dev/hda7` is formatted.

2.4 Modify Booting Options

After formatting of `/dev/hda7` is complete, a display of the installation options is presented. Select your booting options from this display as follows:

1. Press the **CHANGE** key.
2. Select booting.
3. Select the **BOOT LOADER INSTALLATION** tab.
4. Select from the Type window. Do not install any boot loader.
5. Accept the message “If a boot loader is not installed, the system might not start.”

A Linux kernel will be created in a later step. It can be placed into the existing boot partition and started by modifying the menu file.

6. Press the **CONTINUE** key
7. Press the **FINISH** key
8. Press the **ACCEPT** key
9. Click on the **INSTALL** button on the confirm installation window.

A display of the installation progress with a progress bar is shown. This bar empties as packages are copied to the hard drive. Each division on the progress bar shows the amount of data to be copied from each CD. Choose the **DETAILS** tab to see which packages are installed.

2.5 Continue Installing CD2, CD3, CD4, and CD5

When installation of CD1 is complete, a screen appears showing the progress toward building an initial system. Then the system reboots. Do not remove CD1 from Pegasos at this time.

Proceed as follows:

1. Boot into OF with the **<ESC>** key or the menu number 7.
2. Boot from CD1 with this command:


```
boot cd suseboot/inst32 video=radeonfb:1024x768@75
```
3. Repeat the early startup procedure, as follows:
 - a) Choose English
 - b) There is an option to perform media check. If the results are wrong, ignore it.
 - c) Agree to the license.

The installer now analyzes the hardware.
 - d) Choose the **OTHER** button installation.

Here we continue with the rest of the installation. We do not choose **UPDATE** because this option installs the packages from only one CD and, if the installation is restarted later, it does not allow us to choose a user login name, the installation will be unusable, and we will have to start over.

4. Choose the Boot Installed system and click on **OK**.
5. Choose `/dev/hda7`.
6. Click on boot.

The computer now boots from `/dev/hda7` and continues the installation.

7. Replace CD1 with CD2 when requested by the installer. Continue replacing CDs when prompted. Choose the root password (be sure to remember it).
8. For the configuration display, choose the Network configuration:
 - a) ssh can be enabled for remote login.
 - b) The firewall can be disabled. The default is DHCP.
9. Test the internet connection:
 - If the test fails, ignore it.
 - Click on the **LOGS** button and look at the logs to verify that an IP address has been assigned
10. Check the user authentication method. The default is the local passwd file login.
11. Set up the local user:
 - a) Choose a non-root user name and password.
 - b) Turn off automatic login.

The system configuration is now written and the release notes are displayed.
12. Click on the **FINISH** button to log into the system.

The system reboots, and the SUSE graphical login screen is displayed.
13. Log in as user or root.

Do not log in as root. Log in as a user and then change to root when necessary with the **su** command.
14. When all CDs are installed, remove the last CD, CD5.

3 Boot Loader and Menu File

Do not reboot until the SUSE system is running and a login has occurred. Then proceed to create a boot loader and modify the menu file as described in this section.

3.1 Create a Startup Kernel

Start a terminal session. From the Applications menu, select **SYSTEM** → **TERMINAL** → **X TERMINAL**. However, any terminal can be used. Create a Linux kernel using a RAMdisk from the source code included in this installation. Create a zImage.initrd with this command:

```
mkzimage --vmlinux /boot/vmlinux --initrd /boot/initrd --cmdline
"root=/dev/hda7 quiet sysrq=1" --output /tmp/pegasos_bootfile
```

3.2 Copy the Kernel

After the startup kernel is created, copy it as follows:

1. Copy the /tmp/pegasos_bootfile file to the boot partition where the menu file exists.
2. Log in as root and mount the first partition (the boot partition) and copy the SUSE Linux kernel to this partition.
3. Modify the menu file to use this Linux kernel for future boots into SUSE. The steps are as follows:


```
Log in as root.
su -
mount /dev/hda1 /mnt
cd /mnt
cp /tmp/pegasos_bootfile .
ls
```

3.3 Modify the Menu File

Before making any changes to the menu file, copy it to a backup, as follows, so that is available for use if the menu file fails:

```
cd /mnt
cp menu menu.backup
```

Change the menu file on the boot partition to include the option to boot into SUSE. There are four overall changes to make:

1. Change the my-max-boot-num to 8.
2. Add the eighth entry for SUSE.
3. Add the case statement for item number 8, SUSE boot.
4. Set the default boot to SUSE, choice 7.

This is the format for the menu system supplied on the standard Genesi Pegasos systems delivered after March 2005. Future systems may be different.

Using an editor, such as vi or emacs, edit the menu file as follows to complete the four overall steps:

1. Enter the directory where the menu file is stored, and open the menu file:

```
cd /mnt
```
2. Change line 12 from my-max-boot-num 7 to my-max-boot-num 8.
3. Change line 13 from my-boot-default 1 to my-boot-default 7.
4. Add this line following line 25:

```
." 7: SUSE" cr
```
5. Modify the following line, now line 27, from 7: return to OF prompt to 8: return to OF prompt.
6. Add this line immediately after line 38:

```
7 of " hd:0 pegasos_bootfile" endof
```
7. Modify line 39 from 7 of "none" endof to 8 of "none" endof.
8. Save the file. If the menu file does not have permissions to write it from the editor, save the menu contents to another file, such as menu_cp, then exit the editor and copy the menu_cp file to menu, as follows:

```
cp menu_cp menu
```

The menu file now looks like this:

```
\ FORTH is identified by a forthcomment at first line
\
\ terminal control stuff
\
: TTY.CSI d# 27 EMIT ASCII [ EMIT ;
: TTY.HOME TTY.CSI ASCII H EMIT ;
: TTY.CLR_EOS TTY.CSI ASCII J EMIT ;
: TTY.HOME_CLR TTY.HOME TTY.CLR_EOS ;
\
```

```

\ boot menu stuff
\
: my-max-boot-num 8;
: my-boot-default 7;
: my-boot-delay d# 300 ; \ unit = 100 ms
: my-print-menu ( -- )
  TTY.HOME_CLR
  ." " cr
  ." Pegasos Boot menu" cr
  ." " cr
  ." 1: Debian/Sarge (3.1) rc3" cr
  ." 2: Ubuntu/Hoary" cr
  ." 3: Gentoo " cr
  ." 4: Yellow Dog 4" cr
  ." 5: Gentoo Demo" cr
  ." 6: Gentoo Demo - verbose" cr
." 7: SUSE" cr
  ." 8: return to OF prompt" cr
  ." " cr
;
: my-boot-case ( num -- )
  ." " cr
  case
    1 of " hd:2 boot/vmlinuz-2.6.11-powerpc root=/dev/hda3" endof
    2 of " hd:3 boot/vmlinuz-2.6.10-5-powerpc root=/dev/hda4" endof
    3 of " hd:4 boot/gentoo root=/dev/hda5" endof
    4 of " hd:5 boot/2.6.8.ydl-freescale root=/dev/hda6" endof
    5 of " hd:6 boot/kernel root=/dev/hda7 video=radeonfb:800x600-32
splash=silent,theme:luminocity" endof
    6 of " hd:6 boot/kernel root=/dev/hda7 video=radeonfb:800x600-32 splash=none"
endof
    7 of " hd:0 pegasos_bootfile" endof

```

Boot Loader and Menu File

```
8 of " none" endof
  endcase
  $boot
;
: my-input-num ( wait-period max-boot-num default-num -- boot-num )
1 \ loop-inc = 1
3 pick 0 do
  0d emit
  ." press 1-"
  ( wait-period max-boot-num default-num loop-inc )
2 pick ascii 0 + emit
dup 1 = if ." seconds"
then
  ." (default: "
over ascii 0 + emit
  ." ) :
d# 100 ms
key? if
  key
  ( wait-period max-boot-num default-num loop-inc key )
dup 0d = if \ return pressed
  drop leave
then

ascii 0 -
( wait-period max-boot-num default-num loop-inc num )
dup 1 5 pick
( wait-period max-boot-num default-num loop-inc num num 1 max-boot-num )
between if
  rot drop swap leave
then
```

```

        ( wait-period max-boot-num default-num loop-inc num )
        2drop 0 \ loop-inc = 0
    then
dup +loop
drop
( wait-period max-boot-num boot-num )
nip nip
;
my-print-menu
my-boot-delay my-max-boot-num my-boot-default my-input-num
my-boot-case
." within "
    3 pick i - d# 10 / .d

```

3.4 Close Out the Installation

To terminate the installation process when it is complete, change directories (`cd`) out of the `/mnt` directory and then unmount the boot partition, `hda1`, as follows:

```

cd
umount /mnt
exit
restart

```

4 Start SUSE

When the system reboots, or any time when the system starts, choose menu item 7, which starts SUSE. You can change the SUSE configuration with the YaST configuration editor while SUSE is running. Start YaST from the Applications menu → **SYSTEM** → **YAST**.

5 References

The following web pages and documents are referenced in this application note:

- <http://www.opensuse.org>
- http://www.novell.com/products/linuxprofessional/downloads/suse_linux/instructions_eval.html
- AN2739, *Genesi Debian Linux*, a Freescale application note.
- http://www.opensuse.org/PowerPC_X11_configuration

For assistance or answers to any questions, contact us by e-mail at risc10@freescale.com.

6 Document Revision History

Table 2 provides a revision history for this application note.

Table 2. Document Revision History

Rev. No.	Date	Substantive Change(s)
2	12/2005	<ul style="list-style-type: none"> Revised Section 2.5, "Continue Installing CD2, CD3, CD4, and CD5," to continue boot from CD1 until step 7. Corrected <code>initred</code> to <code>initrd</code> in first command line shown in Section 3.1, "Create a Startup Kernel."
1	12/2005	<ul style="list-style-type: none"> Reorganized the top-level sections of the document for clarity. Added PPC terminology Updated Section 2.1, "Obtain the Distribution" to explain that PPC is not supported in Novell SUSE Version 9.3 but is supported in the open version, Version 10.0. Added a note on the default resolution for YaST to instruction step 3 of Section 2.2, "Install the First CD, CD1." Added USB mouse note to step 4 of Section 2.2, "Install the First CD, CD1." Added partition table note to "Create partitions" bullet under step 5 of Section 2.2, "Install the First CD, CD1." Added http://www.opensuse.org/PowerPC_X11_configuration as a fourth reference in Section 5, "References."
0	10/2005	Initial creation.

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