

# **Implementing Linux on the Zynq™-7000 SoC**

## **Lab 0.1 – Pre-Lab**

### **Creating a Cross Build Platform for Zynq**



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Version 05

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## Lab Setup

To complete the SpeedWay labs, the following software and hardware setups are recommended.

### Software

The recommended software for SpeedWay labs is:

- Xilinx ISE WebPACK 14.2 (Free license and download from Xilinx website)
  - Check Xilinx [AR51895](#) for required installation work-arounds
- Cypress CY7C64225 USB-to-UART Bridge Driver
- Tera Term (Exact version used for this SpeedWay is V4.75)
- VMware Player V5.0.0 (Exact version used for this SpeedWay is VMware-player-5.0.0-812388.exe)
- CentOS V6.3 64-bit installer image (Exact version used for this SpeedWay is CentOS-6.3-x86\_64-bin-DVD1.iso)
- Sourcery CodeBench Zynq toolchain (Exact version used for this SpeedWay is xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin)
- Git SCM toolset (Exact version used for this SpeedWay is V1.7.1)
- Adobe Reader for viewing PDF content (Exact version used for this SpeedWay is Adobe Reader X 10.1.4)

### Hardware

The targeted hardware consists of the following:

- PC workstation with at least 5 GB RAM, 30GB free hard disk space, Windows 7 64-bit operating system, and Internet access to download updates from the source code repository and software mirror sites.
- Available SD card slot on PC or external USB-based SD card reader
- Avnet ZedBoard (**AES-Z7EV-7Z020-G**) – *included in kit*
- USB cable (Type A to Micro-USB Type B) – *included in kit*
- 4GB SD card – *included in kit*
- CAT-5 Ethernet patch cable

## Lab Instruction Notes

Throughout all the SpeedWay labs, a generalized instruction is given. If you're comfortable completing the task based on that instruction, feel free to do so. If not, step-by-step instructions are provided.

## Technical Support

For technical support with any of the labs, please contact your local Avnet/Silica FAE or visit the ZedBoard.org support forum:

<http://www.zedboard.org/forum>

Additional technical support resources are listed below.

*ZedBoard Kit support page with Documentation and Reference Designs*

<http://www.zedboard.org/content/support>

For Xilinx technical support, you may contact your local Avnet/Silica FAE or Xilinx Online Technical Support at [www.support.xilinx.com](http://www.support.xilinx.com). On this site you will also find the following resources for assistance:

- Software, IP, and Documentation Updates
- Access to Technical Support Web Tools
- Searchable Answer Database with Over 4,000 Solutions
- User Forums
- Training - Select instructor-led classes and recorded e-learning options

Contact your Avnet/Silica FAE or Avnet Support for any additional questions regarding the ZedBoard reference designs, kit hardware, or if you are interested in designing any of the kit devices into your next design.

<http://www.em.avnet.com/techsupport>

## Lab 0.1 Overview

The Xilinx Linux project combines the benefit of open source Linux operating system together with a customized solution geared towards developing software on its processing platform.

Zynq-7000 All Programmable System on Chip combines a dual ARM® Cortex™-A9 processing system including hardened memory controllers and peripherals, along with Xilinx 7 series programmable logic.

The Zynq-7000 AP SoC Open Source Linux provides Symmetric Multi-Processing (SMP) support for the dual Cortex-A9 ARM core and software drivers for all the peripherals on the processing system.

Xilinx provides tools to build and debug the software applications on Linux as well as for Linux kernel development. The GNU toolchain provided by Xilinx is Sourcery CodeBench which includes C/C++ compilers, optimized C/C++ libraries and GDB debugger. The installer for this toolchain is included in the 14.2 ISE install folder and can also be downloaded from the Xilinx website as well:

[http://www.xilinx.com/member/mentor\\_codebench/xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin](http://www.xilinx.com/member/mentor_codebench/xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin)

Xilinx also works with partners to provide commercial Linux solutions, which can be used for software development. These commercial solutions provide advanced debug, trace and profile capabilities that may not be available in the open source solution.

Building the Linux kernel is only supported from a Linux based host. It is not supported from Windows. This lab will provide appropriate guidance for setting up a suitable cross build platform using the CentOS Linux distribution.

CentOS serves as a good candidate for a cross platform since it follows the Red Hat Enterprise Linux releases and Xilinx does support ISE installs on RHEL Workstation.

## Lab 0.1 Objectives

When you have completed Lab 0.1, you will know how to do the following:

- Set up a Linux virtual machine environment for Zynq development
- Install cross toolchain needed to compile U-Boot and Linux Kernel for Zynq execution

## Experiment 1: VMware Player Installation

This experiment shows how to install VMware Player which will enable the use of a Linux virtual machine workstation to be used for the cross build platform.

If a suitable virtual machine tool is already installed, this Experiment 1 can be skipped and Experiment 2 can be started. If a 64-bit CentOS V6.3 Workstation or similarly compatible Linux workstation is already available, both Experiment 1 and Experiment 2 can be skipped and Experiment 3 can be started.

If software emulation using QEMU is desired, both the guest operating system and the host operating system must both be 64-bit editions. If not performing software emulation, 32-bit editions can be used but 64-bit is strongly recommended since that is what is used for this SpeedWay lab.

### Experiment 1 General Instruction:

Install VMware Player using the official VMware installer. For legal distribution reasons, the VMware player installation executable cannot be included with the SpeedWay lab materials. To download a free legal copy of VMware player, please download a copy from the VMware website:

<http://www.vmware.com/products/player/overview.html>

The version downloaded may differ from the version shown in the SpeedWay lab exercises.

Note: If a suitable virtual machine tool is already installed, this Experiment 1 can be skipped and Experiment 2 can be started. If a 64-bit CentOS V6.3 Workstation or similarly compatible Linux workstation is already available, both Experiment 1 and Experiment 2 can be skipped and Experiment 3 can be started.

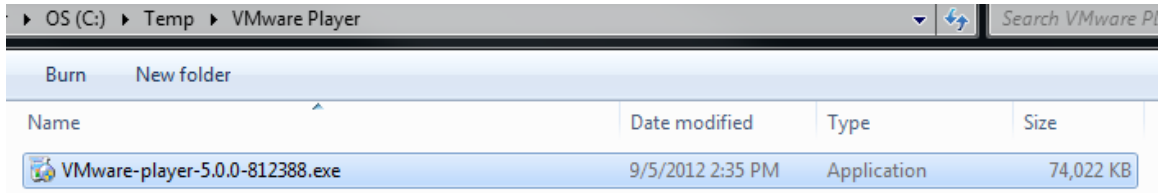
### Experiment 1 Step-by-Step Instructions:

1. To download a free legal copy of VMware player, please download a copy from the VMware website:

<http://www.vmware.com>

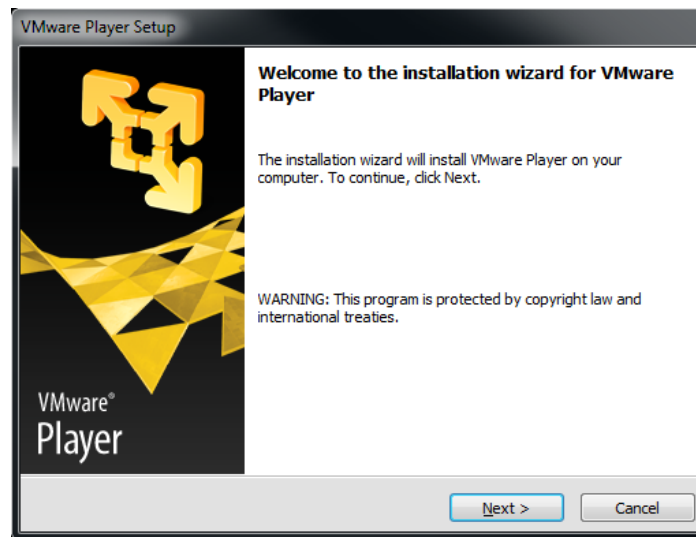
The version downloaded may differ from the version shown in the SpeedWay lab exercises.

2. Launch the VMware Player installer.



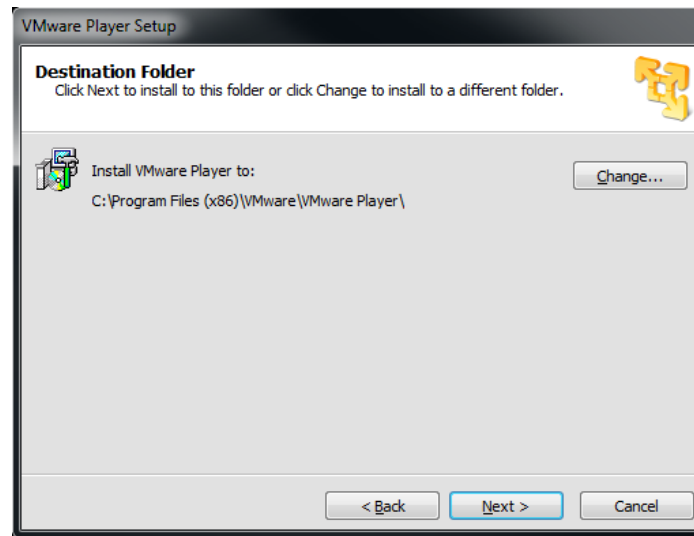
**Figure 1 – VMware Player installer for Windows**

3. Once the VMware Player installation wizard appears, click on the **Next** button.



**Figure 2 – VMware Player Installation Wizard Welcome**

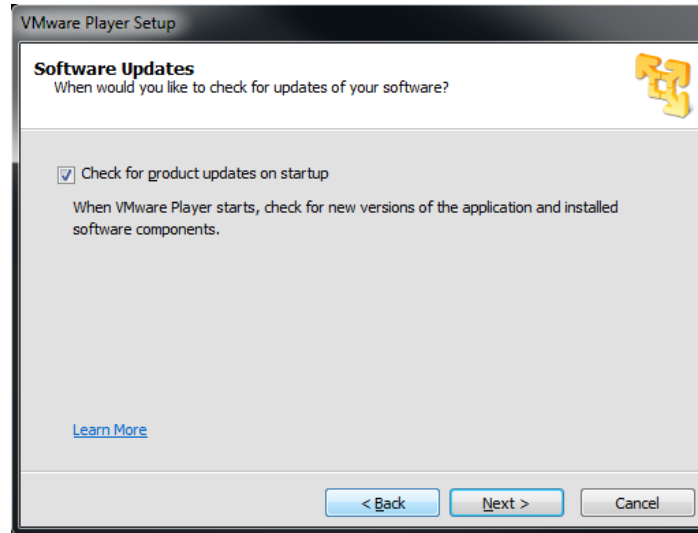
4. In the *Destination Folder* dialog, select the folder that the VMware player application files will be installed into. Once the destination folder has been specified correctly, click the **Next** button. It is strongly recommended that the default suggested destination folder is used.



**Figure 3 – VMware Player Destination Folder Selection**

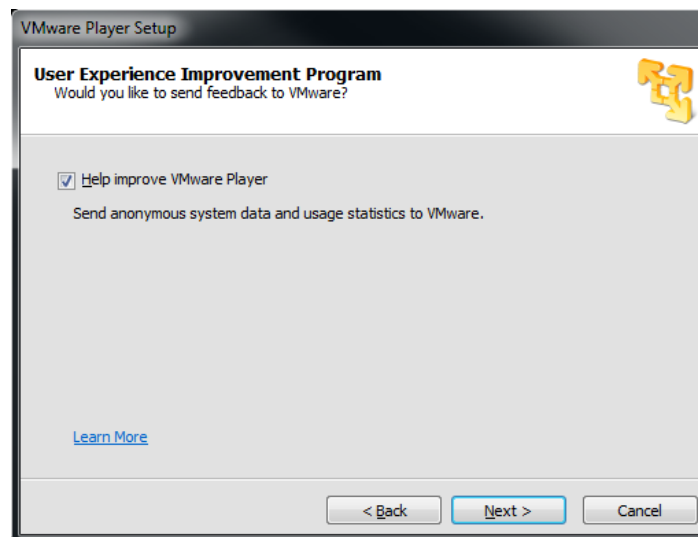


5. Select the desired *Software Updates* options and then click the **Next** button.



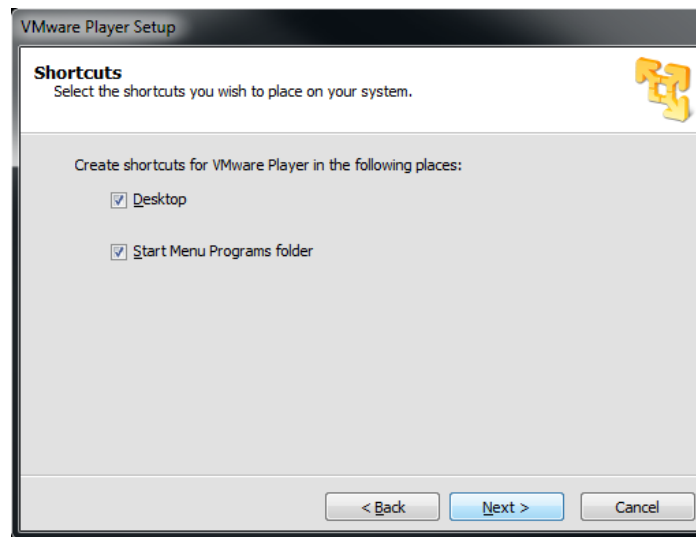
**Figure 4 – VMware Player Software Updates Option**

6. Select the desired *User Experience Improvement Program* options and then click the **Next** button.



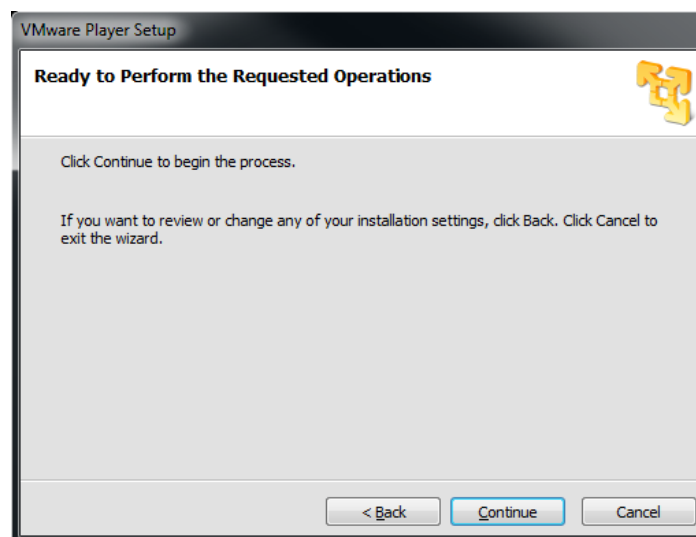
**Figure 5 – VMware Player User Experience Improvement Program Option**

7. Select the desired *Shortcuts* options and then click the **Next** button.



**Figure 6 – VMware player Shortcuts Options**

8. Once the desired options have been selected, click the **Continue** button to begin the install process and wait for the install process to complete.



**Figure 7 – VMware Player Ready to Begin Installation**

9. Once the install process has completed, click the Finish button to complete the install. Reboot the host machine at this point only if prompted to do so.

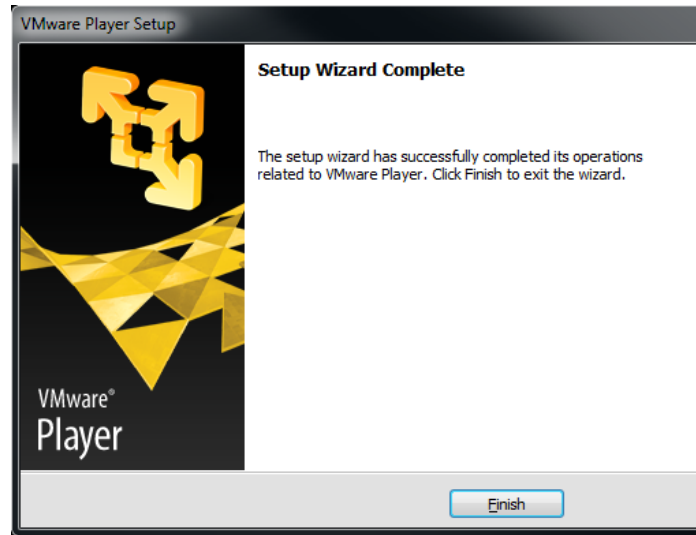


Figure 8 – VMware Player Installation Complete

**Questions:**

**Answer the following questions:**

- *Why is a virtual machine needed for building the Xilinx Linux kernel?*  
\_\_\_\_\_
- *For a cross build environment, which types of host and guest operating systems are recommended: 32-bit or 64-bit?*  
\_\_\_\_\_  
\_\_\_\_\_
- *What is the cost of VMware Player V5.0 when downloaded from the VMware website?*  
\_\_\_\_\_

## Experiment 2: Install CentOS Workstation on Virtual Machine

VMware Player is now available to launch virtual machines, but first we will create new a new VMware virtual machine using CentOS 6.3 install media.

### Experiment 2 General Instruction:

Obtain the CentOS installation media image(s) from one of the official servers listed on <http://www.centos.org> and create a new VMware virtual machine using the downloaded CentOS media as the source image.

#### Important

Installation of a 64-bit guest operating system is only recommended on a 64-bit host operating system. Also, virtualization technology (AMD-V or VT-x) must be supported by the processor and enabled in the BIOS.

On Lenovo T420 laptops, Virtualization Technology BIOS settings must be enabled in order to run a guest OS in 64-bit mode, change these settings in the BIOS **Security**→**Virtualization** settings menu.

On HP Z210 workstations, Virtualization Technology BIOS settings must be enabled in order to run a guest OS in 64-bit mode, change these settings in the BIOS **Security**→**System Security** settings by setting VTx and VTd to Enabled and accepting with F10 then saving the updated settings.

Windows 7 machines that are deployed with Bitlocker™ and other PC protection software require special attention when changing BIOS settings. Bitlocker software looks at the BIOS settings and if they change you may need contact your IT support desk for a security code to unlock the system.

## Experiment 2 Step-by-Step Instructions:

1. Launch VMware player and select menu **Player** → **File** → **New Virtual Machine**, or select the action item **Create a New Virtual Machine** at the right of the window.

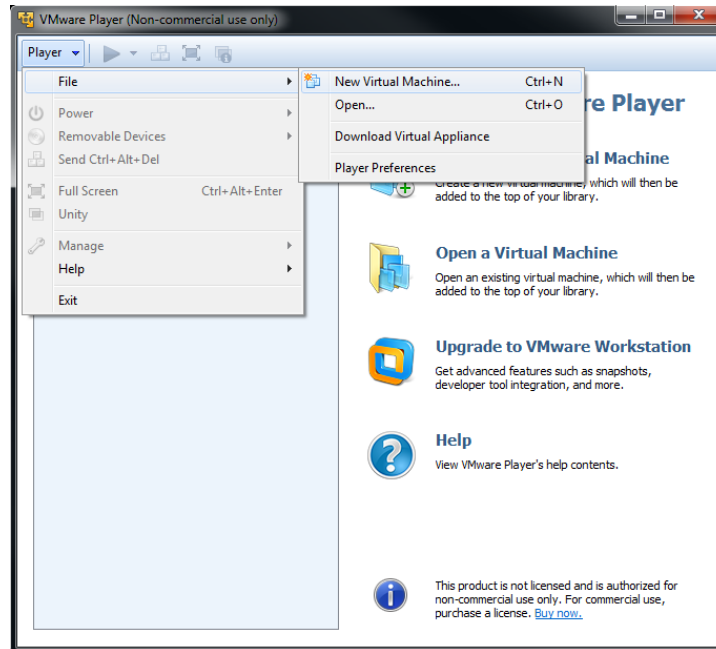
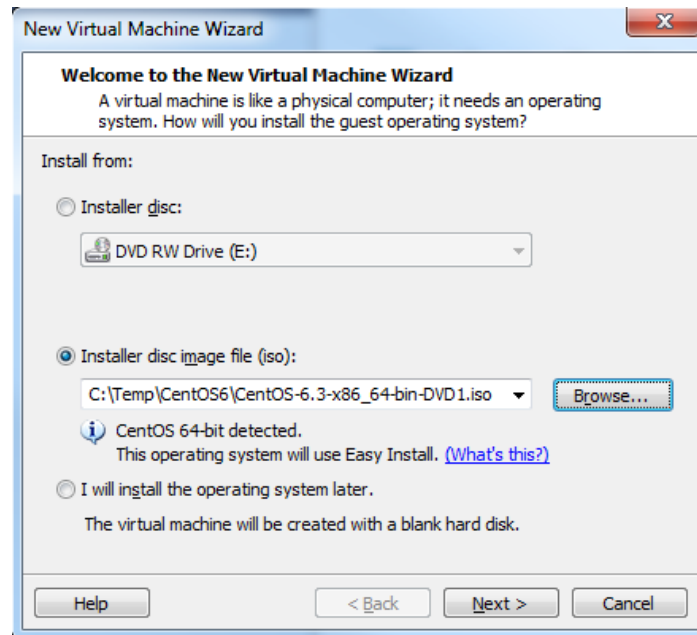


Figure 9 – Using VMware Player to Create a New Virtual Machine

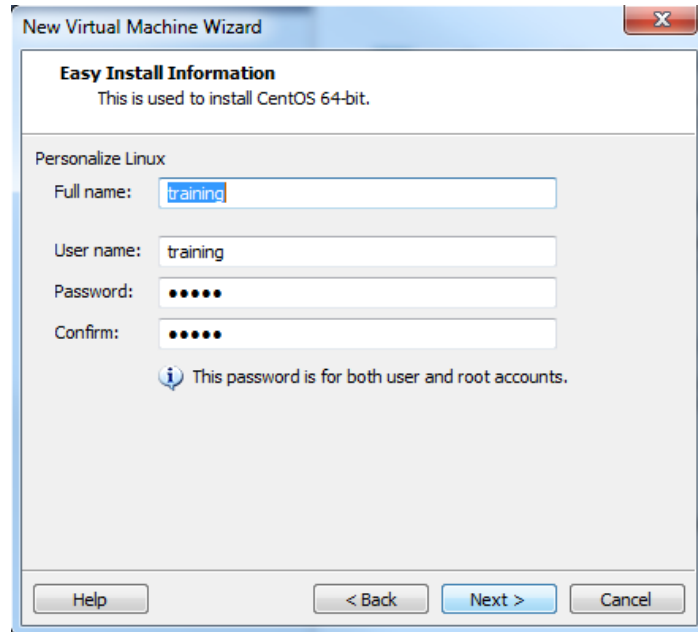
2. In the *New Virtual Machine Wizard* select the **Installer disc image file (iso)** option, locate the CentOS installation media image file, and then click the **Next** button.



**Figure 10 – Selecting the Install Media for New Virtual Machine**

3. Under *Easy Install Information*, enter in information that is appropriate to your own install and then click the **Next** button.

Note: For the virtual machines used during the Avnet SpeedWay, the fields shown in Figure 11 were used along with the account password “**Avnet**”.



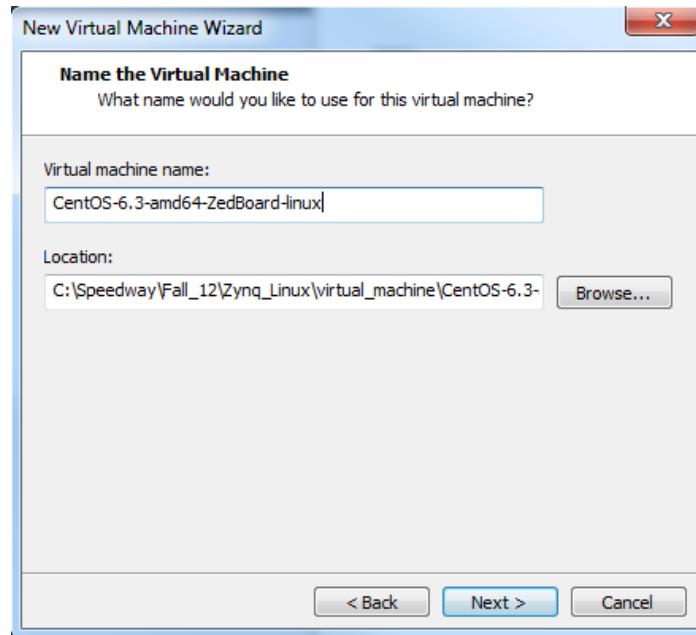
The screenshot shows a window titled "New Virtual Machine Wizard" with a close button (X) in the top right corner. The main heading is "Easy Install Information" with a subtitle "This is used to install CentOS 64-bit." Below this, the section "Personalize Linux" contains four input fields: "Full name:" with the text "training", "User name:" with the text "training", "Password:" with five dots, and "Confirm:" with five dots. An information icon (i) is located below the password fields, followed by the text "This password is for both user and root accounts." At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", and "Cancel".

**Figure 11 – CentOS Personalization**

4. In the *Name the Virtual Machine* window, name the virtual machine **CentOS-6.3-amd64-ZedBoard-linux**, select an appropriate path, and then click the Next button.

For the Speedway, the following path is used:

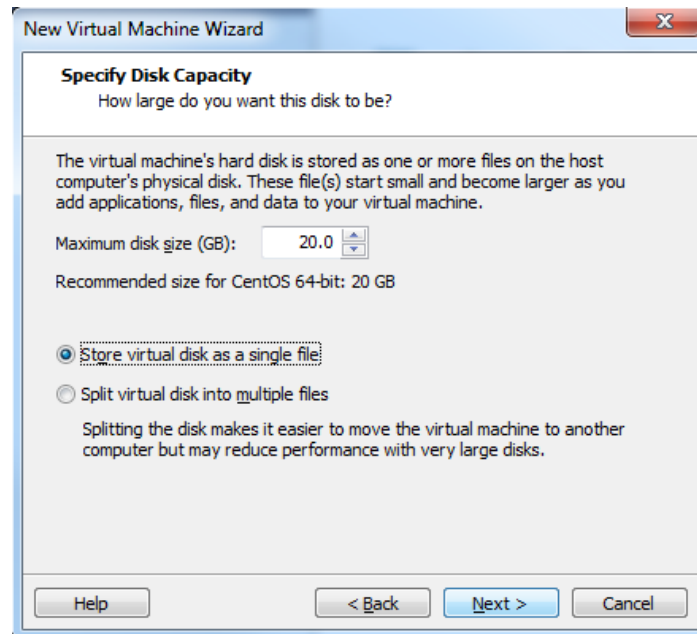
**C:\Speedway\Fall\_12\Zynq\_Linux\virtual\_machine\CentOS-6.3-amd64-ZedBoard-linux**



**Figure 12 – Naming the New Virtual Machine**



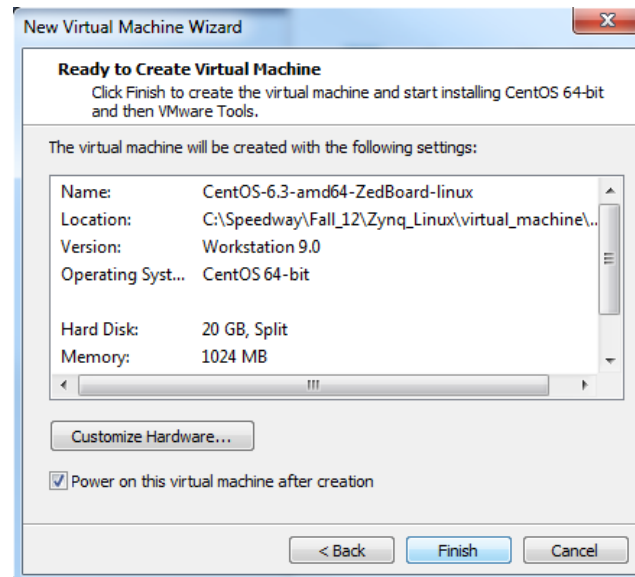
5. In the *Specify Disk Capacity* window, use the default capacity of **20.0GB** but select the option **Store virtual disk as a single file**, and then click the **Next** button.



**Figure 13 – Virtual Machine Disk Capacity**

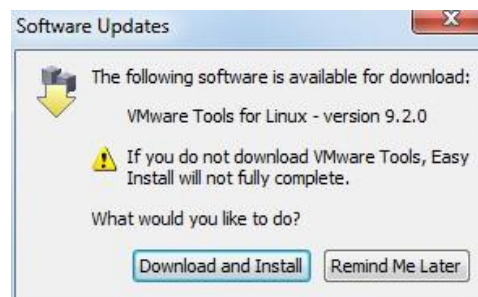
6. In the *Ready to Create Virtual Machine* window, verify the settings for the machine. Be certain that at least 1024MB is allocated for the virtual machine memory and then click the **Finish** button.

The virtual machine will be created and CentOS installed in the new machine. The virtual machine creation and install will take 20-40 minutes to complete depending upon the host machine performance. If they security software installed in the PC, there may be additional prompts to allow changes to the system during the course of the virtual machine creation.



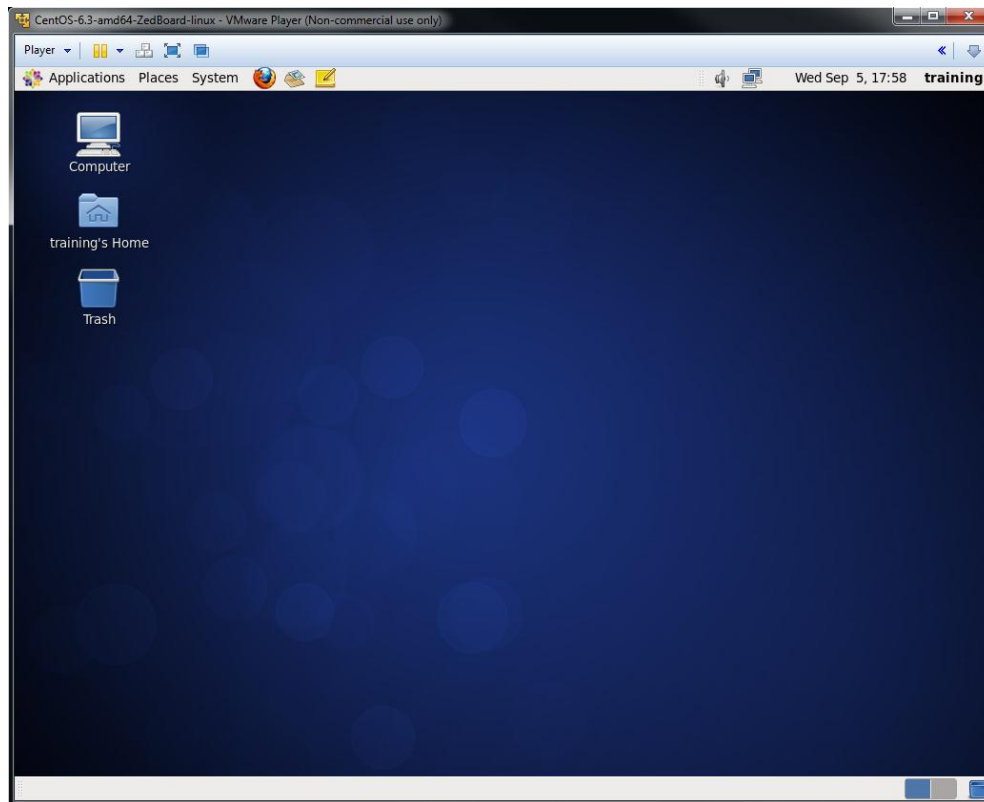
**Figure 14 – Virtual Machine Settings Review**

If prompted to download and install *VMware Tools for Linux*, click the **Download and Install** button to allow the download to complete and the VMware Update Launcher to run on the host OS. The latest version of VMware Tools is recommended to enhance the performance of the virtual machine guest operating system and improve virtual machine management.



**Figure 15 – Download and Install VMware Tools for Linux Prompt**

7. Once the installation process is complete, the virtual machine will be powered on and the Desktop can be seen as in Figure 16 after login using the user account info entered during Step 3.

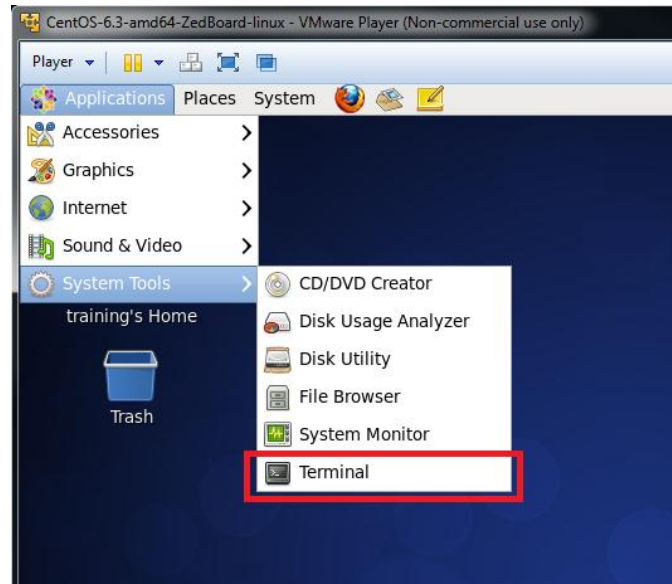


**Figure 16 – New Virtual Machine Following Installation**

8. If you get a notification that the **VMware Tools for Linux** could not be installed automatically, these tools must be installed manually using the remaining steps in this Experiment.

If you do not get a notification, the tools were installed automatically in the background during the CentOS install, skip ahead to Experiment 3.

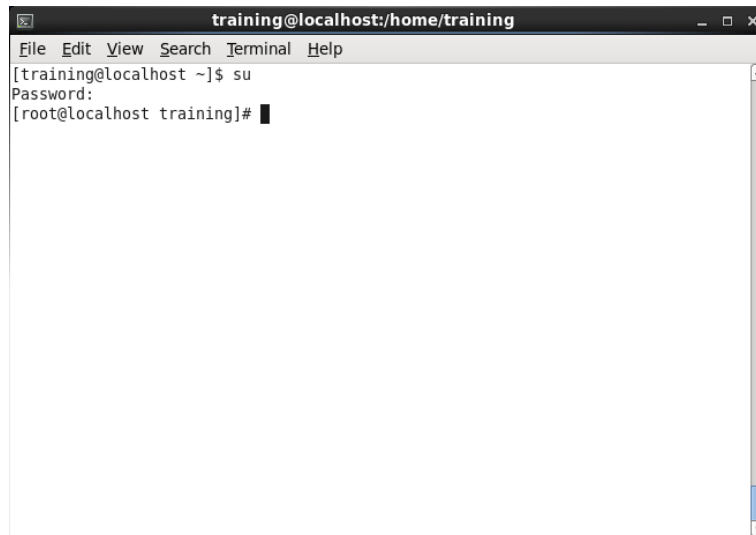
9. In the CentOS guest operating system, open a terminal window through the **Applications→System Tools→Terminal** menu item.



**Figure 17 – Launching the CentOS Terminal from the Desktop**

10. Take on root privileges by running the superuser elevation command **su** and entering the password from Step 3. For SpeedWay event laptops, the password is **Avnet** and is case sensitive.

```
$ su
```



**Figure 18 – Elevating to Superuser Privileges**

11. Install the VMware Tools for Linux prerequisites.

```
# yum install make gcc kernel-devel perl
```

12. On the host operating system, from the VMware Player menu bar, select the **Player→Manage→Install VMware Tools** option.
13. Run the mount command with no arguments to determine whether your Linux distribution automatically mounted the VMware Tools virtual CD-ROM image.

If the CD-ROM device is mounted, the CD-ROM device and its mount point are listed as something like this:

```
/dev/cdrom on /mnt/cdrom type iso9660 (ro,nosuid, nodev)
```

14. If the VMware Tools virtual CD-ROM image is not mounted, mount the CD-ROM drive.

If a mount point directory does not already exist, create it.

```
# mkdir /mnt/cdrom
```

15. Mount the virtual CD-ROM drive.

```
# mount /dev/cdrom /mnt/cdrom
```

16. Change to the /tmp folder as a working directory.

```
# cd /tmp
```

17. List the contents of the mount point directory and note the filename of the VMware Tools tar installer.

```
# ls mount-point
```

18. Uncompress the installer.

```
# tar xzpf /mnt/cdrom/VMwareTools-x.x.x-yyyy.tar.gz
```

Note: The value x.x.x is the product version number, and yyyy is the build number of the product release. If you attempt to install a tar installation over an RPM installation, or the reverse, the installer detects the previous installation and must convert the installer database format before continuing.

19. Unmount the CD-ROM image.

```
# umount /dev/cdrom
```

20. Run the installer and configure VMware Tools.

```
# cd vmware-tools-distrib./vmware-install.pl
```

Respond to the prompts by pressing Enter to accept the default values

Follow the instructions at the end of the install script.

Depending on the VMware Tools for Linux features you use, these instructions can include restarting the X session, restarting networking, logging in again, and starting the VMware User process. You can alternatively reboot the guest operating system to accomplish all these tasks.

### **Questions:**

***Answer the following questions:***

- *What is the login/password used by the guest operating system for the Avnet SpeedWay virtual machine?*  

---
- *What is the minimum recommended memory size in MB for the guest operating system?*  

---

## Experiment 3: Setup Build Environment

In order to pull the latest code changes for U-Boot and the Linux Kernel from the Xilinx repository and build them, our build environment must be configured correctly. The Git SCM tools must be installed along with the Sourcery CodeBench cross toolchain for Zynq.

### Experiment 3 General Instruction:

Install the Git SCM tools followed by the Sourcery CodeBench cross toolchain for Zynq.

### Experiment 3 Step-by-Step Instructions:

1. In the CentOS guest operating system, open a terminal window through the **Applications→System Tools→Terminal** menu item.

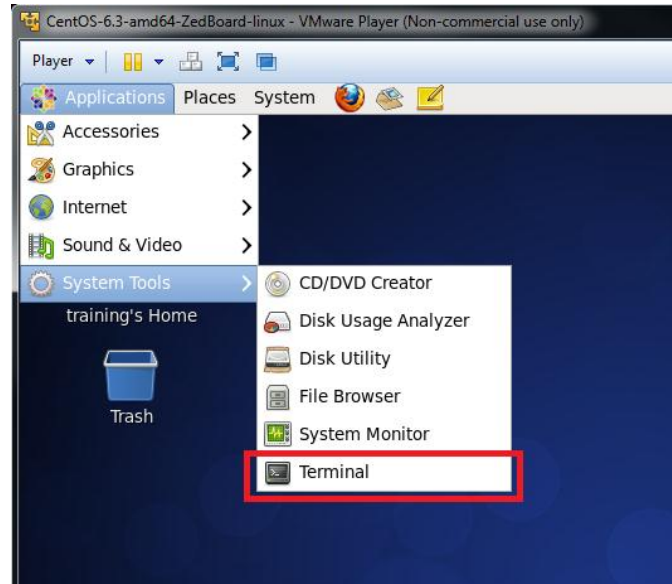
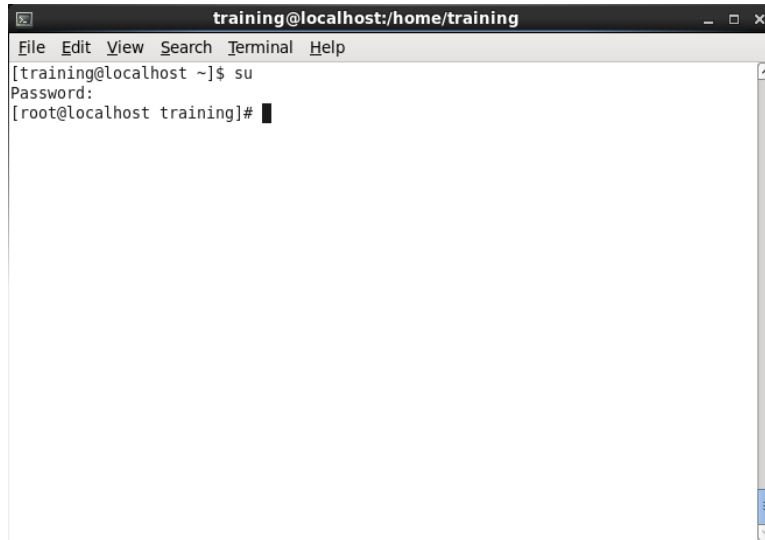


Figure 19 – Launching the CentOS Terminal from the Desktop



2. Take on root privileges by running the superuser elevation command **su** and entering the password from Experiment 2, Step 3. For SpeedWay event laptops, the password is **Avnet** and is case sensitive.

```
$ su
```



**Figure 20 – Elevating to Superuser Privileges**

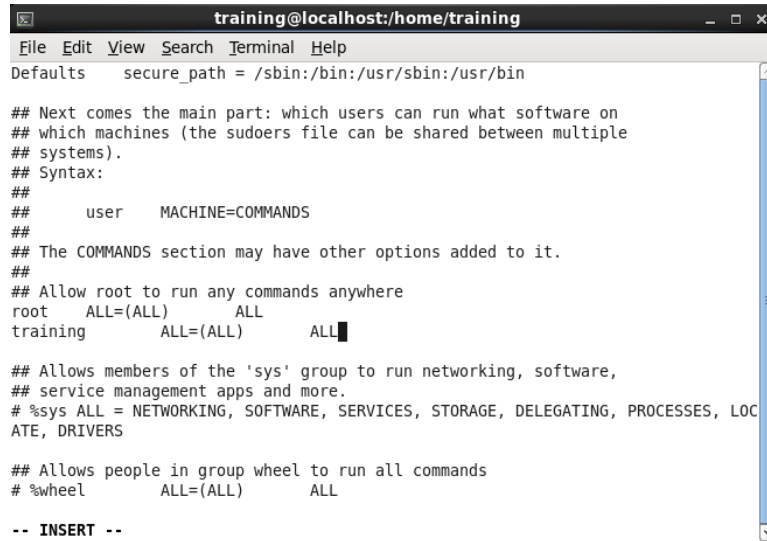
3. Use visudo text editor to edit the /etc/sudoers file.

```
# visudo
```

4. Add the **training** user to the sudoers list by inserting the following line to the users section of the sudoers file as shown in Figure 21. The users section is located towards the end of the file.

```
training    ALL=(ALL)  ALL
```

To insert text from within the vi editor, press the **I** key on the keyboard to use vi insert mode.



```
training@localhost:/home/training
File Edit View Search Terminal Help
Defaults    secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##      user    MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)    ALL
training    ALL=(ALL)    ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOC
ATE, DRIVERS

## Allows people in group wheel to run all commands
# %wheel    ALL=(ALL)    ALL

-- INSERT --
```

**Figure 21 – Adding training Account to /etc/sudoers File**

5. Exit the vi editor and save changes to the sudoers file by using the write-quit key sequence:

```
<ESC> :wq
```

6. The **training** user will now have sufficient privileges to do important systems tasks using the sudo command. Exit the superuser mode.

```
# exit
```

7. Notice how the command prompt has just changed from a **#** character back to a normal **\$** character. Next, the system should be updated to the latest updates so use the yum package manager to install the system updates from the appropriate mirrors and when prompted accept the download and installation of all recommended packages. For SpeedWay event laptops, the password is **Avnet** and is case sensitive. These updates can take several minutes and may present several user prompts before completion.

If prompted to allow download of packages, accept the download by pressing the **Y** key followed by the **Enter** key.

If prompted for the import of the GPG key accept the import by pressing the **Y** key followed by the **Enter** key.

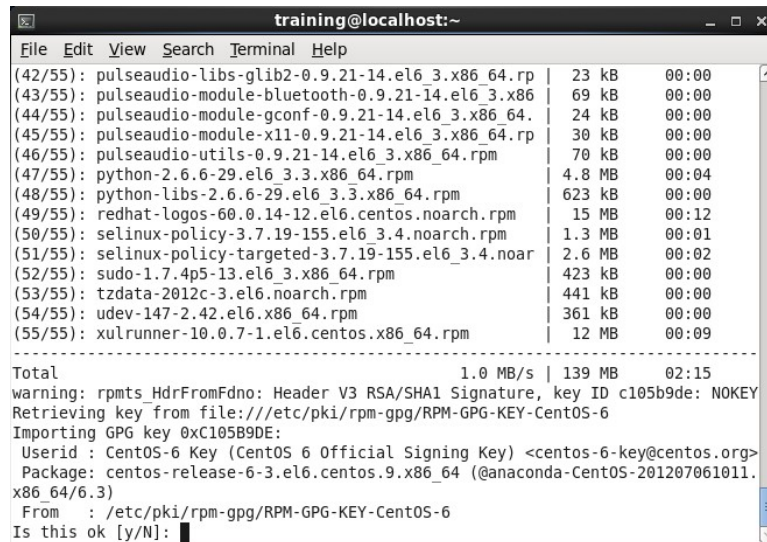
```
$ sudo yum update
```

8. The ncurses-devel package and Git SCM tool will be installed next using the package manager and when prompted accept the download and installation of all recommended packages.

If prompted to allow download of packages, accept the download by pressing the **Y** key followed by the **Enter** key.

If prompted for the import of the GPG key accept the import by pressing the **Y** key followed by the **Enter** key.

```
$ sudo yum install ncurses-devel git
```



```
training@localhost:~  
File Edit View Search Terminal Help  
(42/55): pulseaudio-libs-glib2-0.9.21-14.el6_3.x86_64.rpm | 23 kB | 00:00  
(43/55): pulseaudio-module-bluetooth-0.9.21-14.el6_3.x86_64.rpm | 69 kB | 00:00  
(44/55): pulseaudio-module-gconf-0.9.21-14.el6_3.x86_64.rpm | 24 kB | 00:00  
(45/55): pulseaudio-module-x11-0.9.21-14.el6_3.x86_64.rpm | 30 kB | 00:00  
(46/55): pulseaudio-utils-0.9.21-14.el6_3.x86_64.rpm | 70 kB | 00:00  
(47/55): python-2.6.6-29.el6_3.x86_64.rpm | 4.8 MB | 00:04  
(48/55): python-libs-2.6.6-29.el6_3.x86_64.rpm | 623 kB | 00:00  
(49/55): redhat-logos-60.0.14-12.el6.centos.noarch.rpm | 15 MB | 00:12  
(50/55): selinux-policy-3.7.19-155.el6_3.4.noarch.rpm | 1.3 MB | 00:01  
(51/55): selinux-policy-targeted-3.7.19-155.el6_3.4.noarch.rpm | 2.6 MB | 00:02  
(52/55): sudo-1.7.4p5-13.el6_3.x86_64.rpm | 423 kB | 00:00  
(53/55): tzdata-2012c-3.el6.noarch.rpm | 441 kB | 00:00  
(54/55): udev-147-2.42.el6.x86_64.rpm | 361 kB | 00:00  
(55/55): xulrunner-10.0.7-1.el6.centos.x86_64.rpm | 12 MB | 00:09  
-----  
Total | 1.0 MB/s | 139 MB | 02:15  
warning: rpmts_HdrFromFdno: Header V3 RSA/SHA1 Signature, key ID c105b9de: NOKEY  
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6  
Importing GPG key 0xC105B9DE:  
  Userid : CentOS-6 Key (CentOS 6 Official Signing Key) <centos-6-key@centos.org>  
  Package: centos-release-6-3.el6.centos.9.x86_64 (@anaconda-CentOS-201207061011.x86_64/6.3)  
  From : /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6  
  Is this ok [y/N]:
```

**Figure 22 – Yum Prompt to Import GPG Key**

9. If you plan on using this as your own development machine to submit patches, configure Git with your contact info and customize your preferences. By setting your name and email address, they will be embedded into any of the commits that are generated from this system. For the SpeedWay training reference system, the eponymous **training** identity will be used for training purposes.

Note: Setting the identity only needs to be done once and Git will always use this information unless overridden with a different name or e-mail address for specific projects. To perform the override, repeat these same commands but remember to omit the `--global` flags when in the target project.

```
$ git config --global user.name "training"
$ git config --global user.email "training@avnet.com"
```

10. Set your editor preference (default is vi or vim) if desired. On this reference system, the vi editor will be used.

```
$ git config --global core.editor vi
```

11. If there is a preference for a particular diff tool used to resolve merge conflicts, this should also be set here. On this reference system, the vimdiff tool will be used.

```
$ git config --global merge.tool vimdiff
```

12. In order to use Sourcery CodeBench on an x86 64-bit Linux host system, the 32-bit system libraries must be installed. The 32-bit libraries are available as a series of packages that can be installed using yum on the command line. For SpeedWay event laptops, the sudo password is **Avnet** and is case sensitive.

When prompted, accept the defaults to install all packages.

```
$ sudo yum install glibc-devel.i686 gtk2-devel.i686 \
gtk-nodoka-engine.i686 libcanberra.i686 \
libcanberra-gtk2.i686 PackageKit-gtk-module.i686 \
GConf2.i686 ncurses-libs.i686 xulrunner.i686
```

13. Obtain the Sourcery CodeBench cross toolchain installer from the ISE Installer folder /CodeSourcery/lin/ or download the Sourcery CodeBench installer from the Xilinx URL below. If the VMware tools have been installed correctly, the link can be copied from this PDF document and pasted directly into the browser URL box.

[http://www.xilinx.com/member/mentor\\_codebench/xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin](http://www.xilinx.com/member/mentor_codebench/xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin)

Note: Downloading the installer file from the URL above requires an account login to the Xilinx website so a web browser such as Firefox must be used. If downloading from Windows host operating system copy and paste the installer file to the **training** home folder on the guest operating system.

14. On this reference system, we will be using the **xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin** installer for installation.

If you used Firefox to download the source from within CentOS, start by moving the installer to the home folder.

Note: For long directory/filenames present on the local machine, the **TAB** key on the keyboard can be used for path auto-completion. For example, in the following command simply typing **mv Dow<TAB>** will complete the **Downloads** folder entry and then typing **xil<TAB>** will complete the long toolchain installer filename entry. This can help reduce time and errors in entering commands. Another way to help reduce time entering command line commands is to **Copy** a single line at a time from this PDF document into the VM clipboard by right-clicking in Adobe Reader and selecting the **Copy** option. Then **Paste** contents from the VM clipboard to the CentOS terminal window by right-clicking in the terminal window and selecting the **Paste** option. The backslash character '\' allows a command entry to be followed by an additional line entry when followed by the **<Enter>** key.

```
$ mv Downloads/xilinx-2011.09-50-arm-xilinx-linux-\
gnueabi.bin .
```

15. Make sure the CodeSourcery cross toolchain installer has execute permissions so that it can be run by the **training** user.

```
$ chmod ugo+x xilinx-2011.09-50-arm-xilinx-linux-\
gnueabi.bin
```

16. Launch the CodeSourcery cross toolchain installer and once the installation wizard launches, click the **Next** button.

```
$ ./xilinx-2011.09-50-arm-xilinx-linux-gnueabi.bin
```

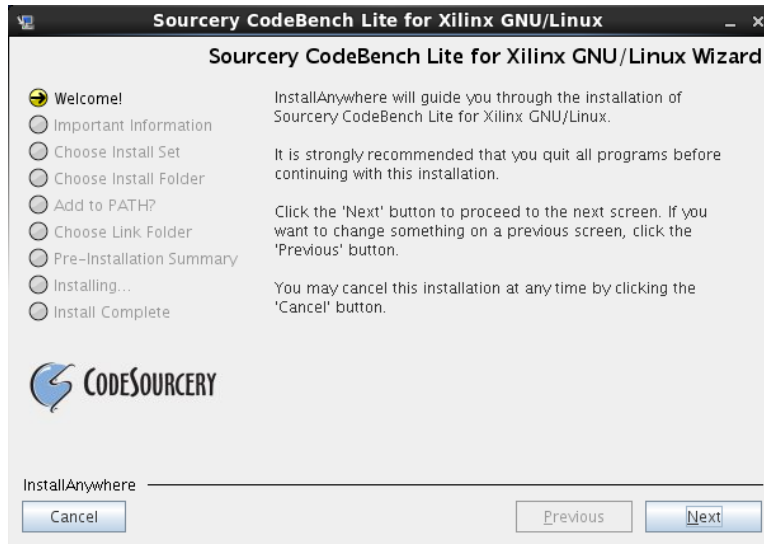


Figure 23 – Sourcery CodeBench Installer Welcome

17. Read through the presented end user license agreement. If you accept the terms of the agreement, click on the **I accept the terms of the License Agreement** option and click the **Next** button.

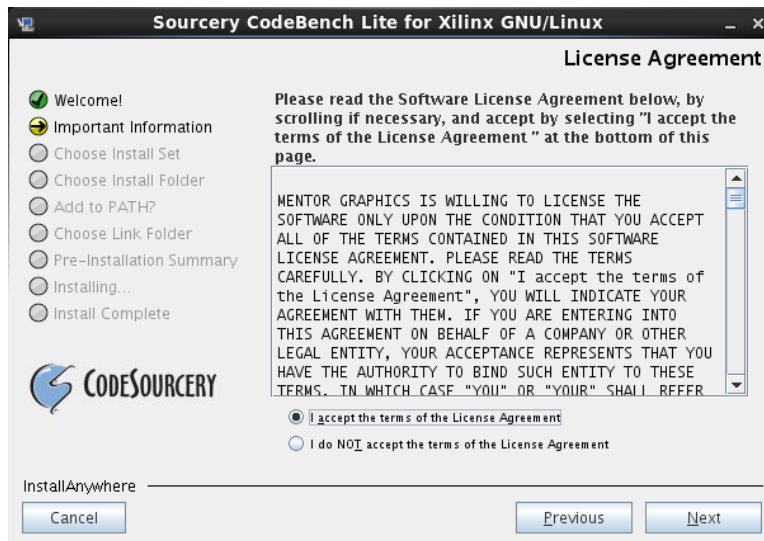


Figure 24 – Sourcery CodeBench License Agreement

18. Read through the important information and then click the **Next** button.

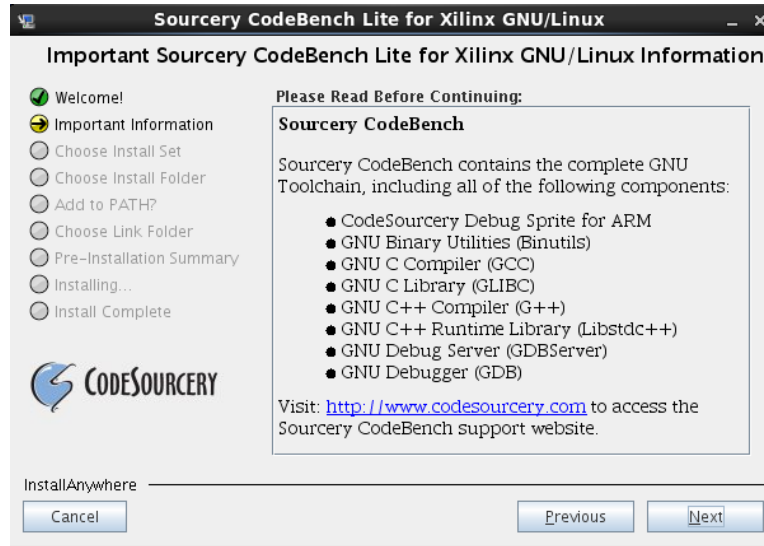


Figure 25 – Sourcery CodeBench Important Information

19. Select the default Install Set option **Typical** and click the **Next** button.

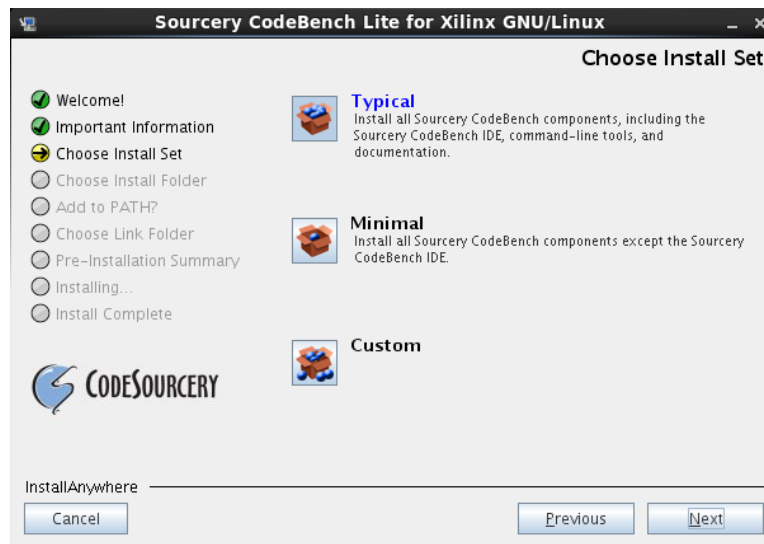
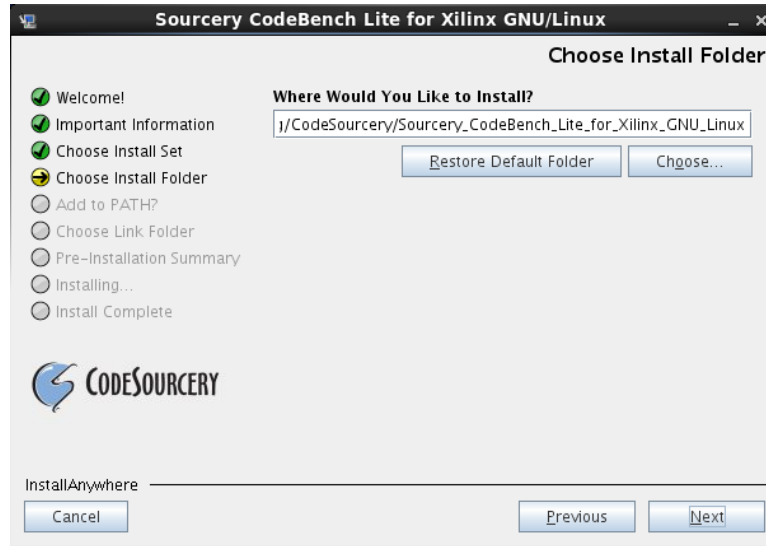


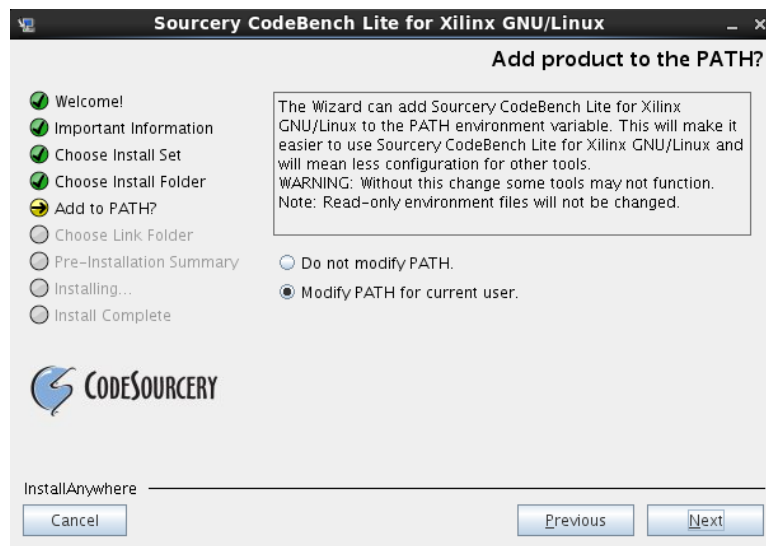
Figure 26 – Sourcery CodeBench Install Set Selection

20. Use the default install folder and click the **Next** button.



**Figure 27 – Sourcery CodeBench Install Folder**

21. Use the default selection to modify the current users PATH environment variable to add the Sourcery CodeBench tools folder, then click the **Next** button.



**Figure 28 – Sourcery CodeBench PATH Option**



22. Use the default selection to add a shortcut to the Sourcery CodeBench tools folder and click the **Next** button.

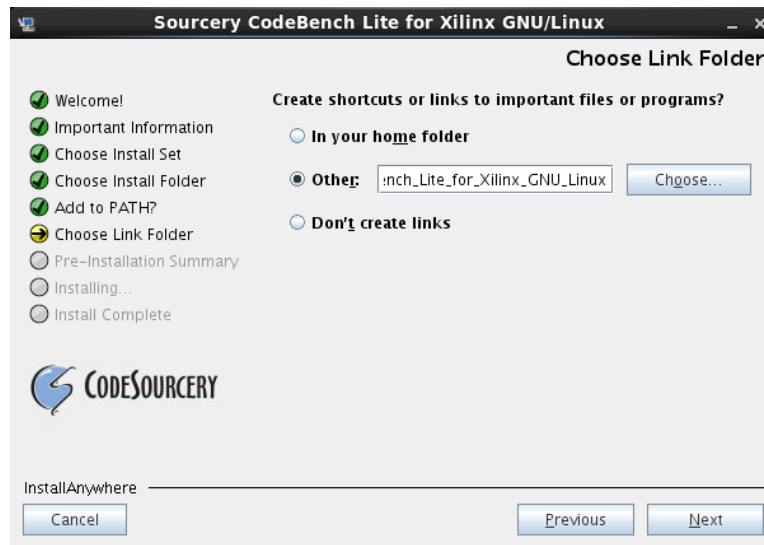


Figure 29 – Sourcery CodeBench Link Folder Option

23. Review the Pre-Installation Summary and verify that the desired options are selected and click the **Install** button. The install process will begin automatically and complete after about 5 to 10 minutes.

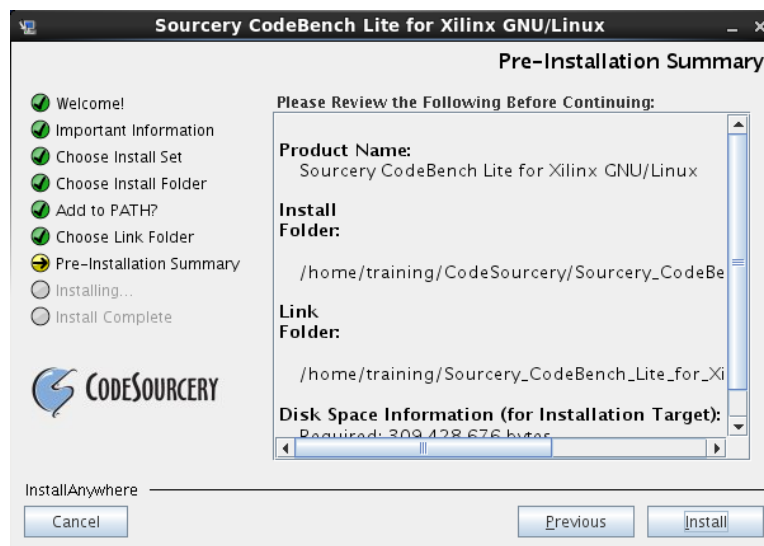
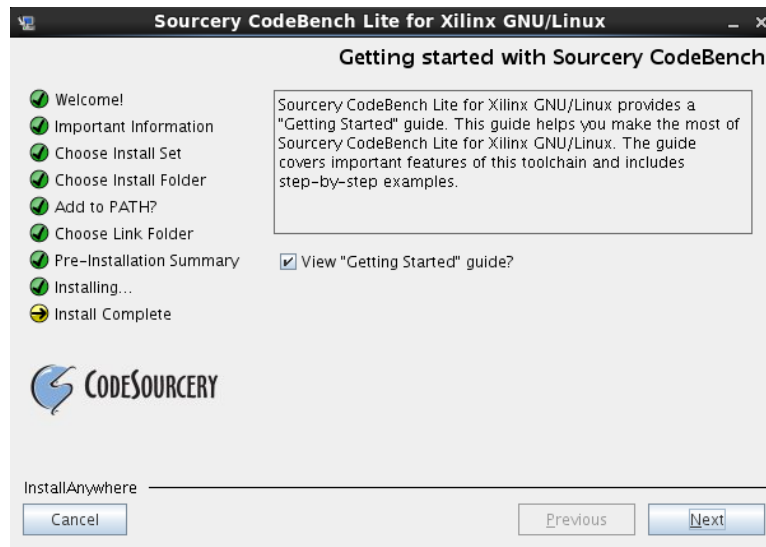


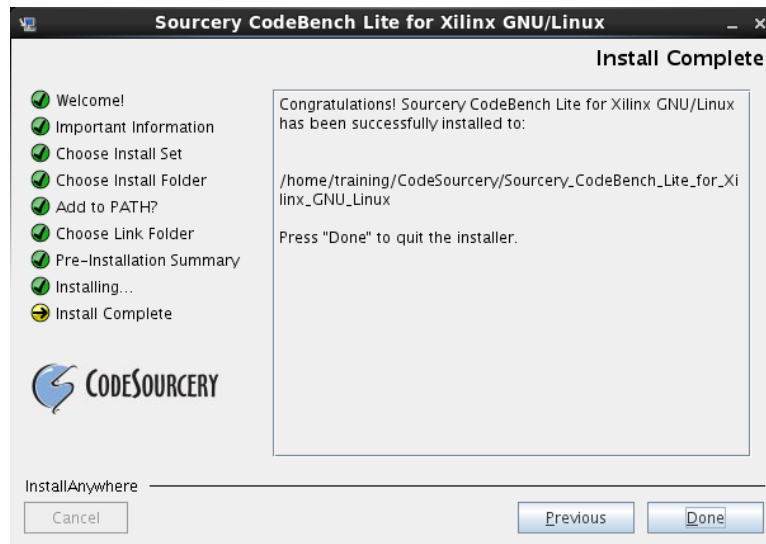
Figure 30 – Sourcery CodeBench Pre-Installation Summary

24. Sourcery CodeBench comes with a Getting Started guide which contains useful information on use of the cross toolchain. Select whether this document should be viewed and click the **Next** button.



**Figure 31 – Sourcery CodeBench Getting Started Option**

25. The Sourcery CodeBench tools are now installed, click the **Done** button.



**Figure 32 – Sourcery CodeBench Tool Install Complete**

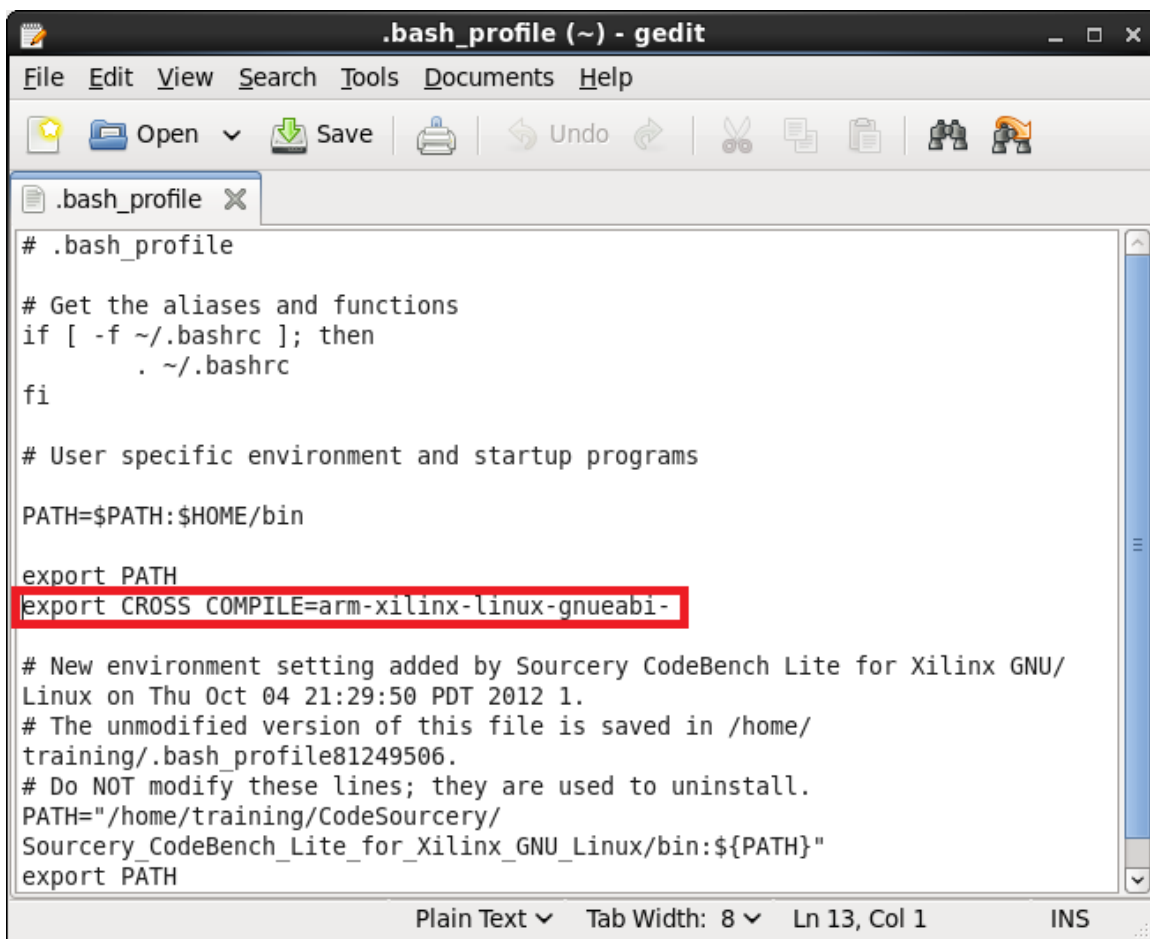
26. Many software items, such as Linux, use the environment variable `CROSS_COMPILE` to invoke the GNU tools that are used to build the software package for an embedded target.

Use the **gedit** text editor to open the bash shell user profile `.bash_profile` file found in the `/home/training/.bash_profile` path.

```
$ gedit .bash_profile
```

Add the following line to the bash shell user profile:

```
export CROSS_COMPILE=arm-xilinx-linux-gnueabi-
```



**Figure 33 – Editing the .bash\_profile File**

Save the changes made to the bash shell user profile and exit **gedit** using the **File→Quit** menu option.

27. The toolchain has already been added to the current user PATH environment variable. Pick up the updated user profile using the source command.

```
$ source .bash_profile
```

28. This completes the setup of the virtual machine. At this point in time you can move onto the other labs. If you wish to save your virtual machine work at any point in time during the lab exercises, the virtual machine operating system can be suspended and the virtual machine window closed. To do this, click on the window close **X** button in the upper right hand corner of the virtual machine window and click on the **Suspend** button when prompted. This will close the virtual machine window but it will also persist the state that the CentOS desktop is left in so that your work can be resumed by re-launching the virtual machine.

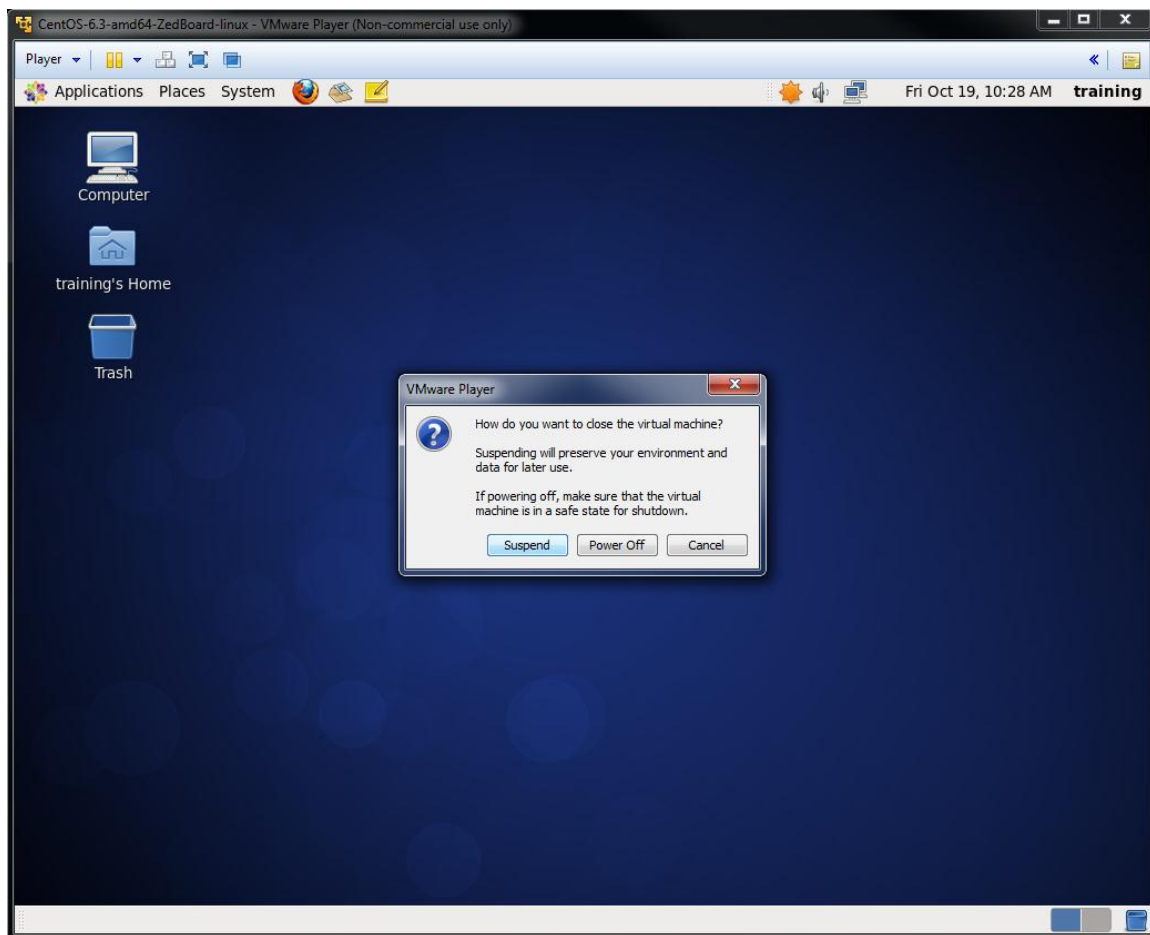


Figure 34 – Suspending the Virtual Machine

## Questions:

**Answer the following questions:**

- Which two parameters will be embedded into any of the Git commits that are generated from this system?

1. \_\_\_\_\_

2. \_\_\_\_\_

- Why is it important to add the training user to the sudoers file?

---

---

---

- Why is the user `.bash_profile` file sourced after installing Sourcery CodeBench?

---

---

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## Exploring Further

If you have additional time and would like to investigate more...

- Read through the Sourcery CodeBench *Getting Started* document available under the folder:

**`/home/training/CodeSourcery/Sourcery_CodeBench_Lite_for_Xilinx_GNU_Linux/share/doc/xilinx-arm-xilinx-linux-gnuabi/pdf/`**

- Create your own “hello world” C file and compile it for Zynq using the Sourcery CodeBench tools.

This concludes Lab 0.1.

## Revision History

Date	Version	Revision
06 Sep 12	00	Initial Draft
28 Sep 12	01	Revised Draft
18 Oct 12	02	Course Release
14 Jan 13	05	ZedBoard.org Training Course Release

## Resources

<http://www.zedboard.org>

<http://www.xilinx.com/zynq>

<http://www.xilinx.com/planahead>

<http://www.xilinx.com/sdk>

## Answers

### Experiment 1

- *Why is a virtual machine needed for building the Xilinx Linux kernel?*

Actually, a virtual machine is not needed if you have access to a native Linux install.

- *For a cross build environment, which types of host and guest operating systems are recommended: 32-bit or 64-bit?*

Cross build can technically be performed on 32-bit host and guest operating systems but 64-bit is strongly recommended.

- *What is the cost of VMware Player V5.0 when downloaded from the VMware website?*

The VMware Player V5.0 can be downloaded and used for free.

### Experiment 2

- *What is the login/password used by the guest operating system for the Avnet SpeedWay virtual machine?*

Login: training

Password: Avnet

- *What is the minimum recommended memory size in MB for the guest operating system?*

At least 1024MB of virtual machine memory is recommended for ZedBoard development purposes.

### Experiment 3

- *Which two parameters will be embedded into any of the Git commits that are generated from this system?*

1. Your name
2. Your email address

- *Why is it important to add the training user to the sudoers file?*

The training user periodically needs to perform important systems tasks using the sudo command. By adding the training user to the sudoers file, these privileges are granted to this user.

- *Why is the user .bash\_profile file sourced after installing Sourcery CodeBench?*

The Sourcery CodeBench gets added to the .bash\_profile file but does not get updated in the current environment. By sourcing the profile, Sourcery CodeBench can be used immediately without logging off or back onto the system.