



VMware®, Linux® and Simulator Installation Guide

Step by step instructions on how to create a personal NetApp simulation environment

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Executive Summary

The NetApp simulator is installed into a Linux operating system but not all administrators are familiar with Linux, or don't have a Linux server available. This guide explains how to create an environment suitable on standard and available hardware such as desktops and laptops.

Introduction

This document aims to give a complete step-by-step guide to installing a full NetApp simulator environment. As there are an almost infinite number of Linux distributions and configurations that will work with the simulator choices have been made to give a simple environment that should last a long time.

Those experienced in Linux and VMware may find useful options in here but the main simulator documentation should be consulted for additional configurations such as accessing the simulator directly from the Linux guest operating system.

Please read the entire document before downloading any files to ensure that the process is clear and will work in your environment. Do not skip steps unless they explicitly state they can be skipped otherwise the remaining instructions may fail.

Configuring your computer

The expected configuration for a simulator host is:

- Laptop or desktop
- x86 32 bit-capable CPU (64 bit x86 CPUs are fine)
- Windows; any version supported by VMware Server or Workstation, 32 bit or 64 bit
- At least 1GB of RAM
- 5 GB of free disk space (single simulator, default disks) – 20GB recommended
- An active internet connection throughout the installation process. Once installed no internet connection is needed
- A screen resolution of at least 1024x768. If you only have this then you have to run in full screen mode, otherwise you can run in Windowed mode.

Apart from the VMware installation itself all files that are needed for Linux and the simulator will be stored in single path to aid in portability.

Refer to the appendix for details on how to shrink VMware disks and reclaim disk space.

Create the following directories on your hard disk:

```
C:\VMWARE
C:\VMWARE\ISOIMAGES
C:\VMWARE\TEMP
```

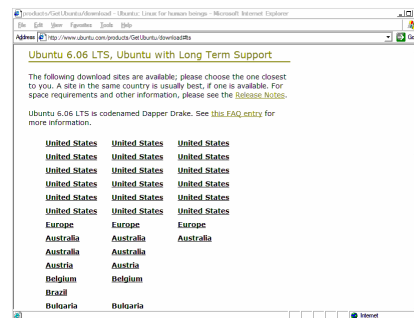
If you are planning on creating your environment on a different partition or an external drive then change the path to the drive you intend to use wherever you see instructions in the documentation that reference **C:** locations.

Downloading Ubuntu Linux

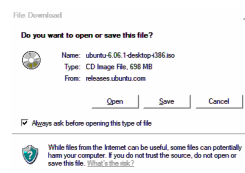
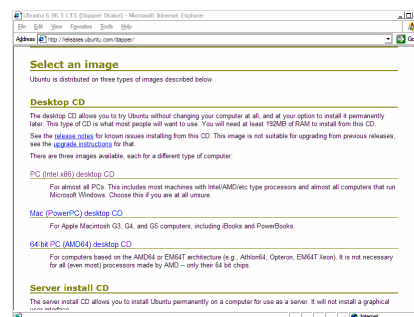
This guide uses Ubuntu Linux 6.06.x LTS; this was chosen for the ease of installation and because it is a version that gets extended support from its creators. This should be

downloaded directly from one of the mirror sites listed on the Ubuntu website:

<http://www.ubuntu.com/products/GetUbuntu/download#lts>



After choosing your closest mirror you will be given a choice of installation CDs. Select the PC (Intel® x86) desktop CD and download to the `c:\vmware\isoimages` directory.



Downloading VMware

This document assumes that no version of VMware is currently installed; only one version can be installed on a computer at a time but built images tend to be portable between the various versions so you can switch in the future.

For the purposes of this document the free Server version is recommended and runs on Windows® 2000, 2003 and XP. See the appendix for more details on VMware product choices.

Go to the <http://www.vmware.com/products/server/> site and choose the download option **VMware Server for Windows Operating Systems Binary (.exe)**, saving the file into the `C:\VMWARE` folder.

You will also need a serial number that you get by registering at <http://register.vmware.com/content/registration.html>

I suggest you create a notepad file in **C:\VMWARE** called **serial.txt** and cut-and-paste the serial number from your browser into the file in case you need to re-install in the future.

Downloading the simulator

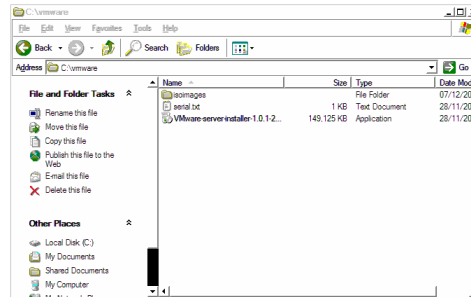
Simulators are available from the NOW website. The URL is currently:

<http://now.netapp.com/NOW/cgi-bin/simulator>

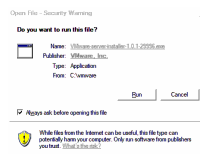
The simulators tested with this document are the 7.x product line. Please download the ISO image(s) and store them in your **C:\vmware\isoimages** directory.

Installing VMware

1. In Explorer run the VMware installation executable you downloaded earlier and saved into **c:\vmware**



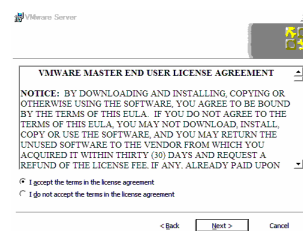
2. Ignore any security warnings from Windows and press **Run**.



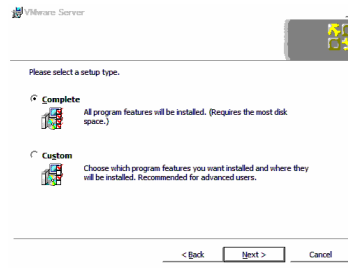
After a few seconds the installation wizard will appear.



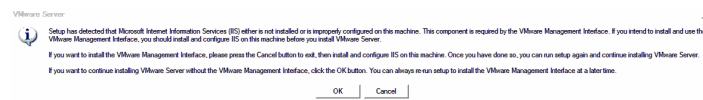
3. Press **Next**.
4. Read the license agreement carefully then click **I accept** followed by **Next**.



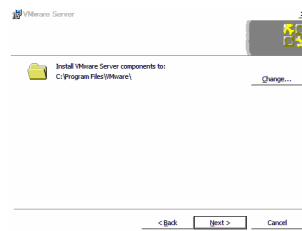
5. Select the **complete** installation. Press **Next**.



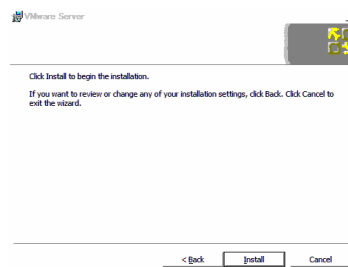
A warning may appear saying that *IIS* isn't installed or configured. If it does just press **OK**; this is always the case for some versions of Windows and default configurations.



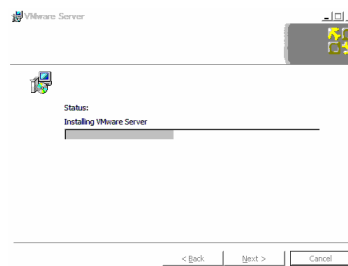
6. Press **Next** to keep the default installation directory.



7. The wizard input is complete. Press **Install**.



VMware will now install.

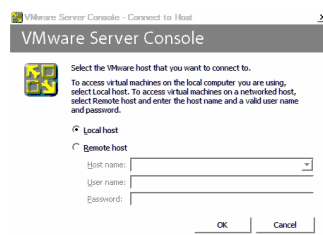


If a popup appears asking about disabling autorun say **Yes**.

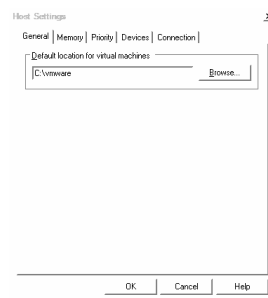
When complete there should be a VMware Server Console icon on your desktop.



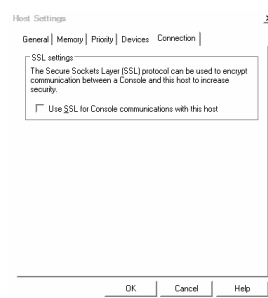
8. Start VMware Server using the icon.
9. Choose the Local host option and press **OK**.



10. From the *Local Host* window menu bar at the top, select **H**ost followed by **S**ettings.



11. Change the *Default location for virtual machines* to **C:\vmware**. Now go into the **C**onnection tab.

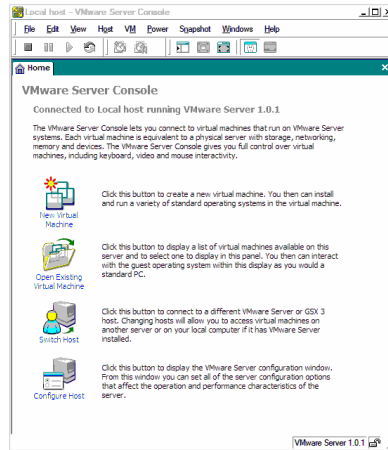


12. Make sure that **U**se **S**SL is disabled. Press **OK**.
13. **C**lose the VMware console host.

VMware installation is complete.

Installing Ubuntu Linux

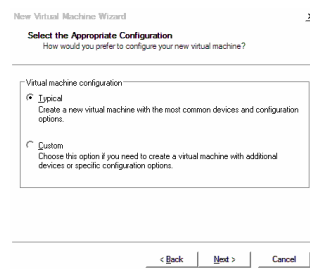
1. Start VMware Server using the **VMware Server console** link. Connect to the **local host**.



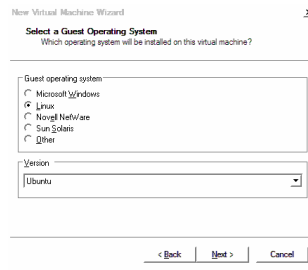
2. Click the **New Virtual Machine** icon to start the new machine wizard.



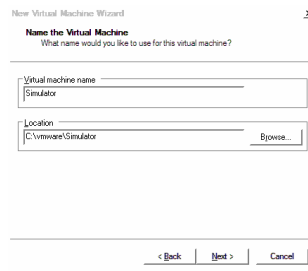
3. Press **Next**.
4. Leave the configuration type as **Typical** and press **Next**.



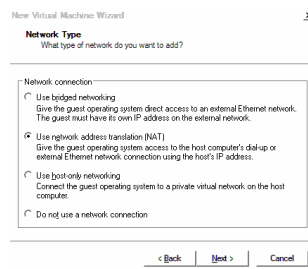
5. Change the *Guest operating system* type to **Linux** and in the *Version* drop down box change the option to **Ubuntu**. Press **Next**.



6. Change the *Virtual Machine Name* from Ubuntu to **Simulator**. The *Location* should automatically change to **C:\vmware\Simulator**. Press **Next**.

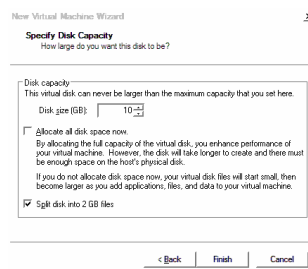


7. Change the *Network connection* to **Use network address translation (NAT)**. Press **Next**. See the appendix for more details and choices.

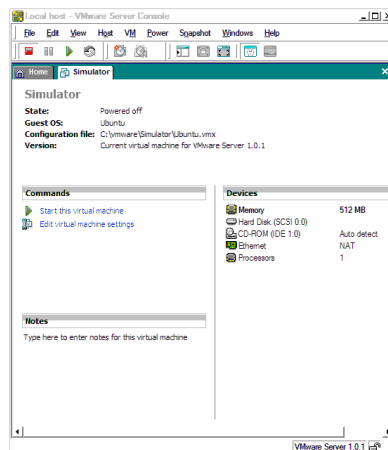


8. Change the *Disk size (GB)* to **10**. Select **Split disk into 2 GB files** as this will make the simulator require less space when shrinking. See the appendix for more information on disk sizes and managing virtual disks.

The option **Allocate all disk space now** controls space usage and performance. If you have plenty of spare disk space then set this option and VMware will consume the 10GB of space permanently. Otherwise **deselect** this option to have VMware allocate disk space on demand.

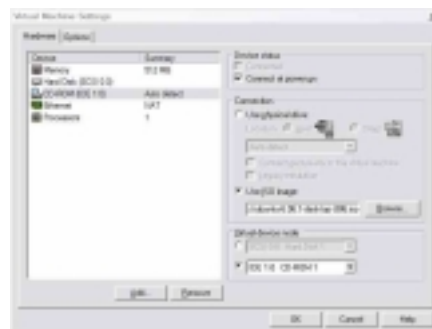


9. Press **Finish** to turn to the VMware main screen with the guest operating shown.



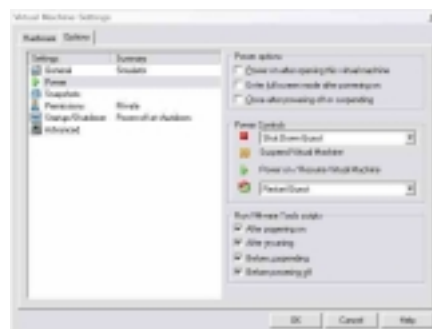
10. Change the CD-ROM so that your guest boots from the Linux CD using the **Edit virtual machine settings** in the *Commands* window.

11. Highlight the **CD-ROM (IDE 1:0)** option to show the settings on the right hand pane. Change the *Connection* to **Use ISO image** and either **Browse** to and select the Ubuntu SO image or enter **C:\vmware\isoimages\ubuntu-6.06.1-desktop-i386.iso** in the empty box.

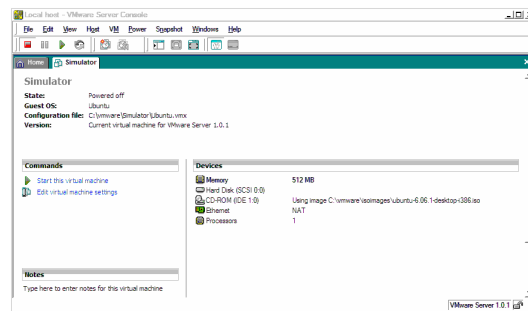


Note: If you are running VMware Workstation then remove the Floppy, USB Controller and Audio devices. If the configured memory is below 512MB then change to 512MB.

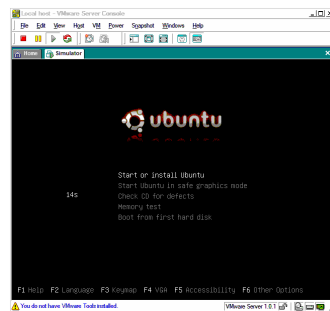
12. Press the **Options** tab at the top and select the **Power** option. In the *Run VMware Tools scripts* section on the right hand side **select** the tick boxes for all 4 options.



13. Press **OK** to return to the VMware main screen.



14. **Start this virtual machine** to start Linux for the first time.



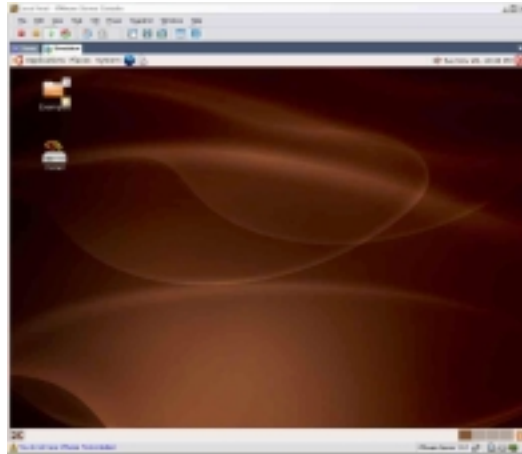
Linux will start to run.

Press **Ctrl+Alt+Enter** if you want to go into full screen mode or only have a screen resolution of 1024x768. To leave full screen mode press **Ctrl+Alt**.

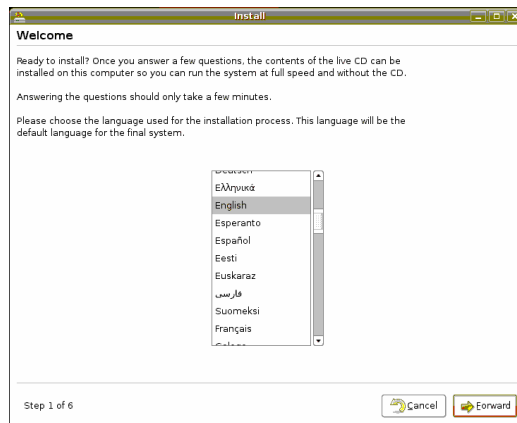
If you are in Windowed mode you'll find that you can't move your mouse past the edge of the VMware window. This will be the case until VMware tools are installed later on. For now just press **Ctrl+Alt** to *release* control from VMware back to the host operating system.

In either case click back into the VMware window when you want to give control of your mouse back to VMware.

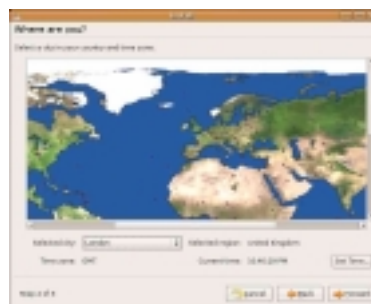
15. After a couple of minutes Linux will be running and you will be in the Linux desktop.



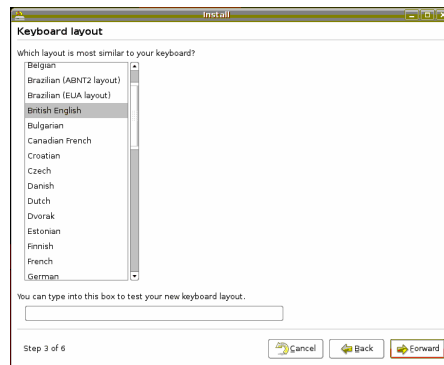
16. The next part of the process is to copy the Linux files from the ISO image onto the hard disk just like a real computer install. Double click the **Install** icon.



17. For this part of the installation leave the default of English and press the **Forward** button.
18. Pick the city closest to you using either the graphic display or directly via the *Selected city* section. Once this is done press **Forward**.



19. Choose the keyboard most appropriate for your computer and test a few of your locale specific keys if required. Then press **Forward**.



20. Enter the following details for the user name and password:

What is your name? **linux**

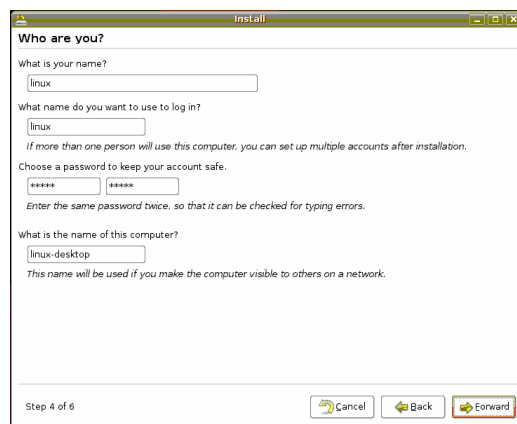
What name do you want to use to log in? **linux**

Choose a password to keep your account safe. **linux**

[enter **linux** again in the second box]

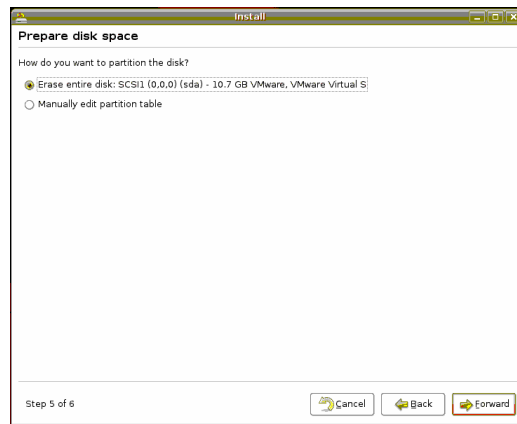
What is the name of this computer? **linux-desktop**

If you followed the networking configuration advice then a password of **linux** will be very easy to remember in future. If you ignored the advice then chose a strong password to prevent others from logging directly into your Linux guest OS.

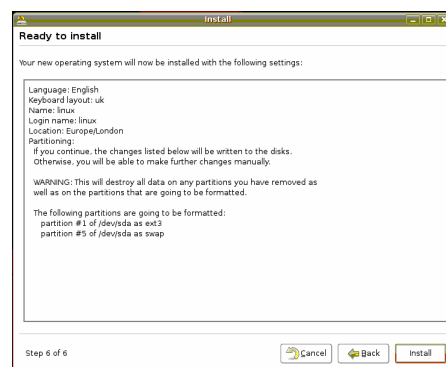


21. Press **Forward**.

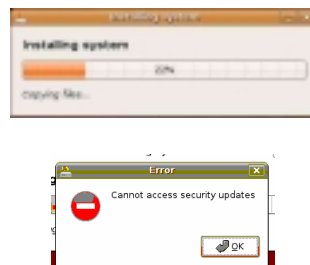
22. The default option to *Erase entire disk* will configure the virtual hard disk correctly. Press **Forward**.



23. The options selected will be shown. Press **Install** to start the file copy operation.



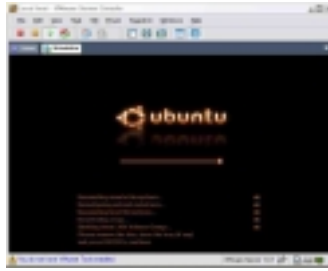
24. This portion will take a while though I find the estimate to be on the pessimistic side. If you get an error about accessing security updates just press **OK**.



25. An *Installation Complete* box will appear. Press **Restart now**. We do not need to eject the cd at this point – the message in the box is advisory. After a few seconds Linux should start the reboot process.



26. Press the **ENTER** key and Linux will reboot to the login screen.



27. Enter the *Username* of **linux** and press **ENTER**.

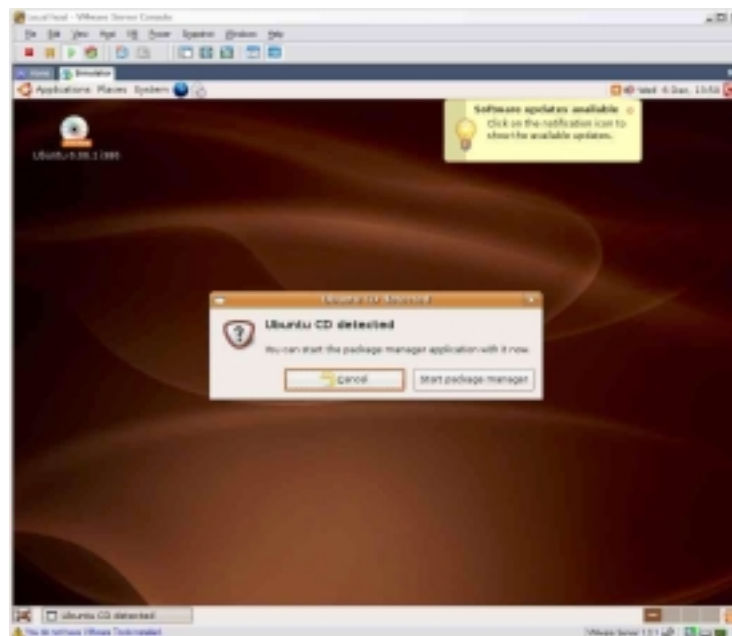


28. Enter the *Password* of **linux** and press **ENTER**. You will be logged in.

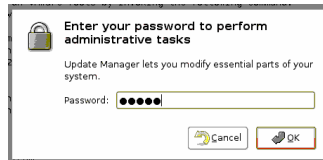


29. In the *Ubuntu CD detected* window press **Start package manager**.

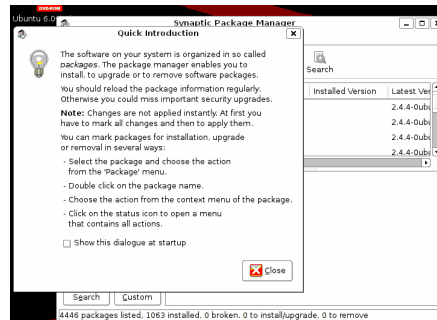
Note: For the time being ignore any *Software updates available* that may appear after a few seconds.



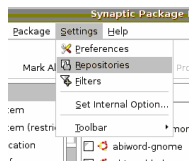
30. When asked for your password enter **linux**.



31. Press close to close the *Quick Introduction* window.



32. In the *Synaptic Package Manager* window select the Settings menu followed by Reppositories.



Make sure all the following are selected and have ticks:

CD disk with Ubuntu 6.06 LTS (Binary)

Officially supported

Restricted copyright

Ubuntu 6.06 LTS (Binary)

Officially supported

Restricted copyright

Ubuntu 6.06 LTS (Source)

Officially supported

Restricted copyright

Ubuntu 6.06 LTS Updates (Binary)

Officially supported

Restricted copyright

Ubuntu 6.06 LTS Updates (Source)

Officially supported

Restricted copyright

Ubuntu 6.06 LTS Security Updates (Binary)

Officially supported

Restricted copyright
Ubuntu 6.06 LTS Security Updates (Source)
Officially supported
Restricted copyright

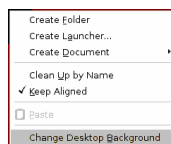
Press **+Add** or tick any of the above that need to be added. Do not remove any that are defaulted.

We do not want to enable any additional *Installation Media* that contain the text *Community maintained*. If the installation started normally then the above should have already been selected correctly, but in some cases the **LTS Security Updates** may not be selected by the install process.

33. Press **C**lose to save the changes. Press **C**lose to a message about *Repositories changed* if prompted.
34. Press the close window button to exit the *Synaptic Package Manager*.



35. Lets get rid of the patterned background – this will speed up the display slightly. **Right-click** on the main desktop window and select **Change Desktop Background**.

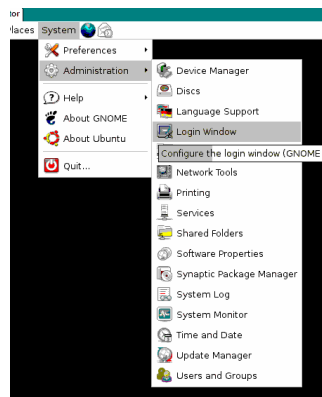


36. Scroll the *Desktop Wallpaper* list up to the top and select **No wallpaper**. If you want a different colour than dark brown then click on the dark brown square and choose another colour.

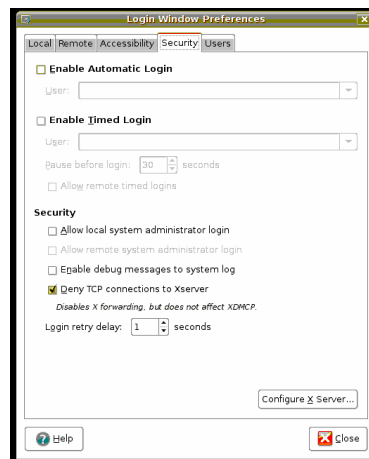


37. Press **F**inish to save the desktop settings.

38. Next enable automatic login to make future sessions easier to use. From the main menu at the top of the screen select **System** followed by **Administration** followed by **Login Window**.



39. Select the **Security** tab. Then

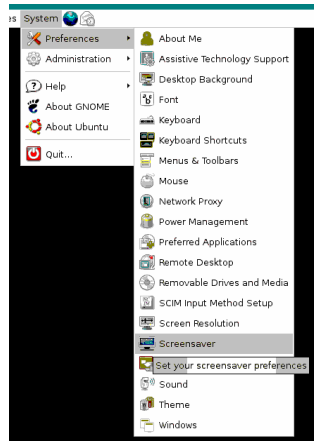


40. Click the **Enable Automatic Login**.

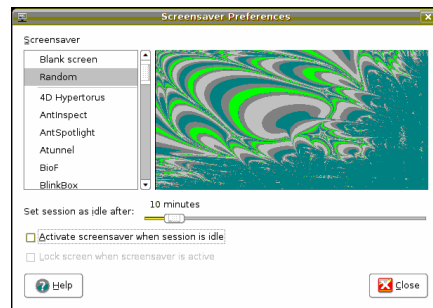


In the drop down box that appears select the *User linux*. Now press the **C**lose button at the bottom of the Window.

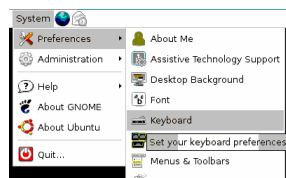
41. Next disable the screensaver since screensavers in virtual environments just wastes the host CPU. From the **System** menu choose **Screensaver**.



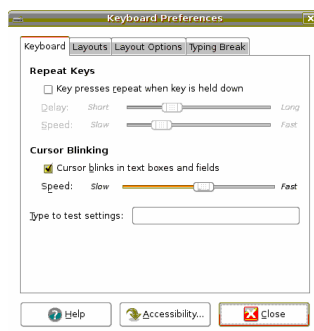
42. Make sure that the **Activate screensaver when session is idle** is not checked and then press **C**lose.



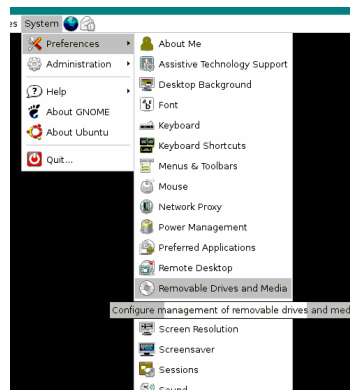
43. Disable keyboard auto-repeat to help make sure that all key presses into VMware and the simulator are keys you pressed and not caused by a busy PC. From the **System** menu choose **K**eyboard.



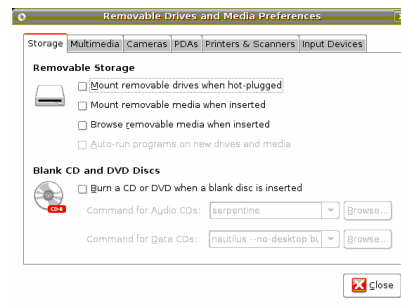
44. Turn off the **Key presses repeat when key is held down** and then press **C**lose.



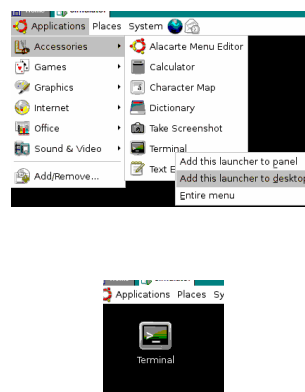
45. Now tell Linux to not automatically mount CDROM images. Go into the **System, Preferences, Removable Drives and Media** menu item.



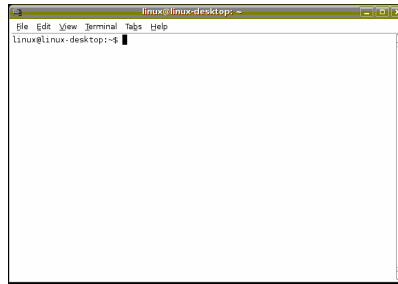
46. **Turn off** any ticked items in the *Storage* tab so that no actions are taken when disks are inserted into the VMware virtual machine. Then press **Close** to save the changes.



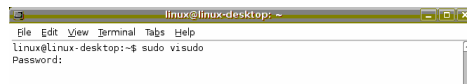
47. Put a shortcut on the desktop for the Terminal command line access application. Select the **Applications** menu followed by **Accessories**. Now **right-click** on the **Terminal** option and select **Add this launcher to desktop**. Then click anywhere in the desktop and you should see the new icon.



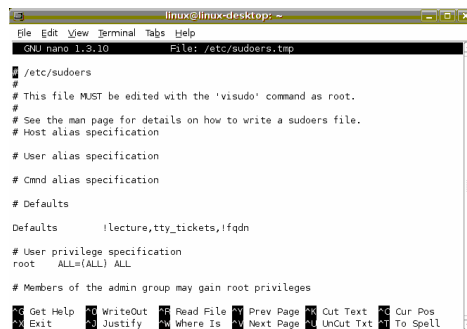
48. Double click on the **Terminal** desktop icon to start a command line session.



49. Remove the requirement for entering the “sudo” password each time by running the following command:
sudo visudo



This will open up a text editor called *GNU nano*.



50. Scroll down to the bottom of the file using the **arrow key** on your keyboard. Change the last line from:

%admin ALL=(ALL) ALL

to

%admin ALL=NOPASSWD: ALL

To recap: we’re replacing the (ALL) with NOPASSWD: for the %admin group of which the user linux is a member.

51. Press **Control-X** on the keyboard to save the changes and press **y** to the *Save modified buffer* question, followed by **pressing enter** to keep the prompted filename of **/etc/sudoers.tmp**.



If everything goes well you will be returned to the command prompt:



If there was a mistake then you'll be asked "*What now?*" Press **x** to undo all your changes then repeat the **sudo visudo** command and make the change again.

Once the `/etc/sudoers` file has been successfully changed there will be no more requests for your password from the command line.

52. Run the following command:
sudo apt-get update

```
linux@linux-desktop: ~  
File Edit View Terminal Tabs Help  
linux@linux-desktop:~$ sudo apt-get update  
Get: 1 http://gb.archive.ubuntu.com dapper Release.gpg [189B]  
Get: 2 http://gb.archive.ubuntu.com dapper-updates Release.gpg [191B]  
Hit http://gb.archive.ubuntu.com dapper-updates Release.gpg  
Hit http://gb.archive.ubuntu.com dapper-updates Release  
Hit http://gb.archive.ubuntu.com dapper/main Packages  
Hit http://gb.archive.ubuntu.com dapper/restricted Packages  
Hit http://gb.archive.ubuntu.com dapper/main Sources
```

53. A screen full of information will appear and the process may pause for a while with the message *[waiting for header]* – then eventually it will return to the command line prompt.

```
Failed 11598 in 2m3s (98%)
Failed to fetch http://gb.archive.ubuntu.com/ubuntu/dists/dapper-updates/Release.gpg
Bad header line: IP: 195.248.90.38 80
Failed to fetch http://gb.archive.ubuntu.com/ubuntu/dists/dapper/main/binary-i386/Packages.gpg: Got a single header over 360 chars
IP: 195.248.90.38 80
Failed to fetch http://gb.archive.ubuntu.com/ubuntu/dists/dapper/restricted/binary-i386/Packages.gpg: Got a single header over 360 chars
IP: 195.248.90.38 80
Failed to fetch http://gb.archive.ubuntu.com/ubuntu/dists/dapper/main/source/Source.gpg: Bad header line: IP: 195.248.90.38 80
Reading package lists... Done
E: Some index files failed to download, they have been ignored, or old ones used instead.
linux@desktop:~$
```

Note: if you see a message like “some index files failed to download” then repeat the **sudo apt-get update** command and this should succeed without error.

54. Perform a full upgrade of the system using the following command:
sudo apt-get upgrade -y

```
linu@linux-desktop:~$ sudo apt-get upgrade -y
Reading package lists... Done
Building dependency tree... Done
The following packages will be upgraded:
  cpio dpkg dmidekg hal hal-device-manager language-pack-en
  language-pack-gnome-en libhal-storage1 libl10n-2 xserver-xorg-core
1 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 8786kB of archives.
After unpacking 5202kB of additional disk space will be used.
1 http://ppg.archive.ubuntu.com dapper-updates/main dpkg 1.13.11ubuntu7 [186
kB]
```

Note: This step is optional but recommended. If there are problems installing VMWare tools due to missing kernel header packages or the VMWare tools not working once compiled, start again 😊 but omit this step.

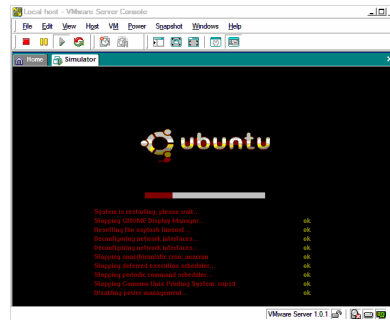
After this completes you will be returned to the command prompt. A message should also appear at the top of the screen warning that you need to perform a reboot.

```
Setting up cpio (2.6-1ubuntu0.2) ...
Setting up dselect (1.13.11ubuntu7) ...
Setting up libhal1 (0.5.7-1ubuntu18.2) ...
Setting up hal (0.5.7-1ubuntu18.2) ...
Setting up hal-device-manager (0.5.7-1ubuntu18.2) ...
Setting up libhal-storage1 (0.5.7-1ubuntu18.2) ...
Setting up xservser-xorg-core (1.0.2-0ubuntu10.4) ...
linux@linux-desktop:~$
```

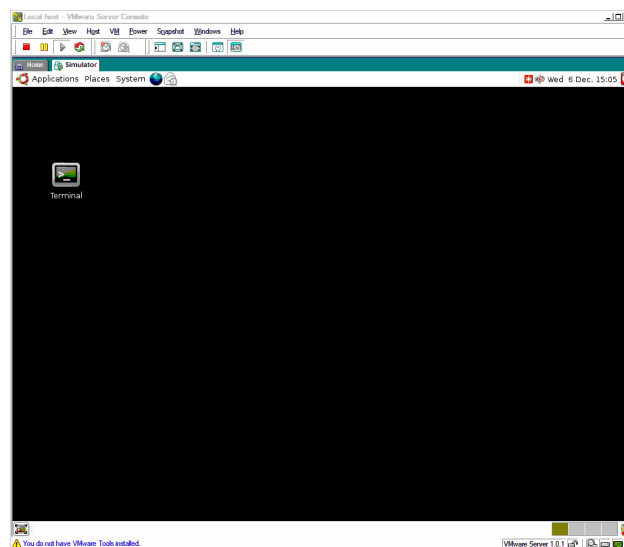
55. Type in the following to reboot the system immediately:
sudo reboot

```
Setting up xinit (1.0.1-0ubuntu3.1) ...  
Installing new version of config file /etc/X11/Xsession ...  
Setting up xserver-xorg-core (1.0.2-0ubuntu10.4) ...  
linux@linux-desktop:~$ sudo reboot
```

Linux will start the reboot process by shutting down the GUI and then after another few seconds the Ubuntu reboot screen will be displayed.



Once Linux restarts if everything went according to the instructions above then you should have a screen similar to the one below, automatically logged in and ready to go.



Ignore any update popup messages at this point.

56. To enable the mouse to easily move between Windows and improve VMware network, disk and screen performance the next step is to install the VMware tools.

By default several development tools needed for compiling *vmware-toolbox* aren't installed.

Double click on the **Terminal** desktop icon to start a command line session and run the following command:

```
sudo apt-get -y install gcc make linux-headers-$(uname -r) expect
```

```
linux@linux-desktop:~$ sudo apt-get install -y gcc make linux-headers-$(uname -r) expect
) expect
Reading package lists... Done
Building dependency tree... Done
The following extra packages will be installed:
  binutils cpp cpp-4.0 gcc-4.0 linux-headers-2.6.15-26
Suggested packages:
  binutils-doc cpp-doc gcc-4.0-locales expectk manpages-dev autoconf
  automake1.9 libtool flex bison gcc-4.0-doc libc6-dev-amd64 lib64gcc1
Recommended packages:
  libc6-dev libc-dev libmudflao0-dev
```

After a few minutes, internet and network bandwidth permitting, the development tools will be installed.

```
Setting up cpp-4.0 (4.0.3-1ubuntu5) ...
Setting up cpp (4.0.3-1) ...
Setting up expect (5.42.1-1.2ubuntu1) ...
Setting up gcc-4.0 (4.0.3-1ubuntu5) ...
Setting up gcc (4.0.3-1) ...
Setting up linux-headers-2.6.15-26 (2.6.15-26.47) ...
Setting up linux-headers-2.6.15-26-386 (2.6.15-26.47) ...
Setting up make (3.80+3.81.b4-1) ...
linux@linux-desktop:~$
```

57. From the VMware menu select the installation option. Do this by pressing **Ctrl-Alt** to exit control from VMware back to your Windows OS, and then from the **VM** menu select **Install VMware Tools**.



When selected the following box will appear:



58. Press the **Install** button. Wait a few seconds then click the *terminal* window and enter the following command to mount the cdrom:

```
sudo mount /media/cdrom
```

```
linux@linux-desktop:~$ sudo mount /media/cdrom
mount: block device /dev/hdc is write-protected, mounting read-only
linux@linux-desktop:~$
```

59. Extract the VMware toolbox software with the following command:

```
sudo tar xvzf /media/cdrom/VM*gz -C /tmp
```

```
linux@linux-desktop:~$ sudo tar -xvzf /media/cdrom/VM*gz -C /tmp
vmware-tools-distrib/
vmware-tools-distrib/bin/
vmware-tools-distrib/bin/vmware-uninstall-tools.pl
vmware-tools-distrib/bin/vmware-config-tools.pl
vmware-tools-distrib/etc/
vmware-tools-distrib/etc/NOT_CONFIGURED
vmware-tools-distrib/etc/installer.sh
vmware-tools-distrib/etc/poweron-vm-default
vmware-tools-distrib/etc/resize-vm-default
vmware-tools-distrib/etc/suspend-vm-default
vmware-tools-distrib/etc/poweroff-vm-default
vmware-tools-distrib/vmware-install.pl
vmware-tools-distrib/lib/
vmware-tools-distrib/lib/ks32/
```

60. Lots of files will be extracted. Run the following command:

```
cd /tmp/vm*rib
```

```
vmware-tools-distrib/installer/
vmware-tools-distrib/installer/services.sh
vmware-tools-distrib/INSTALL
vmware-tools-distrib/FILES
linux@linux-desktop:~$ cd /tmp/vm*rib
linux@linux-desktop:/tmp/vmware-tools-distrib$
```

The command prompt should change from `linux@linux:desktop:~$` to the new directory of `linux@linux:desktop:/tmp/vmware-tools-distrib$`.

61. Run the VMware tools installation package with the following command:
sudo ./vmware-install.pl

```
linux@linux-desktop:/tmp/vmware-tools-distrib$ sudo ./vmware-install.pl
Password:
Creating a new installer database using the tar3 format.
Installing the content of the package.
In which directory do you want to install the binary files?
[/usr/bin]
```

62. At this point the installation package will ask lots of question. Press **enter** to each question until you are returned to the command prompt. The only exception is the display size question where you should select **1024x768** if offered a different default size.

```
The configuration of VMware Tools 1.0.1 build-29996 for Linux for this running
kernel completed successfully.

You must restart your X session before any mouse or graphics changes take
effect.

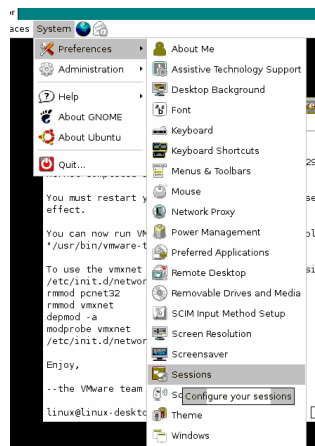
You can now run VMware Tools by invoking the following command:
"/usr/bin/vmware-toolbox" during an X session.

To use the vmxnet driver, restart networking using the following commands:
/etc/init.d/networking stop
rmmod pcnet32
rmmod vmxnet
depmod -a
modprobe vmxnet
/etc/init.d/networking start

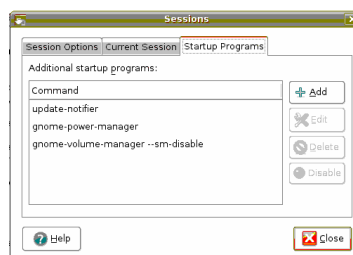
Enjoy,
--the VMware team

linux@linux-desktop:/tmp/vmware-tools-distrib$
```

63. VMware tools needs to start each time Linux is restarted. From the **System** menu choose **Preferences** followed by **Sessions**.



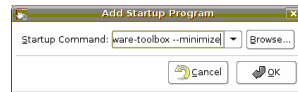
64. Once the *Sessions* window opens click the **Startup Programs** tab.



65. Highlight the **update-notifier** line and click **Disable**. This prevents update message each time you reboot Linux.

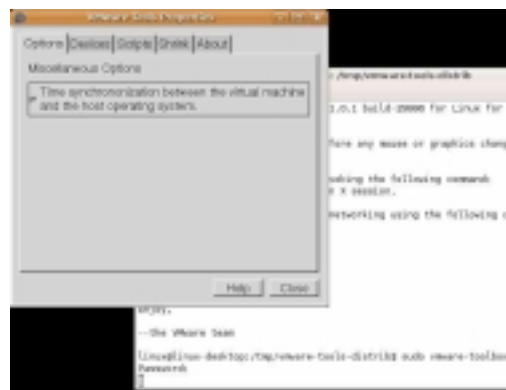
66. Now click the **Add** button. Then in the *Startup Command* box enter:
sudo vmware-toolbox --minimize

67. Press **OK** followed by the **Close** button.



68. To ensure that the correct date and time exist for the simulator and Linux. From the *Terminal* window that is still open run the following command:
sudo vmware-toolbox

After a few seconds the *VMware Tools Properties* window will appear.



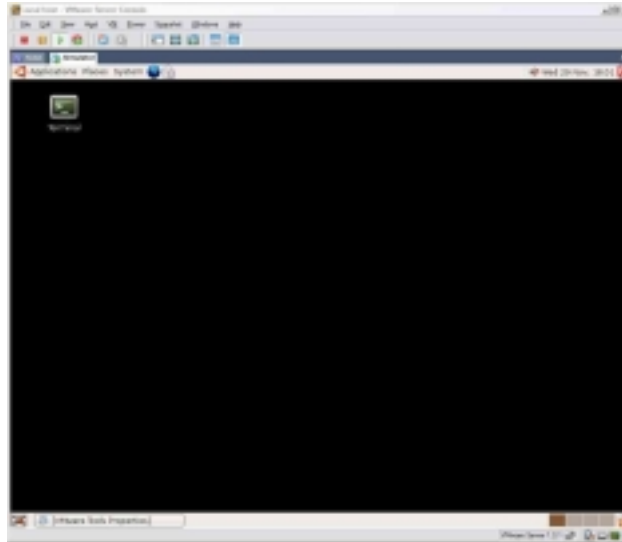
69. In the *Options* tab click the **Time sync** option – you'll notice it goes darker when correctly pressed.

Close the VMware Tools Properties window.

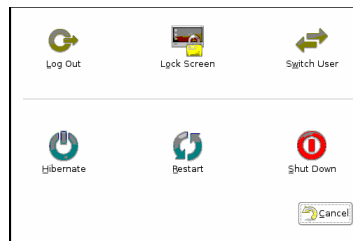
70. Run the following command to reboot:
sudo reboot

71. Wait for Linux to reboot.

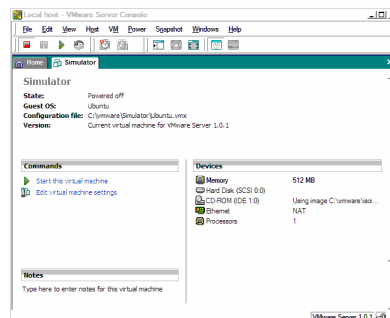
72. Check that VMware tools are running at the bottom of the screen and if you are in windowed mode you can now move the mouse away past the edge of the inside window. Additionally you can cut and paste between Linux and your Windows OS.



73. At this point Linux is configured and should be shut down, followed by a backup. Click the **red power button** at the top right of the screen and **Shut down**.

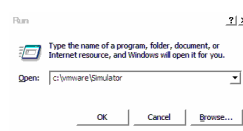


You should be returned to the VMware main screen once this has completed.

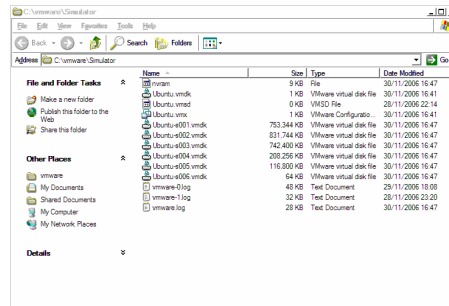


74. **close** the VMware Server Console window.

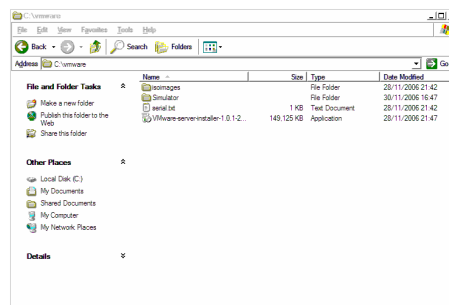
75. Use the Windows **Start -> Run** and enter **c:\vmware\simulator**



Now check that the list of files shown contains no .lck files. Your output should look below if you are in detail mode – there may be a few more or less log files but no .lck files.



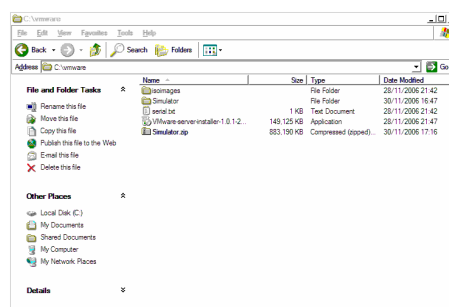
Press the green-arrow **Up** button to change folder to **c:\vmware**.



76. **Right-click** on the **Simulator** folder and select the option **Send To** followed by **Compressed (Zipped) Folder**. This will create the zip backup that can be given to other people or used later in case anything happens to your simulator folder or Linux configuration.



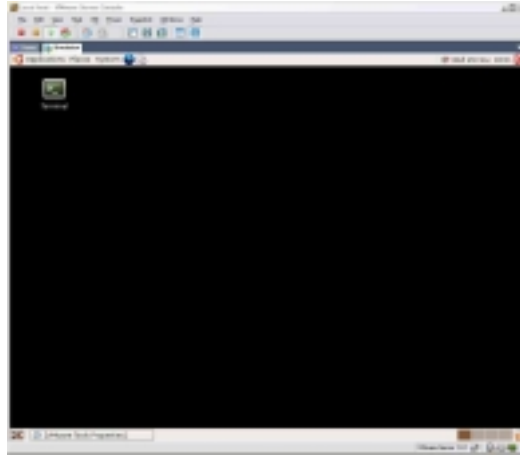
77. After completing you can shut down the Windows Explorer window or copy the zip file elsewhere.



End of Linux installation.

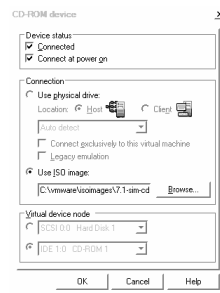
Installing a simulator

1. Start VMware and start your Linux session.

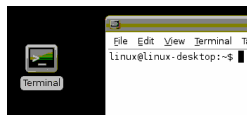


2. From the *Local Host* console menu bar select **VM**, followed by **Removable Devices**. Choose the **CDROM** line and then **edit**.
3. Make sure that the device is **Connected**, then in the **Use ISO image** section change the image name to the simulator ISO image downloaded earlier. This is easiest done with the browse button.

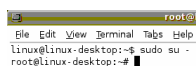
Once you have selected the right ISO image press **OK** to save the change.



4. Back in the main Linux window start a **Terminal** session using the desktop icon.



5. Mounting the ISO image requires special permissions. To get the right mode use the following command:
sudo su -



6. Mount the cd using the following commands:

```
mount /media/cdrom
cd /media/cdrom
```

```
root@linux-desktop:~# mount /media/cdrom
mount: block device /dev/hdc is write-protected, mounting read-only
root@linux-desktop:~# cd /media/cdrom
root@linux-desktop:/media/cdrom#
```

7. Run the setup script with the default options to extract and configure the simulator:

```
bash setup.sh -z
```

```
root@linux-desktop:/media/cdrom# bash setup.sh -z
```

```
Script version 19 (24/Nov/2006)
Unattended install or reconfig.
Configuration:
  Installing:      1
  Cluster install: 0
  Install path:    /sim
  DHCP:           1
  Allow http:      n
```

Note: The **-z** option can be omitted the defaults aren't appropriate for your environment – for example the installation path can be changed from the default **/sim**. Refer to the main simulator documentation for more details of options.

After a few seconds the simulator will unpack and return you to the command prompt.

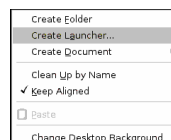
```
minus:ack:      1
Allow core files: 0
Creating /sim
Unpacking sim.tgz to /sim
Configured the simulator's mac address to be [00:50:56:1c:42:c0]
Please ensure the simulator is not running.
Checking the default route...
You have a single network interface called eth0 (default route) . You will not be
able to access the simulator from this Linux host. If this interface is marked
DOWN in ifconfig then your simulator will crash.
Your system has 4096MB of free memory. The smallest simulator memory you should choose
is 58MB. The maximum simulator memory is 376MB.
The recommended memory is 128MB.
Complete. Run /sim/runsim.sh to start the simulator.
root@linux-desktop:/media/cdrom#
```

8. Type in the following commands to un-mount the ISO image and close the terminal session:

```
exit
sudo umount /media/cdrom
exit
```

```
Complete. Run /sim/runsim.sh to start the simulator.
root@linux-desktop:/media/cdrom# exit
logout
linux@linux-desktop:~$ sudo umount /media/cdrom
linux@linux-desktop:~$ exit
```

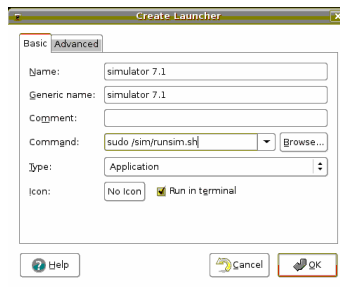
9. Create a desktop icon to run the simulator by right-clicking on the Linux desktop and selecting **Create Launcher...**



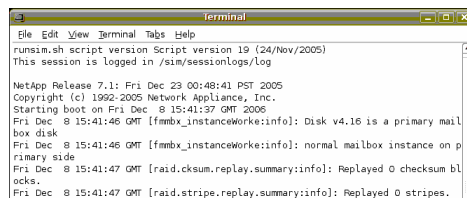
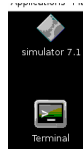
10. Fill in the form. For the *Name* and *Generic name* the recommended convention is **simulator <version>** so in this example: **simulator 7.1**

For the command enter: **sudo /sim/runsim.sh**

Make sure that the **Run in Terminal** option is selected.



11. Pressing **OK** to return to the desktop. Double click on the **simulator** icon to test the simulator.



12. After a short while the simulator will request a DHCP request (VMware in NAT mode automatically gives an IP address) and then starts asking for the normal ONTAP setup questions such as hostname.

The following are based on ONTAP 7.2.1 and no significant changes have been made to the order of questions in the past several versions of ONTAP but if you get questions you weren't expecting then please refer to the standard Data ONTAP documentation for the version you are installing for more details. The aim of this section is to get to a point where FilerView is working. Any defaults we select now can be changes using the standard management tools – this process is just the first time configuration.

13. Enter a hostname that is unique for your environment. I suggest something like **simulator**

```
Model Name: Simulator
Processors: 1
slot 0: NetApp Virtual SCSI Host Adapter v0
3 Disks: 0.3GB
1 shelf with LRC
slot 1: NetApp Virtual SCSI Host Adapter v1
slot 2: NetApp Virtual SCSI Host Adapter v2
slot 3: NetApp Virtual SCSI Host Adapter v3
slot 4: NetApp Virtual SCSI Host Adapter v4
3 Disks: 0.3GB
1 shelf with LRC
slot 5: NetApp Virtual SCSI Host Adapter v5
slot 6: NetApp Virtual SCSI Host Adapter v6
slot 7: NetApp Virtual SCSI Host Adapter v7
slot 8: NetApp Virtual SCSI Host Adapter v8
4 Tapes: VT-100MB
VT-100MB
VT-100MB
Please enter the new hostname []: simulator
```

14. When asked *Do you want to configure virtual network interfaces? [n]:* press **enter** to select the default of **no**.

15. You will be asked *Please enter the IP address for Network Interface ns0 [192.xxx.xxx.xxx]:*

Please write the IP address given down somewhere as you will need it again shortly. Each simulator will be given a unique IP address and this is different per machine as VMware allocates different ranges at installation.

Press **enter** to select the given IP address.

16. Press **enter** when asked to *Please enter the netmask for Network Interface ns0 [255.255.255.0]:*

```
Please enter the new hostname []: simulator
Do you want to configure virtual network interfaces? [n]:
Please enter the IP address for Network Interface ns0 [192.168.24.142]:
Please enter the netmask for Network Interface ns0 [255.255.255.0]:
```

17. Press **enter** to keep choosing the defaults for the following questions as they appear:

Please enter the IP address for Network Interface ns1: []

Would you like to continue setup through the web interface? [n]:

Please enter the IP address of the default gateway: [192.xxx.xxx.xxx]:

*The administration host is given root access to the filer's
/etc files for system administration. To allow /etc root access
to all NFS clients enter RETURN below.*

Please enter the name or IP address of the administration host:

18. When asked for the *Timezone* please enter the time zone for the area you are in.

19. Press **enter** to keep choosing the defaults for the following questions as they appear:

Where is the filer located? []:

What language will be used for multi-protocol files (Type ? for list)?:

Do you want to run DNS resolver? [n]:

Do you want to run NIS client? [n]:

20. You will now be asked to set the password. I recommend keeping it blank as long as the VMware network configuration is set to NAT. If you have set it to anything other than NAT then you should probably use a strong password.

Press **enter** to:

New password:

Retype new password:

21. The simulator should now complete the boot process and display several lines of configuration information.

```
*** NOTE ***
For tape device use(0:242:424200:000000).
Wed Jan 3 11:00:45 GMT [tapenc.alias.addKinfo]: Alias st3 automatically a
For tape device use(0:242:424200:000000).
add net default: gateway 192.168.24.2: entry already exists
Wed Jan 3 11:00:46 GMT [dfu.firmwareUpToDateInfo]: Firmware is up-to-date -
ll disk drives
Wed Jan 3 11:00:46 GMT [sfu.firmwareUpToDateInfo]: Firmware is up-to-date -
ll disk shelves.
Wed Jan 3 11:00:47 GMT [mgr.boot.disk_doneInfo]: NetApp Release 7.2.1 boot
plate. Last disk update written at Wed Jan 3 11:00:06 GMT 2007
Wed Jan 3 11:00:47 GMT [mgr.boot.reason_okNotice]: System rebooted after a
t command.
```

22. You will then be asked to setup the CIFS protocol. At this point press **Control + c** as we do not want to set CIFS up at this point.

```

This process will enable CIFS access to the filer from a windows(R) system.
Use "?" for help at any prompt and Ctrl-C to exit without committing changes.

Your filer is currently visible to all systems using WINS. The WINS
name server currently configured is: [ 192.168.24.2 ].

(1) Keep the current WINS configuration
(2) Change the current WINS name server address(es)
(3) Disable WINS
Selection (1-3)? [1]:

simulator> Wed Jan  3 11:12:27 GMT [console_login_mgr:info]: root logged in from
console

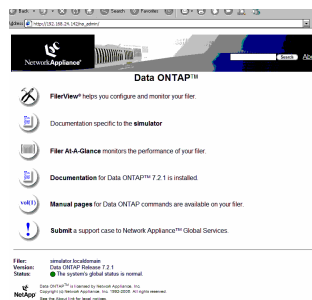
```

23. Now go back to Windows and start an Internet Explorer session. In the address bar type in the IP address you wrote down earlier.

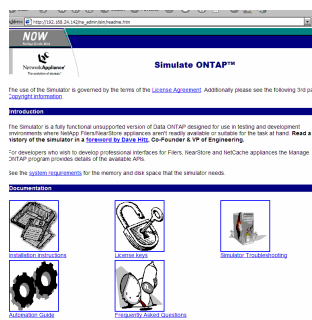
You should be shown the following Error screen:



24. Click the na_admin link. Enter the user name of **root** and no password (assuming you didn't create a password for the simulator earlier). Press **ok** to be shown the main FilerView screen.



25. Notice that the second option is *Documentation specific to the Simulator*. Click this to review the rest of the simulator documentation including license keys, troubleshooting, and FAQ sections.



26. When you've finished reviewing things in FilerView **close** down Internet Explorer and return to the VMware session. Back in the Simulator window press **enter** a few times to make sure you are on a clean *simulator>* prompt and then type:
- halt**

27. After a few seconds the simulator should shut down and you will be returned to the main Linux screen.
28. At this point it may be prudent to take a VMware snapshot. Doing so will allow you to revert the VMware session back to this point at any time you require. See the appendix for more details.

Remember to cleanly shut down your simulator and your Linux sessions. Avoid using the VMware suspend-to-disk (hibernate) feature when a simulator is running. Instead halt your simulator first and then halt / suspend the VMware session.

Appendix

VMware versions and their suitability for simulator usage

VMware version	Suitable?	Costs?	Notes
ESX	Yes	Yes	Using simulators on a production ESX hosts is not recommended. See the appendix for more details on how to get networking to work.
Player	No	No	No creation capabilities. 3 rd party tools exist that help but Server is better.
Server	Yes	No	Works on XP although official doc says Windows “server” platforms only
Workstation	Yes	Yes	Advanced VMware snapshot capabilities

VMware and simulator networking

Network Type	Guest access internet?	LAN sees Sim?	Notes
Bridged	Yes	Yes	Always needs a physical network connection. Simulator and guest OS require physical network IP addresses. Other users on your network can access the sim and guest OS
NAT	Yes	No	Gets IP address from VMware but still enables the host to network access Linux and the simulator
Host only	No	No	Can't access internet so not suitable for installation
None	No	No	Can't access anything

The recommended setting is NAT.

In Bridged mode when the physical network interface is disconnected from the network then the guest OS and the simulator are also disconnected from the network and cannot see the host. With NAT a physical disconnection allows networking between the simulator and host to continue as normal.

If you want to allow access to the simulator from other servers on your network then bridged mode is the correct mode to use. However the simulator only uses DHCP the first time it is started so bridged mode is only recommended on private physical networks where the administrator can control the IP addresses given to guest and simulator hosts and ensure that no duplicate IP addresses exist.

The simulator turns on promiscuous networking on the “virtual” interface it is attached to. This in turn causes the physical adapter in the PC to go into promiscuous

mode. For ESX server this is disabled by default for security and performance reasons. To enable promiscuous networking use one of the following methods depending on the version of ESX.

From the ESX 2.5 command line:

```
echo PromiscuousAllowed yes > /proc/vmware/net/vmnic0/config
```

Note: The *vmnic0* refers to the physical network card or vSwitch in ESX.

From the ESX 3 Virtual Infrastructure Client:

1. **Select** the ESX 3 host where the simulator VM is attached to. Select the **Configuration** tab, followed by **Networking** and then click the **properties** tab for the appropriate vSwitch.
2. Highlight the vSwitch, select **Edit** > **Security** and change the **Promiscuous Mode** policy exceptions to **Accept**.

Increasing VMware Virtual disk sizes

Simulators can be created bigger than the default maximum of approximately 10GB that is available by default, however due to the performance limitations of the simulator it is recommended that a small quantity of small disks are used and so the default of 10GB was selected.

The size of the image can be increased after building by following a few “simple” steps but this is only recommended for advanced users.

1. Download the GParted LiveCD in Windows from the following URL and save in your **c:\vmware\isoimages** directory: <http://gparted.sourceforge.net/livecd.php>
2. Shut down your simulator and Linux VMware session.
3. Go to a Windows **command** prompt and cd into your simulator directory.
4. Resize the *Ubuntu.vmdk* to the new size. The **-x** parameter is the new size you’d like the disk to be: e.g. to go from 10Gb to 20Gb use:

```
C:\vmware\simulator> "c:\program files\vmware\vmware server\vmware-vdiskmanager.exe" -x 20Gb Ubuntu.vmdk
```

The path to *vmware-vdiskmanager.exe* may be different depending on which version of VMware you are using.

5. Reconfigure the virtual cdrom in the VMware Console to point to the GParted LiveCD you downloaded earlier.
6. By default VMware will start to boot from the hard disk version of Ubuntu Linux instead of the GParted ISO image, so when you start your VMware image you should immediately click into it to give focus to the VMware window, press ESC when the BIOS screen starts. Choose CDrom.
7. Wait for the Extra Boot options screen to be shown then choose **xvesa** followed by **Done**. After a while you’ll be asked to choose your language, keyboard, screen

size and depth – just pick whatever is appropriate. I find that **1024x768** and **24** bits works fine.

8. The graphical resize screen should be shown. Click the cyan extended partition (**/dev/sda2**) and resize it to be the full size of the remaining partition.
9. Then click the red linux-swap partition (**/dev/sda5**) and choose the resize option. Change the *free space following* to **0** and that should change the *free space preceding* to **>0** and the red graphic should move to the right of the screen.
10. Choose the cyan (**/dev/sda2**) partition again and resize. Change the *New Size* option to be the *Minimum size* (e.g. 455MB). That should move the cyan partition to the right.
Click on the yellow/white (**/dev/sda**) partition and resize. Change the *New Size (MiB)* to match the *Maximum Size*. That should expand the box.
11. Now click the Apply button from the top of the screen and wait a few minutes. Then quit and press the big red power button on the bottom menu bar to reboot.

Decreasing VMware virtual disk sizes

When simulators are deleted you may wish to reclaim disk space back in your Windows host. If you have created any VMware snapshots then they will need to be removed before following this process.

This is done using the following method:

1. Start your Linux virtual machine if it isn't already running.
2. Ensure that any simulators inside your VM are shut down if they were running.
3. Open the VMware tools icon at the bottom of the screen to get into the VMware tools interface.
4. Choose the **Shrink** tab, highlight the **/** line and press **Shrink**.
After a few minutes you'll be asked if you want to shrink the disk. Say **Yes**.
5. The session will "freeze" and a Windows popup will appear showing the shrink progress.

After the shrink completes your virtual disks may be smaller; the space inside VMware will look the same.

Installing more than one simulator into the same Linux VM

A Linux VM is not limited to storing a single simulator. You have the following options:

A. Delete the existing simulator. To do this:

1. Delete the desktop icon
2. From a terminal session enter **rm -rf /sim**

3. Install your new simulator and create a new desktop icon
- B. Install the new simulator into a new directory.
1. Make sure you have sufficient disk space once the new simulator is installed.
 2. Instead of running `./setup.sh -z` as part of the simulator installation, run the command without the `-z` option and select the default answers to all questions except the path to install into. Pick a path that contains the version number to make it simple to identify what simulators are where; e.g. install into `/sim7.3` or `/sim7.2.2` or whatever version the new simulator is.
 3. When creating the desktop icon ensure the correct `sudo /<new path>/runsim.sh` path is used

You can also run more than one simulator at a time as long as you have sufficient memory – with the default configuration of Linux (512MB) and the default configuration of the simulator (128MB) you can run at least 2 simulators at the same time. To run more either increase the amount of Linux memory via the *VMware Console* or decrease the amount of memory in the simulator by running the `setup.sh` script in the appropriate `/sim` directories.

Using VMware snapshots

VMware has the concept of snapshots and they work in a similar fashion to the Filer snapshots in that you can use them as recovery points of your entire simulator in the event that something goes wrong and your simulator refuses to start or you misconfigure your simulator.

Please refer to the VMware documentation for the product you are using. The following is based on VMware server and that only supports a single Snapshot.

Creating the snapshot

With the simulator and Linux shut down select the *VMware console menu* -> **Snapshot** -> **Take a Snapshot**.

The primary reason for shutting everything down is to make sure that networking restarts properly if you revert after several months.

Using the snapshot

You can roll back to the snapshot created earlier at any time. Once you roll back all changes performed after this point are discarded so make sure that you do wish to roll back everything – this is especially important if you have more than one simulator installed in the same Linux host.

To use the snapshot you don't need to shut anything down, just go to the *VMware console menu* -> **Snapshot** -> **Revert to a Snapshot**. If your session was running then it should immediately halt and return to the main console – if it wasn't then you

probably won't notice any differences but when you restart the session it should be back at that point in time.

Removing the snapshot

VMware snapshots consume disk space and also prevent you from shrinking your disks. You may also want to remove and re-create your snapshot to save the "current" state of your environment instead of an earlier state.

Removing is simply a case of shutting down your session and then going to the *VMware console menu* -> **Snapshot** -> **Remove Snapshot**. You do not need to revert to the snapshot before you remove it.

Creating a second Linux virtual machine

It is simple to create another Linux virtual machine in the event that the original gets corrupted, or you wish to have 2 different Linux sessions with different simulators.

Use the following process:

1. *Optional*: Delete your existing **c:\vmware\Simulator** folder if you no longer want the simulators and Linux machine you previously created.
2. Open an Explorer window into **c:\vmware\temp**. This folder should be empty.
3. Open a second Explorer window and browse to the **c:\vmware** folder. Double click on the **simulator.zip** file.
4. In the *Simulator.zip* window that opens **right-click** and **copy** on the **Simulator** folder that is shown.
5. Select the **c:\vmware\temp** window and then paste. This should copy the files from the zip file into the **c:\vmware\temp** folder and automatically create a simulator folder underneath **c:\vmware\temp**.
6. Rename the **c:\vmware\temp\simulator** folder to something other than **simulator**. This step is optional if you did delete your existing simulator folder in step 1, otherwise it is required.
7. Using Explorer cut the new folder you've created and paste it into **c:\vmware**. Close all the explorer windows.
8. Start VMware. Select **File, Open**, then **Browse**. Then browse into the **c:\vmware\<new folder>** and select the **Ubuntu.vmx** file.
9. The virtual machine is now added to VMware and can be started. You will be asked a question about the *UUID* changing; select **Always create** and press **OK**.
10. Once the machine has started and automatically logged in go into a terminal session and run the following commands to enable the *eth0* network interface:
sudo rm /etc/iftab

sudo reboot

11. Your new machine is now ready.

Version history:

1.0.3	Paul Hargreaves:	Disable keyboard auto-repeat
1.0.2	Paul Hargreaves:	Add in VMware snapshots when complete Complete through to a working FilerView session
1.0.1	Paul Hargreaves:	VMware disk layout recommendations changed
1.0	Paul Hargreaves,	Network Appliance UK: Initial creation