

Institute of Public Administration
MSc in Computer Science
Introduction to Hardware and Software Assignment
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**User Manual for
Setting up
Windows 7 and
Debian Linux
Operating Systems**

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Section A

1 Creating The Microsoft XP Professional Environment using VM Workstation and Set up Drive Partitions

"Virtualization is the process of using special software - a class of programs called hypervisors or virtual machine managers - to create a complete environment in which a guest operating system can function as though it were installed on its own computer. That guest environment is called a virtual machine." ¹ (Meyers, 2012)

There are many advantages of Virtualisation:

- Hardware Consolidation- Can run many different servers on the one physical machine
- Power Saving - Running multiple virtual machines on a single server can reduce power consumption drastically.
- System Duplication - One ISO file can be rolled out on many virtual machines very quickly. This helps increase uptime a system, i.e. if a problem occurs just delete the machine and reinstall it.
- Testing - can be used as a "sandbox" to try out programs or environments safely.

Disadvantages:

- Can be very expensive to roll out at Enterprise level. Virtualisation needs a good network infrastructure and that doesn't come cheap.
- Centralised system vulnerable to attack - ² (Dawson, 2013) "single point of failure"

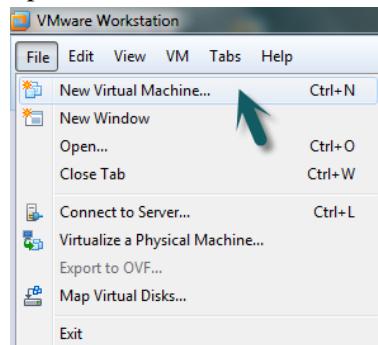
1.1 Creating the Virtual Machine

NB: This step can be disregarded if you are installing the operating system onto a physical machine. Just insert the installation media, i.e. CD or USB Drive and power on the machine and skip to step 1.2

VMWorkstation is a platform used to virtualise environments and a trial version can be downloaded at www.vmware.com/go/downloadworkstation. Other possible virtualisation software platforms include Virtual Box and Microsoft Virtual PC, KVM and Parallels.

Step 1

Open VM Workstation



- Click File

- Click **New Virtual Machine**

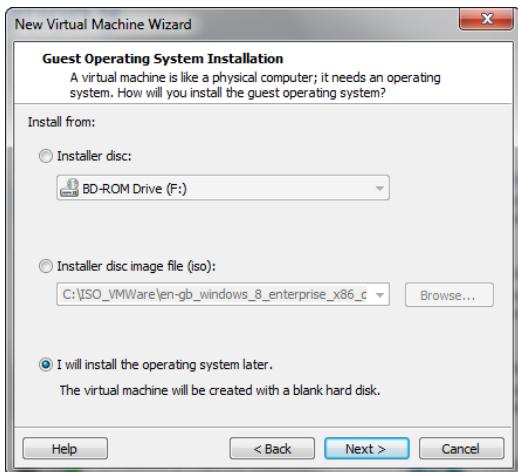
Step 2



- Chose **Typical** configuration and click **Next**.

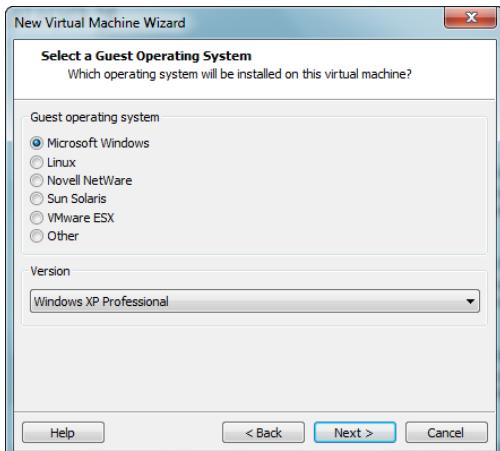
The custom configuration is used for more advanced options or when you need to create a machine compatible with older VM Workstation versions, e.g. Workstation 8.

Step 3



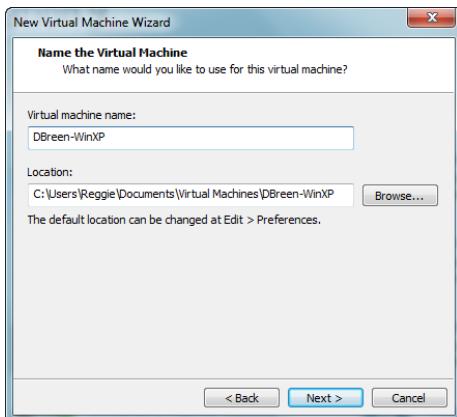
- Chose **I will install the operating system later.**
- Click **Next**

Step 4



- Choose **Microsoft Windows** and **XP Professional**

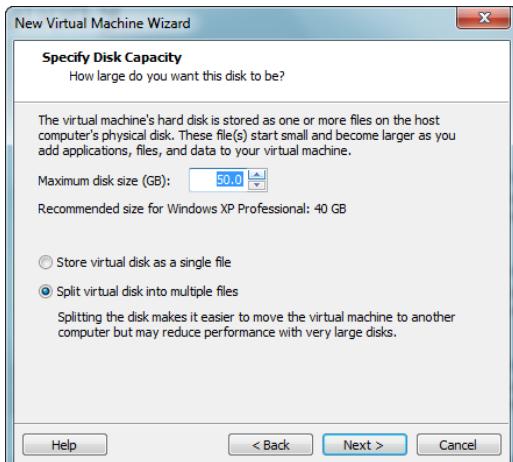
Step 5



- Enter the machine name
- Browse to the location where you want to save the virtual machine

Give the machine a meaningful name and store it somewhere you will remember. Default is a Virtual Machines folder in the Documents folder.

Step 6



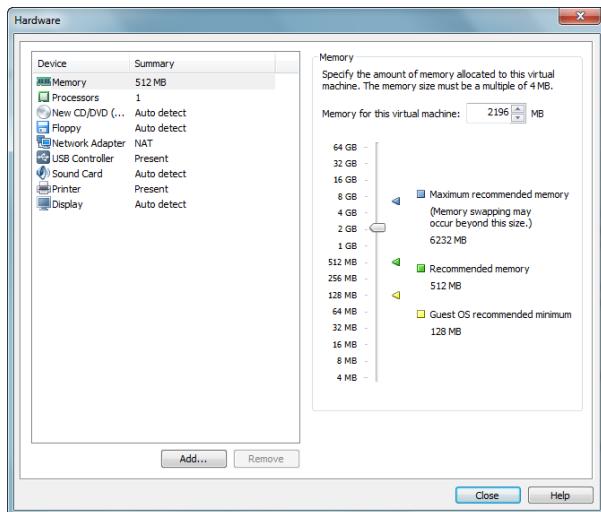
- Chose the size of the hard drive.
- Chose **Split virtual disk into multiple files**.

Thick and Thin provisioning

Step7

- Click Customize Hardware

Step 8

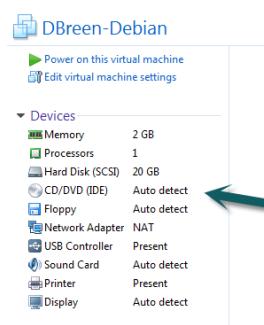


- To increase RAM click on the **Memory**
- Slide the pointer up to 2GB

Depending on your machine's capabilities, you have the option to increase the RAM of the Machine. My computer has 8GB RAM so it can easily run this virtual machine with 2GB Ram assigned to it while it is running.

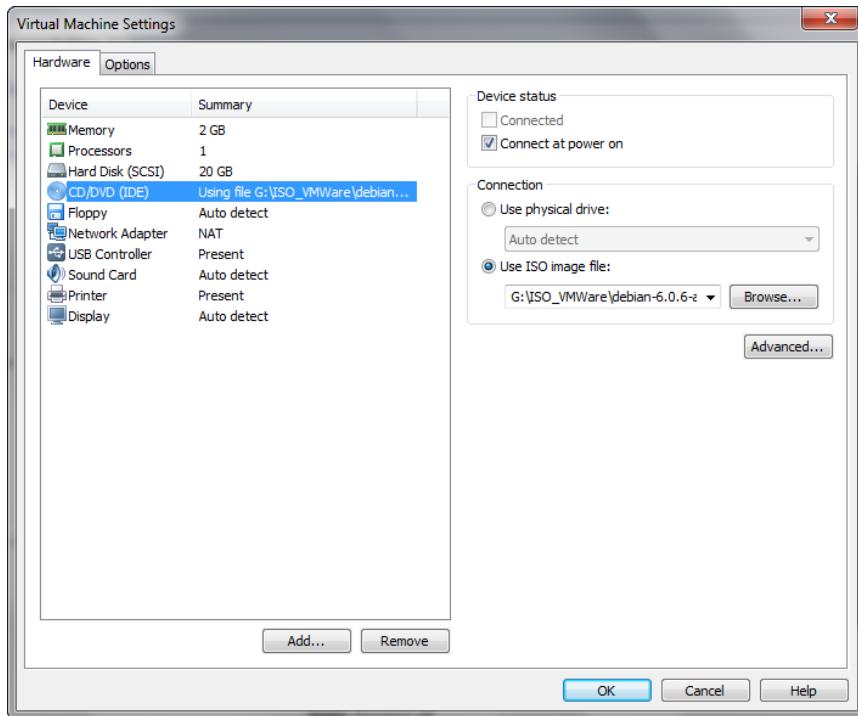
Minimum and Maximum recommended RAM are shown on the right, min 64MB and Max 6232MB.

Step 9



- Click on the **CD/DVD** tab.

Step 10



- Click on the **CD/DVD** tab.
- Choose **Use ISO image file**
- Ensure **Connect at power on** is ticked
- Browse to the location you have downloaded the ISO file for Microsoft XP Professional
- Click **OK**

This step mounts the installation disk image file to the CD/DVD drive on the virtual machine and it will run the disk when the machine is powered on and boot from the CD/DVD drive. The reason we mount the ISO file this way is so we can further customise the installation, otherwise it would run in unattended mode and use default settings.

Step 11

- Click **Power on this virtual machine**

1.2 Setting up Windows XP Professional

Step 1

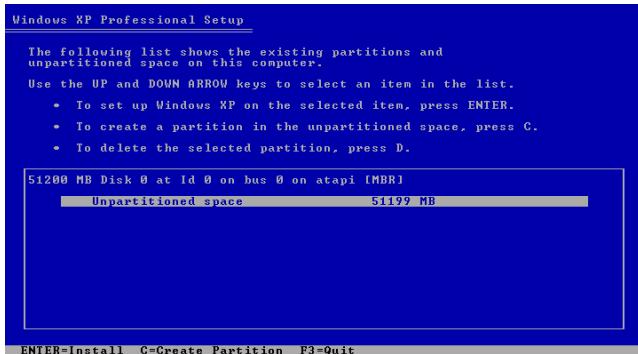


- The system starts to run the Windows Setup
- Press **Enter** to continue

Step 2

- Press **F8** to agree to the **Licensing Agreement**

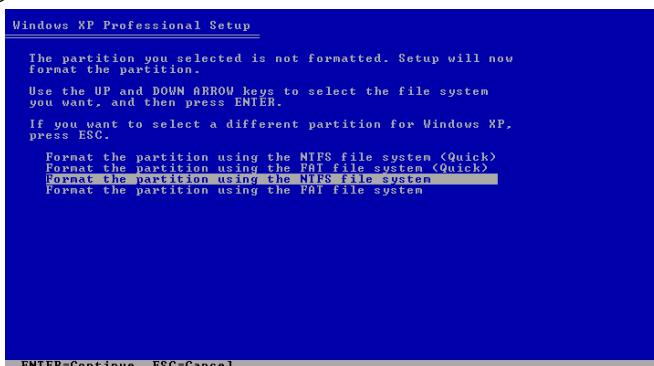
Step 3



- Press **C** to create a partition
- Enter the size of the partition to create in MB

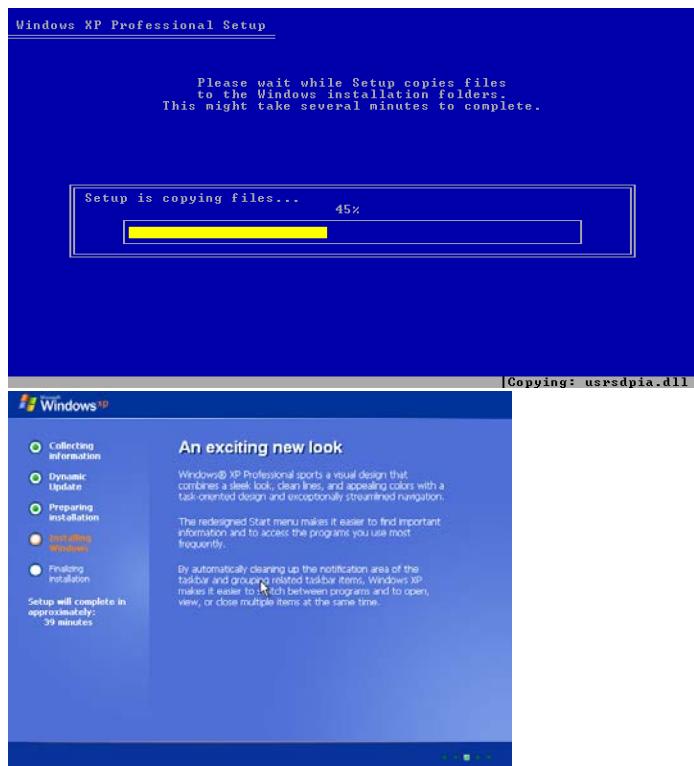
Step 4

Creating Partitions



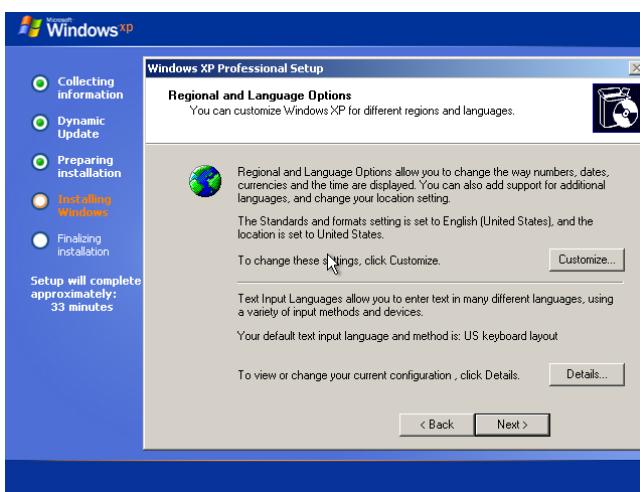
- Highlight the intended bootable drive (usually c:) and press **Enter**
- Highlight the type of file system you want to use for the bootable drive
- Suggested to choose FAT

Step 5



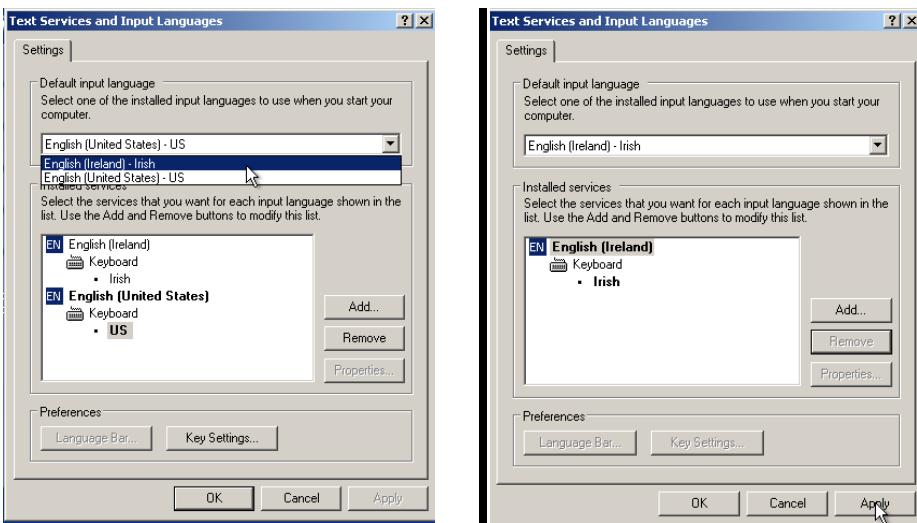
- The drive will be formatted and windows will resume the installation

Step 6



- Click **Customize** to customise the Regional and Language Options
- Change the Standards and formats and location

Step 7



- Click **Customize** to change the Text Services and Input Languages
- Amend the settings as required and click **Ok**
- Click **Next**

Step 8

- Enter your Full Name and Organisation and click **Next**
- Enter a valid Product Key and click **Next**
- Enter the Computer name and Administrator Password and click **Next**
- Choose your Time Zone and click **Next**

Step 9



- Choose Typical for Network Settings unless you need to manually configure the networking components.
- Click **Next**

Step 10



- You have now successfully installed Windows XP Professional
- Enter the administrator password and press **Enter** to login

1.3 Setting up 2 partitions on the drive

Each hard disk can be divided into primary and extended partitions, up to 4 primary partitions on a disk and limitless extended partitions. Primary partitions are bootable which means they can hold an operating system and boot the system. One partition is marked "active" at a time and the computer boots from that partition. This setting can be changed in the Disk Management section of the computer manager.

Partitioning is useful in a number of situations.

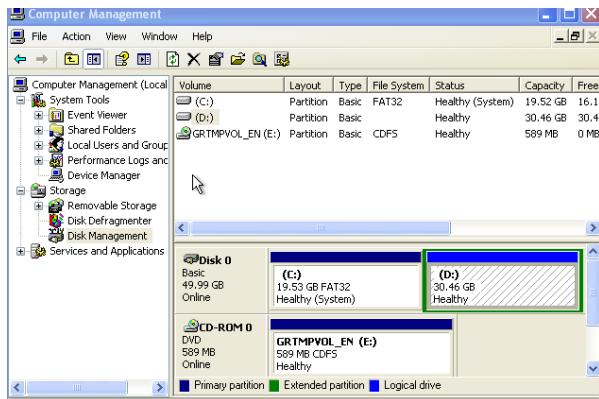
- Multiple Boot systems - possible to hold multiple operating systems on one drive.
- Separating the system files from the Operating system.
- Different filing systems, e.g. NTFS, FAT16, FAT32, Linux etc. Older filing systems had a limit to volume size due to a limit on addressable memory. As hard drives grew in size they would have to be partitioned to use all the free space.
- Organisation - some people find it useful to partition the drive as a mechanism to organise their files into separate partitions.

Step 1

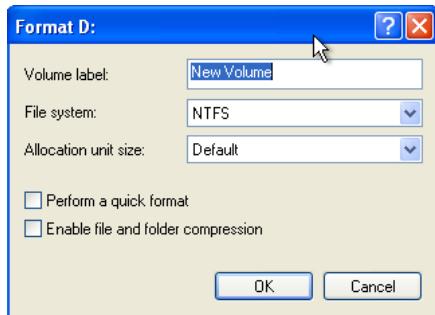
- Open the **Computer Management** utility by right clicking on **My Computer** and then **manage**.

Step 2

- We have already created the two partitions while setting up windows. The primary bootable drive C: is already formatted for the FAT 32 filing system. We now must format the other drive which will hold our user files.
- NTFS is the most suitable filing system for these purposes as it allows setting of privileges.



- Right Click on the second partition D: and click **format**



- Choose **NTFS** as the file system and click **Ok**
- Click Ok on the warning screen

Volume	Layout	Type	File System	Status	Capacity	Free Space	% Free	Fault Toler
(C:)	Partition	Basic	FAT32	Healthy (System)	19.52 GB	16.12 GB	82 %	No
GRTMPVOL_EN (E:)	Partition	Basic	CDFS	Healthy	589 MB	0 MB	0 %	No
New Volume (D:)	Partition	Basic	NTFS	Healthy	30.46 GB	30.39 GB	99 %	No

- The second partition is now formatted in **NTFS**

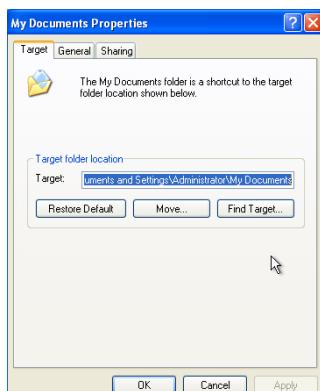
1.4 Moving the My Documents Folder

Now that we have created the NTFS partition we must move the user documents folder from the C: to the D:

Step 1

- Right Click on **My Documents>Properties** in the Start Menu

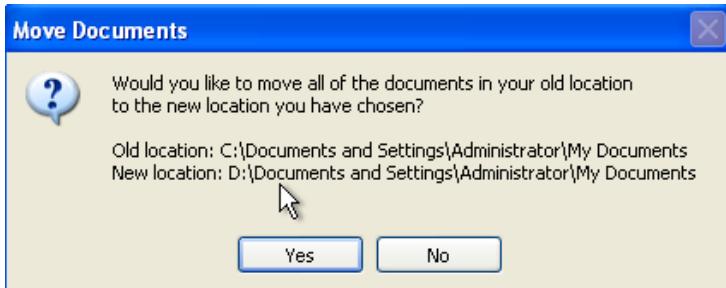
Step2



- In the **Target** path, change the C: to a D: and click **Apply**

- You will be asked if you want to create a folder at that location, click **Yes**

Step 3



- Click **Yes** to move all the documents to the new location
- The location for the User Documents folders are now changed to the D:

1.5 Assign the Machine to a Workgroup

To demonstrate the process of setting up/joining a workgroup we will set up a workgroup called "D-Breen".

Step 1



- Open the control panel by clicking **Start** and **Control Panel**
- Click **Network and Internet Connections**
- Click **Set up or change your home or small office network**

Step 2



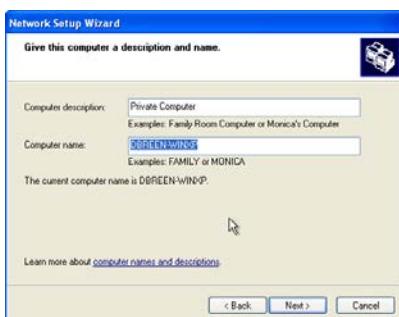
- Click **Next** to start the Network Setup Wizard
- Click **Next** on the checklist screen

Step 3



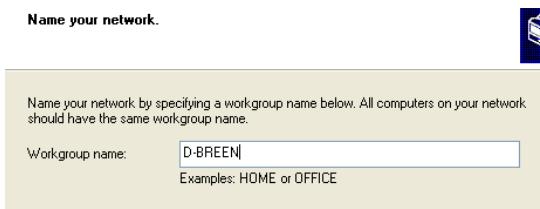
- Choose the statement that best describes your computer.
- If you connect through a router choose the second option.
- Click **Next**

Step 4



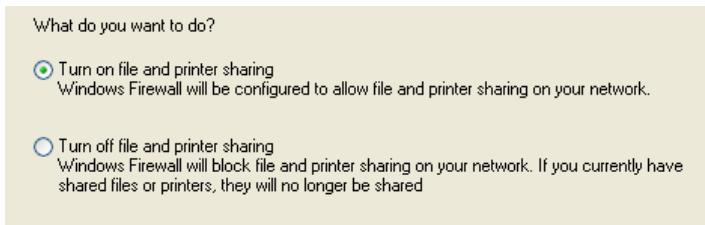
- Enter a short description of your computer and a computer name
- Click **Next**

Step 5



- Enter a Workgroup name
- Click **Next**

Step 6



- If you want to enable file and printer sharing choose the first option
- Click **Next**

Step 7

- Review the settings and click **Next** if they are all correct

Step 8



- A Network setup disk is used to run the network setup wizard on computers in your network not running Windows XP.
- To create a Network Setup Disk choose the first option.
- We don't need a Network setup disk at this time so we will choose the last option.
- Click **Next**

Step 9

- The Setup is now complete. Click **Finish**
- Click **Yes** to restart your computer.

2 Installing Updates and Antivirus and Firewall Activation

³ (Meyers, 2012) states

"An anti-malware program such as a classic antivirus program protects your PC in two ways. It can be both sword and shield"

Anti Virus is an essential tool to have installed on a computer. They can both passively protect by monitoring a computer's activity and actively search for viruses and destroy them. Antivirus will help protect against many types of malware, e.g Virus, Worm, Trojan Horse.

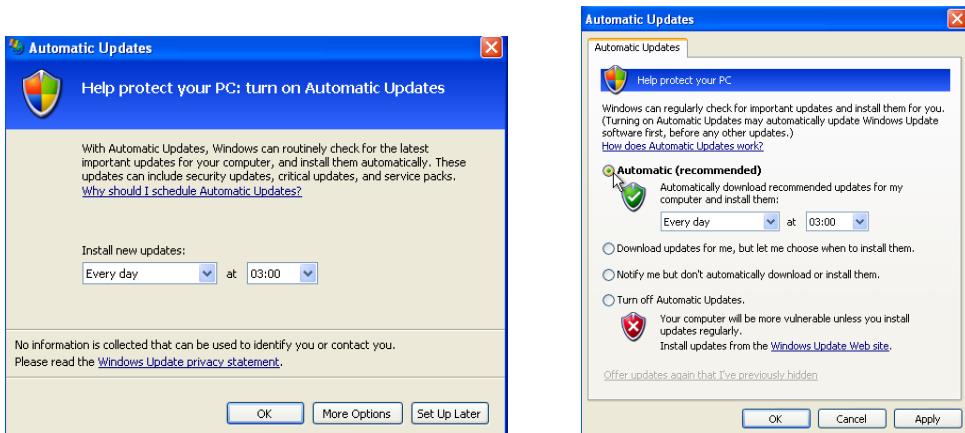
2.1 Update Windows XP with all Service Packs and Security Fixes

Step 1



- Click the Windows update icon in the taskbar at the bottom right hand side of the desktop. (see screenshot above)

Step 2



- Click on **More Options** (see above left screenshot)
- Recommended to automatically download and install windows updates.
- Choose a scheduled time and frequency for the updates and click **Apply**

Step 3



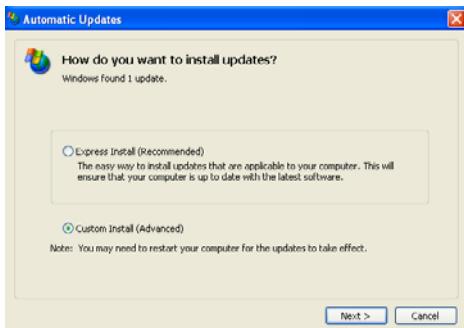
- To check for updates immediately click **Start>All Programs>Windows Update**
- This will open www.microsoft.com/windowsupdate



- When prompted choose to **Install** the update

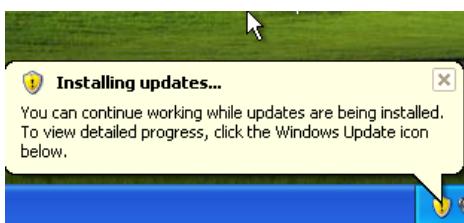
Step4

- The Windows update icon should appear in the taskbar again.
- Click on the icon



- Choose **Express Install (Recommended)**
- **Custom Install** lets you choose exactly which packages you would like to install
- Click **Next**
- Click **Install**

Step 6



- The updates will automatically install without any further input from the user
- They may require a restart or install upon shut down so be careful not to power down fully or plug out the machine while this is in progress.
- The updates can be reversed by using the system restore tool.

2.2 Install Microsoft Security Essentials Antivirus and Turn on Firewall

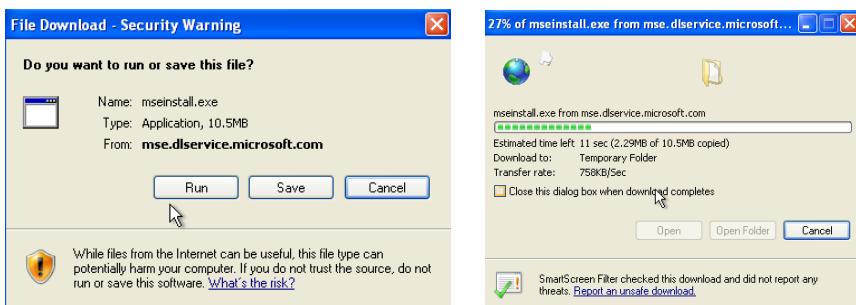
⁴ (Meyers, 2012) states:

"*Firewalls* are devices or software that protect an internal network from unauthorized access to and from the Internet at large. Firewalls use a number of methods to protect networks, such as hiding IP addresses and blocking TCP/IP ports."

Step 1

- Open your web browser
- Go to <http://windows.microsoft.com/en-us/windows/security-essentials-download>
- Click **Download**

Step 2



- Click **Run**

- Windows Security Essentials will start downloading

Step 3

- Click **Run** when the download finishes

Step 4



- The Installation wizard will now start.
- Click **Next**

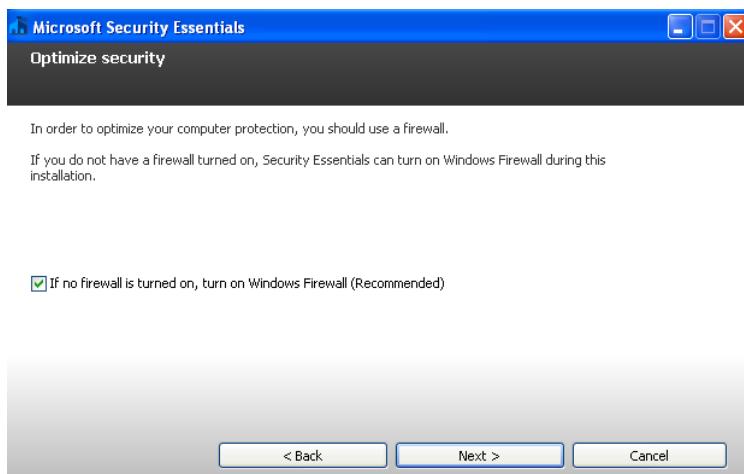
Step 5

- Read the Licence Agreement
- Click **I Accept** to continue

Step 6

- Choose whether to take part in the Customer Experience Improvement Program, which will send information to Microsoft to help them make improvements in the future.
- Click **Next**

Step 7



- You can choose to turn on the firewall at this point by checking the box and click **Next**.
- This is not essential but is highly recommended.

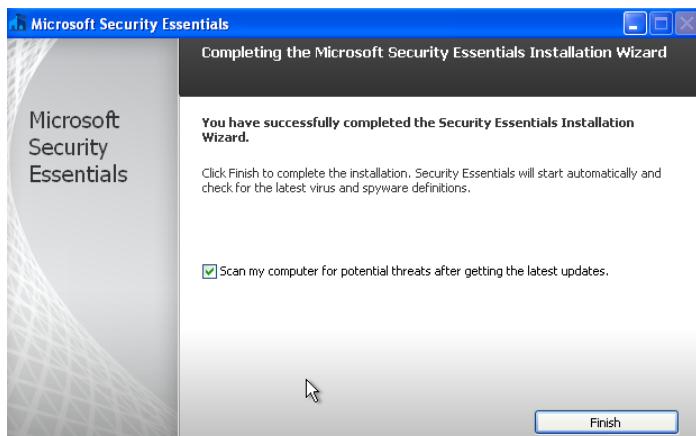


- The firewall can be turned on/off later if you wish by opening the control panel from the start menu, click on **Security Center** and toggle the **Firewall** to **On**. (See above screenshot)

Step 8

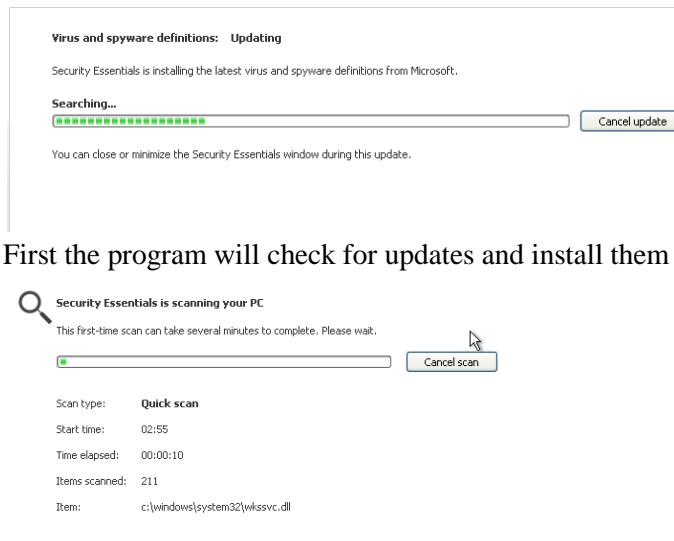
- Click **Install** to install the program

Step 9

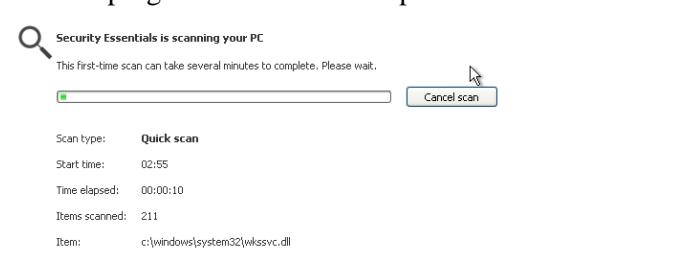


- When installation completes, leave the box ticked to update the latest virus definitions and then scan your computer for threats. (see above screenshot)
- Click **Finish**

Step 10

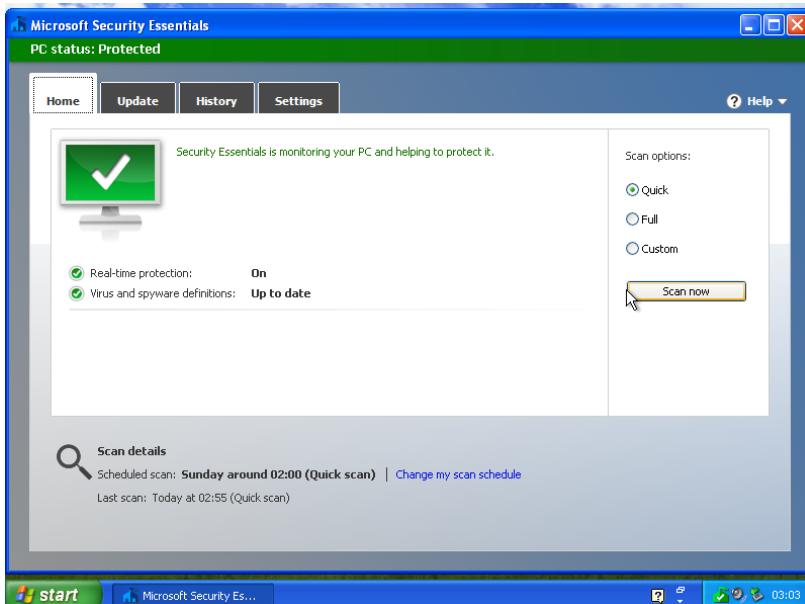


- First the program will check for updates and install them automatically.



- Then a quick scan for viruses and other malware will be performed.

- In the future the definitions updates will be done automatically and scans will be scheduled weekly at a certain time.



- To change the automatic scan time or disable it or perform a manual scan, you can open Microsoft Security Essentials can be opened by clicking on the icon in the taskbar or clicking Start>All Programs>Microsoft Security Essentials.

3 Setting up Users, Groups and Security and Permissions

3.1 Security Measures in Relation to Passwords and Login

Step 1



- Open the **Control Panel**, click **Change to Classic View**
- Click **Administrative Tools**



- Click **Local Security Policy**

Step 2

The screenshot shows the 'Local Security Policy' editor. The left pane shows a tree structure with 'Security Settings' expanded, and 'Account Policies' is selected. The right pane shows a table of policy settings:

Policy	Setting
Enforce password history	0 passwords remem...
Maximum password age	42 days
Minimum password age	0 days
Minimum password length	0 characters
Password must meet complexity requirements	Disabled
Store password using reversible encryption for all users in the domain	Disabled

- Click **Account Policy** then **Password Policy**
- Click **Password must meet complexity requirements**

Step 3



Password must meet complexity requirements

This security setting determines whether passwords must meet complexity requirements.

If this policy is enabled, passwords must meet the following minimum requirements:

- Not contain the user's account name or parts of the user's full name that exceed two consecutive characters
- Be at least six characters in length
- Contain characters from three of the following four categories:
 - English uppercase characters [A through Z]
 - English lowercase characters [a through z]
 - Base 10 digits [0 through 9]
 - Non-alphanumeric characters [for example, !, \$, #, %]
- Complexity requirements are enforced when passwords are changed or created.

- Click **Enabled**
- Click **Apply** and then **OK**
- The minimum requirements for new passwords now are shown in the screenshot above, taken from the **Explain this setting** tab.

Step 4

Policy	Security Setting
Accounts: Administrator account status	Enabled
Accounts: Guest account status	Enabled
Accounts: Limit local account use of blank passwords to console logon only	Enabled
Accounts: Rename administrator account	Administrator
Accounts: Rename guest account	Guest
Audit: Audit the access of global system objects	Disabled

- To disable the Guest Account
- Click on **Security Options>Accounts:Guest account status**
- Click **Disabled**
- Click **Apply** then **OK**

Step 5

- To rename the Administrators Account , click **Accounts: Rename administrator account**
- Enter the changed name
- Click **OK**

NB There are many more options for configuring the security measures on your system within the **Local Security Measures**, e.g. Password history memory, max password age, min password age, min password length). All these options are explained in detail if you click on them and the click the **Explain this setting** tab. See example below:

According to the ⁵ **Explain this setting** tab on renaming the Administrator account in **Local Security Settings**

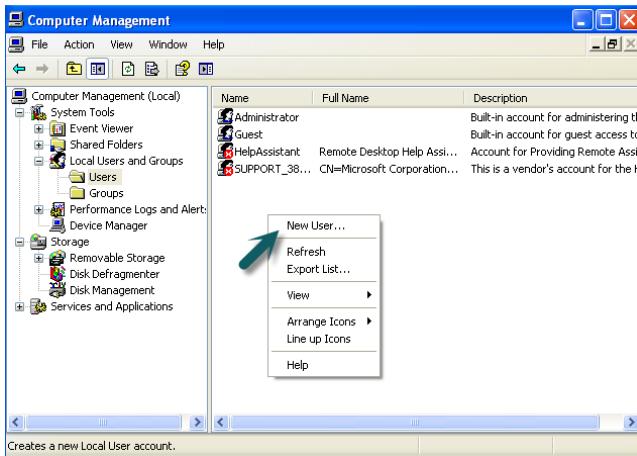
"Because the Administrator account is known to exist on all computers running Windows 2000 Server, Windows 2000 Professional, Windows XP Professional, and the Windows Server 2003 family, renaming the account makes it slightly more difficult for unauthorized persons to guess this privileged username and password combination"

3.2 Setting up the Users accounts

Step 1

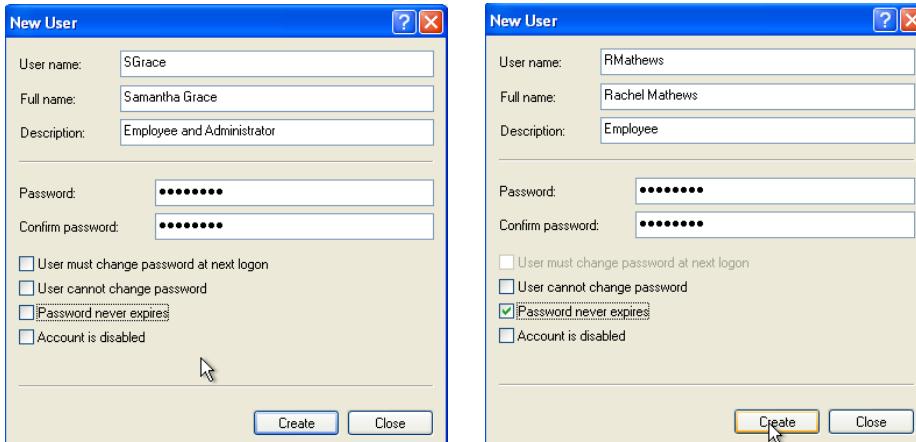
- Right click on **My Computer** in the **Start Menu** and click **Manage**

Step 2



- Click on **Local Users and Groups** and then **Users**
- Right click in the main area on the right (see screenshot above) and click **New User**

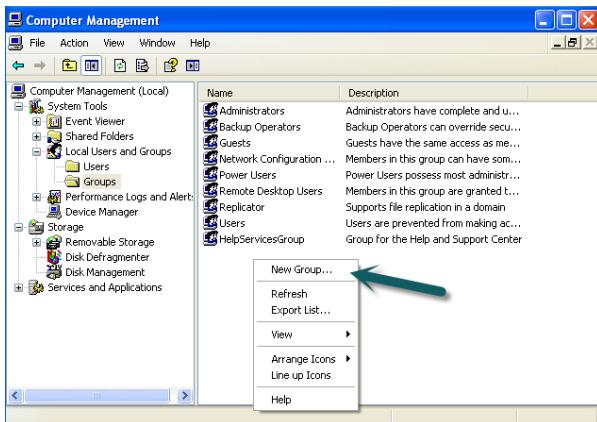
Step 3



- Enter the user name, full name, brief description and password for the user.
- Its a good idea to use the same naming convention for each username, e.g. *FirstinitialSurname*
- There are four additional options. Tick the first option to have the user change the password on their next logon. The second forbids the user from changing the password. The third states that the password never expires. The fourth disables the account.
- In this case for demonstration sake we will tick only the third option, i.e. password never expires.
- Click **Create** to create the user
- The user is now created and all the fields will go blank, ready to input another user.
- Repeat the process for all the users to be added to the system

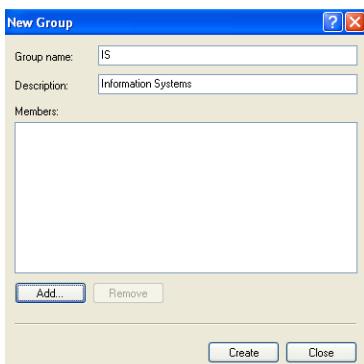
3.3 Setting up Groups

Step 1



- Click on the **Groups** folder in **Local Users and Groups** on the left hand side of the Computer Management screen.
- Right click in the main area on the right of the screen (see above screenshot)
- Click **New Group**

Step 2



- Enter the **Group name** and a brief **Description**.
- Click **Add** to add members.

Step 3

- Enter the usernames of the members of the group separated by a semicolon ;
- Click **Check Names**
- If the names are valid usernames the path will appear (see above right screenshot)
- Click **OK**

Step 4



- The users are now added to the group.
- Click **Create** to create the group.
- The fields will go empty, ready to add another group. Repeat the process to add more groups.
- When finished creating groups click **Close**.

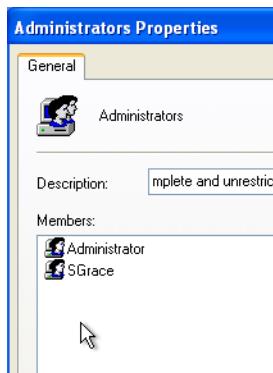
Step 5

Name	Description
Administrators	Administrators have complete and unrestricted access to all resources on the system.
Backup Operators	Backup Operators can override security restrictions when performing backups.
Guests	Guests have the same access as members of this group.
Network Configuration Operators	Members in this group can have some administrative rights.
Power Users	Power Users possess most administrative rights.
Remote Desktop Users	Members in this group are granted the ability to connect to the computer via Remote Desktop.
Replicator	Supports file replication in a domain.
Users	Users are prevented from making changes to their own accounts.
Finance	Finance Department
HelpServicesGroup	Group for the Help and Support Center
HR	Human Resources
IS	Information Systems

- To Add/Remove members of a group, double click on the group

Step 6

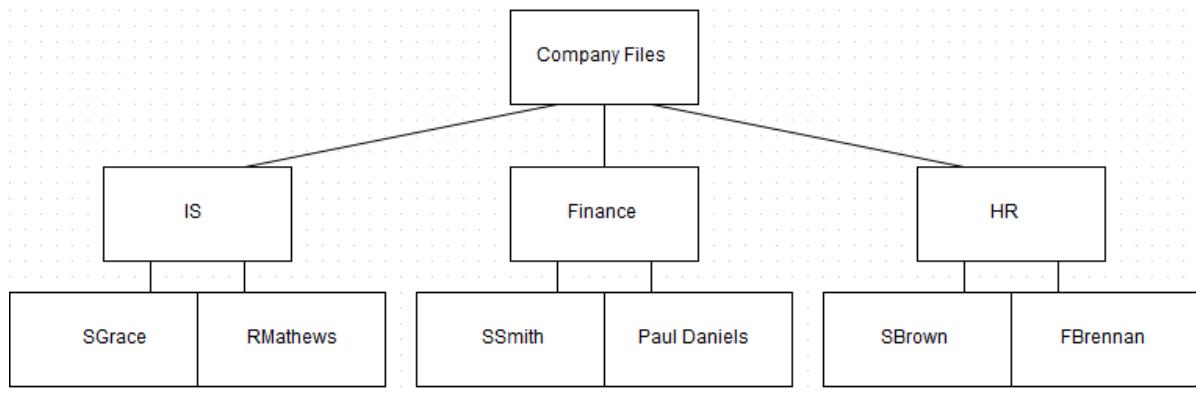
- To remove a member, highlight the member and click **Remove**
- To add a member, click **Add**



- Follow the same procedure as before and click **OK**
- Example, see above screenshot, User Samantha Grace has been added to the Administrator Group.

3.4 Creating the Folder Structure for an Organisation

In this manual we will create the following folder structure:



Step1

- Open **My Computer** from the start menu
- Open the second NTFS partition, D:\
- Right click anywhere within the D:\ screen and click **New Folder**
- Rename the new folder to a meaningful name e.g. **Company Files**.

Step 2



- Create the Department Folders in the same way within the **Company Files** folder.

Step 3



- Create the User Folders in the same way within their relevant departments.
- Now the folder structure is created

3.5 Setting Permissions and Restrictions to folders.

The reason we put the user accounts on the NTFS partition and not on the FAT partition is because of NTFS permissions.⁶ (Meyers, 2012) states:

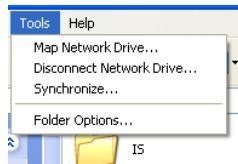
"Windows uses the powerful NT File System (NTFS) to protect its resources"

The FAT filing system does give some form of protection using its share permissions but NTFS is a much more powerful tool for allowing and denying access to specific users and groups.

To demonstrate NTFS permissions we will:

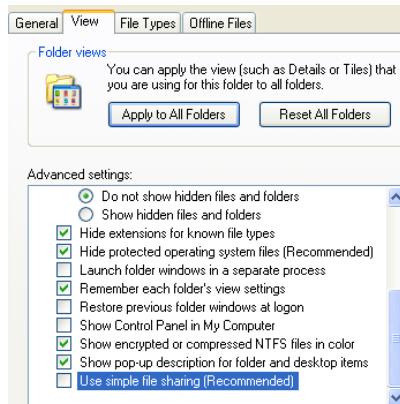
- Restrict Department Folders to access only to members of that department.
- Restrict Access to each person's private folder to only themselves and give read only access to members of the same department.
- Allow Administrator access to all folders.

Step 1



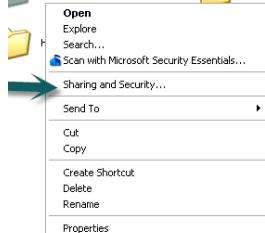
- To turn on Full NTFS permissions open the Company folder and click on **Tools**
- Click **Folder Options**

Step 2



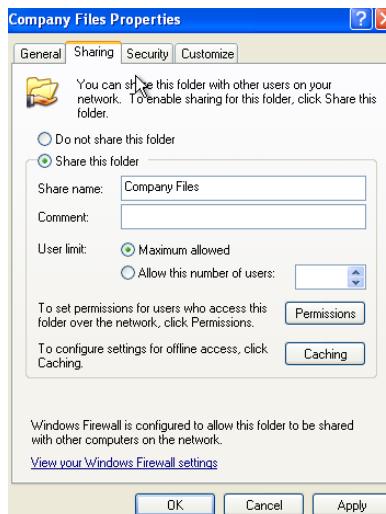
- At the bottom of Advanced Settings untick the box for **Use simple file sharing**
- Click **Apply to All Folders**

Step 3



- Right click on a department folder and click **Sharing and Security**

Step 4

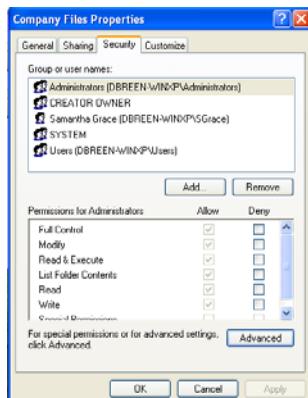


- To enable Sharing, tick the **Share this folder** option

Step 5

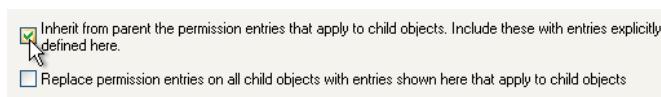
- Tick the **Security** tab

Step 6

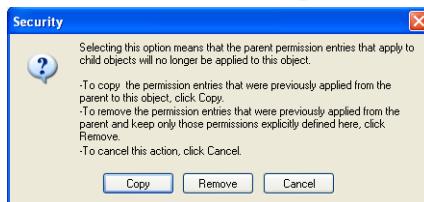


- Click the **Advanced** tab

Step 7

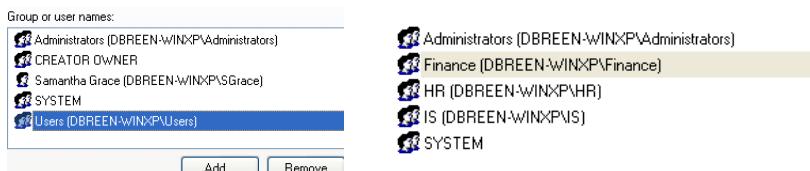


- Untick the **Inherit from parent** box



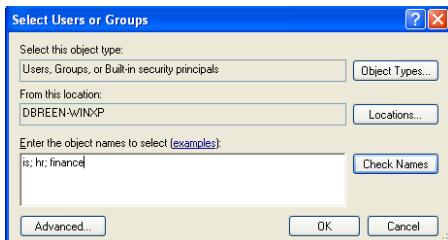
- Click **Copy** to keep the permissions already applied to the folder, we will add/remove permissions in the next step
- Click **OK**

Step 8



- Remove all the Groups and User Groups except the **Administrators** and **SYSTEM** by highlighting them and clicking **Remove**.
- Click **Add** to add Users/Groups to the permissions list.

Step 9



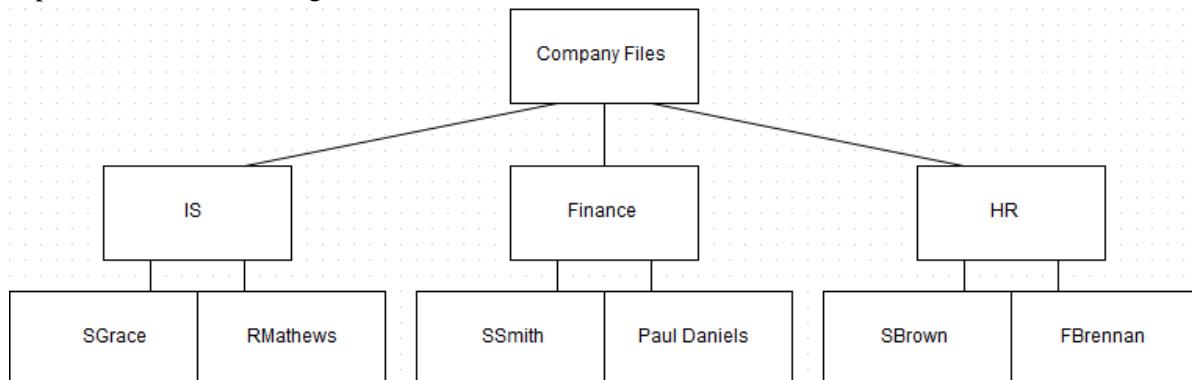
- Enter the names of the Groups or Users separated by a ; (see above screenshot)
- Click **Check Names**.
- If the group names and usernames are valid they will appear in the box.
- Click **OK**

Step 10

Permissions for IS	Allow	Deny
Full Control	<input type="checkbox"/>	<input type="checkbox"/>
Modify	<input type="checkbox"/>	<input type="checkbox"/>
Read & Execute	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List Folder Contents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Read	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Write	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Special Permissions		

- Highlight a group on the list and modify the permissions by ticking the **Allow** or **Deny** boxes.

To achieve our required permissions stated earlier we must perform Steps 1 - 10 until we have implemented the following:



Company Folder:

Allow **full access** to **System** and **Administrator**

Allow **Read&Excute, List Folder Contents, Read and Write** to **all 3 groups**

Department Folder:

Allow **full access** to **SYSTEM** and **Administrator**

Allow **Read&Excute, List Folder Contents, Read and Write** to the **department only** (e.g. IS)

User Folder:

Allow **full access** to **SYSTEM** and **Administrator**

Allow **Read&Excute, List Folder Contents, Read and Write** to the specific user

Allow **List Folder Contents** and **Read** to the **department the user is from**

3.6 Blocking Websites using the Hosts File

⁷ According to <http://helpdeskgeek.com>

*"The Windows **HOSTS** file allows you to block some of this content very easily and for free. However, this is not a complete internet security solution. It is still recommended that you run anti-virus software on your computer and be careful of the websites you visit."*

Step 1

- Click **Start**, then **Run**
- Enter C:\WINDOWS\system32\drivers\etc and press enter

Step 2



- Double click on **hosts file**
- Choose to open the file with **Notepad**

```
# Copyright (c) 1993-1999 Microsoft Corp.  
#  
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.  
#  
# This file contains the mappings of IP addresses to host names. Each  
# entry should be kept on an individual line. The IP address should  
# be placed in the first column followed by the corresponding host name.  
# The IP address and the host name should be separated by at least one  
# space.  
#  
# Additionally, comments (such as these) may be inserted on individual  
# lines or following the machine name denoted by a '#' symbol.  
#  
# For example:  
#  
#      102.54.94.97      rhino.acme.com      # source server  
#            38.25.63.10      x.acme.com        # x client host  
  
127.0.0.1      localhost  
127.0.0.1      www.facebook.com  
127.0.0.1      www.twitter.com  
127.0.0.1      www.myspace.com
```

- At the bottom of the file after 127.0.0.1 localhost, copy the IP address and write the URL of the websites you want to block.
- Save the file by clicking **File>Save**
- Microsoft Security Essentials may pick up on the activity and think something malicious is going on, if it shows a message click **Details** and **Allow** the action.
- When anyone tries to go to any of the sites associated with these domain names they will now be redirected to 127.0.0.1 which is the loopback address i.e. looped back to your computer.

4 Setting up Remote Connectivity

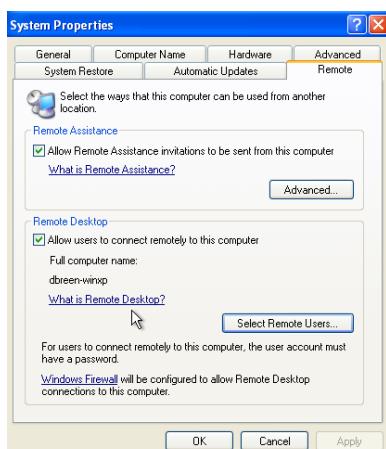
⁸ (Microsoft, 2013) state:

" With Remote Desktop Connection, you can access a computer running Windows from another computer running Windows that is connected to the same network or to the Internet. For example, you can use all of your work computer's programs, files, and network resources from your home computer, and it's just like you're sitting in front of your computer at work."

Remote connectivity allows you to log in to a remote computer on a network and use it as if you were sitting in front of it. It uses port 3389 by default and it is a common security measure to change this port to a random port number to stop any undesirable people hacking into the remote desktop and trying passwords. For the same reason it is a good idea to change the name of the Administrator account on the system as all xp computers have the same name on the administrator account by default.

4.1 Allowing Remote Desktop on the computer

Step 1



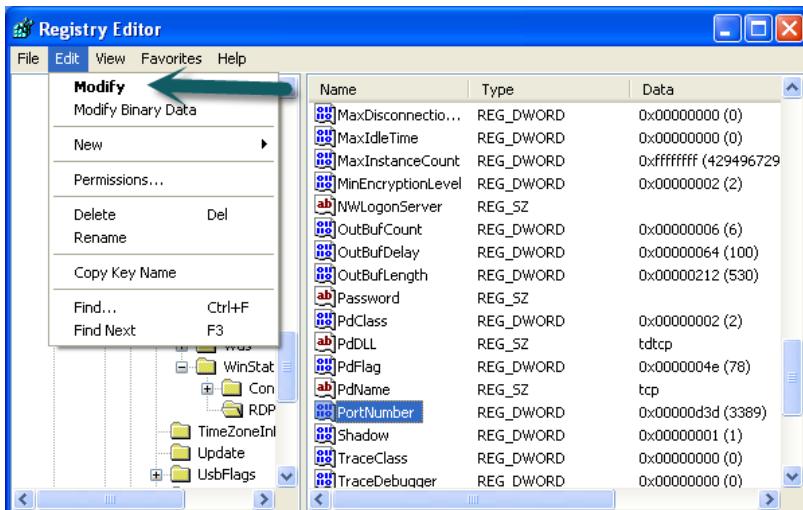
- Open the **Control Panel>System**
- Click the **Remote** tab
- Tick the box to **Allow users to connect remotely to this computer**
- Administrators automatically have enough privileges to connect remotely. If you want to add more users to the list of remote users click **Select Remote Users** and add more users in the same way as we added users to groups earlier.
- Its not recommended to allow too many people to connect remotely for security reason.

4.2 Changing the Default Port

Step 1

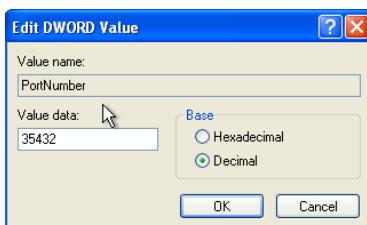
- Click **Start>Run**
- Enter **regedit** and press **Enter** to open the Registry Editor.

Step 2



- Follow the path **HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\TerminalService\r\WinStations\RDP-Tcp\PortNumber**
- Highlight **PortNumber** and click **Edit** and **Modify**. (See above screenshot)

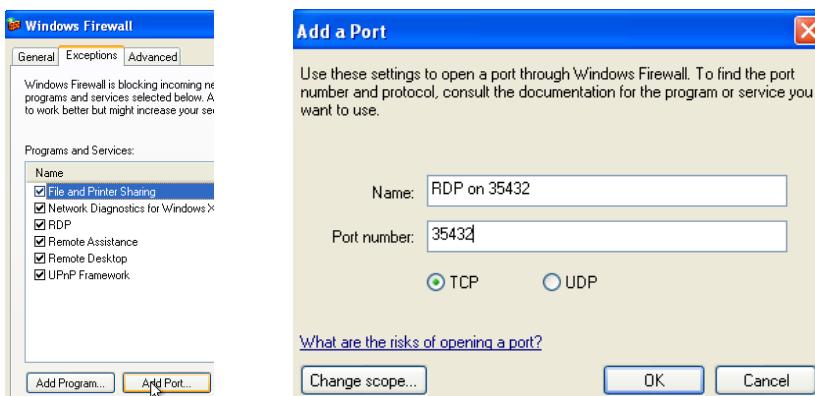
Step 3



- Choose **Decimal** and change the **Value data** to your desired port number.
- Click **OK**

4.3 Opening the Port on Windows Firewall

Step 1



- Now we must open the port on Windows Firewall or the communication will not get through.
- Open **Windows Firewall** in the **Control Panel**

Step 2

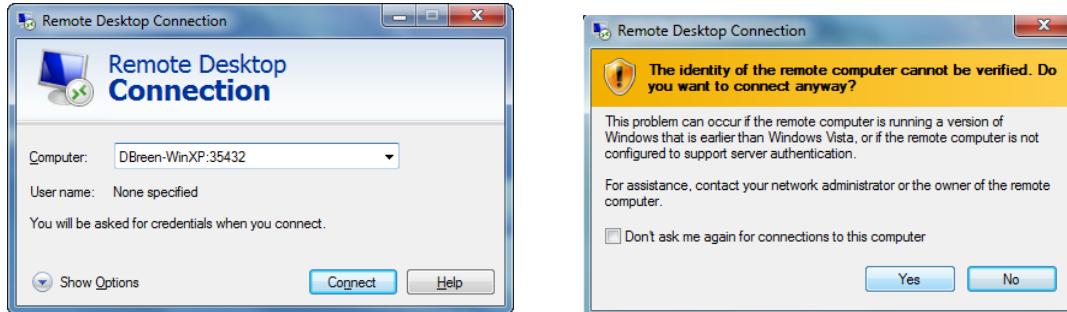
- Click on the **Exceptions** tab
- Click **Add Port**

Step 3

- Enter a name for the port (e.g. RDP on 35432)
- Enter the Port number
- Choose TCP- as that is the protocol RDP uses to authenticate a connection
- Click **OK**

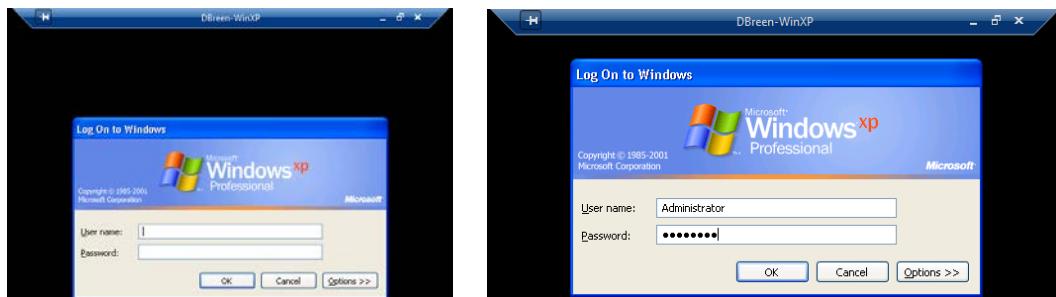
4.4 Connecting to the computer using RDP

Step 1



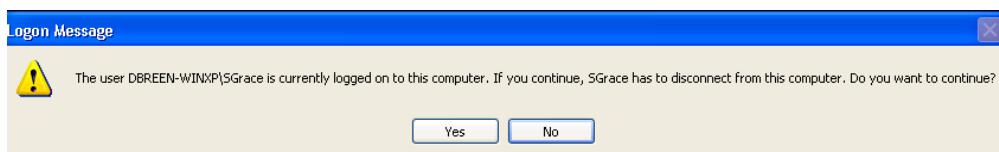
- From another computer on the network, open **Remote Desktop Connection**
- Enter the computer name on the network or the IP address followed by a : and the port number (e.g. DBreen-WinXP:35432 or 192.154.6.30:35432)
- The IP address can be found typing ipconfig into the command line.
- Click **Connect**

Step 2



- Enter the login details for an authorised user, i.e. an administrator
- Click **OK**

Step 3



- If someone else is logged in to the computer the above message will be displayed. Clicking **Yes** will log that user out.



- You should now be logged on to the computer remotely, and the desktop of the other computer should be displayed on your screen. (See screenshot above)

5 Connect The Windows machine and the Debian Machine using Static IP Addresses

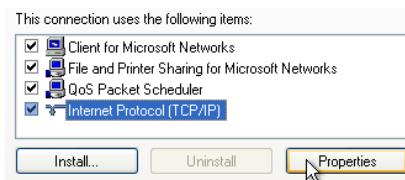
5.1 Set Windows XP Machine to assign IP Address Statically

Step 1



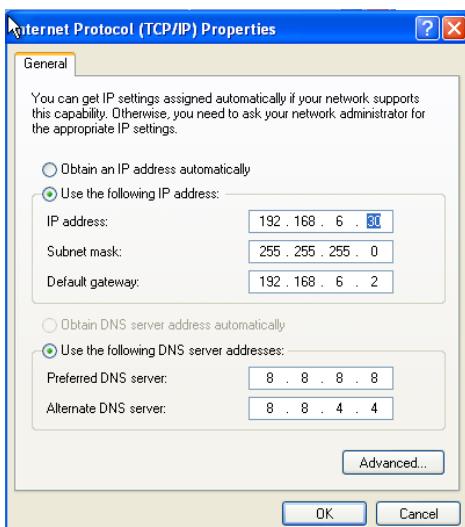
- Open Start>Control Panel>Network Connections.
- Right Click on the **Local Area Connection** and click **Properties**.

Step 2



- Highlight **Internet Protocol** and click **Properties**.

Step 3



- Choose **Use the following IP address:**
- Set the IP Address to the desired value, keep it on the same network as the default gateway.
- For a Class C network the default subnet mask is 255.255.255.0

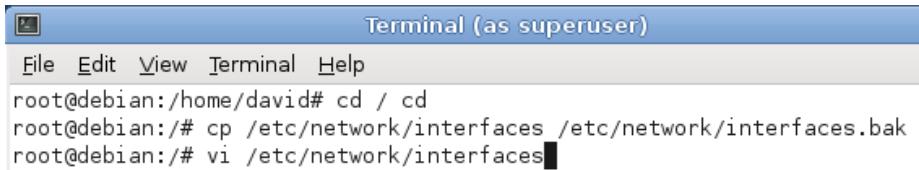
- Set the Default Gateway to the IP Address of the router. If you don't know this address you can find it using **ipconfig** in the command line before you make any changes.
- If you want to be able to access the internet you will need to find out the Preferred and Alternate DNS server of your Internet Service Provider. These can be found by contacting your ISP directly or looking up the settings of your router using its IP address and logging in.

Step 4

- Click **OK**
- Click **OK**
- You have now set the computer up with a static IP address

5.2 Set Debian Machine to assign IP Address Statically

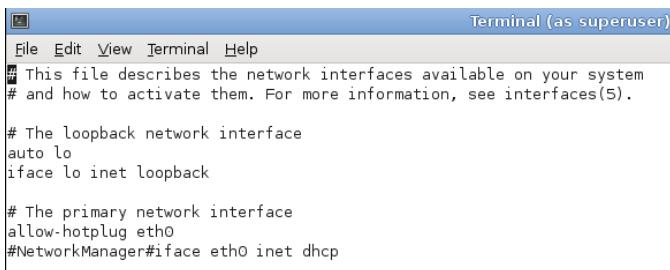
Step 1



```
Terminal (as superuser)
File Edit View Terminal Help
root@debian:/home/david# cd / cd
root@debian:# cp /etc/network/interfaces /etc/network/interfaces.bak
root@debian:# vi /etc/network/interfaces
```

- Open the **Root Terminal**
- Make a backup of the current file using the command **cp /etc/network/interfaces /etc/network/interfaces.bak**
- Enter **vi /etc/network/interfaces** to open the file for editing

Step 2



```
Terminal (as superuser)
File Edit View Terminal Help
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
allow-hotplug eth0
#NetworkManager#iface eth0 inet dhcp
```

- See at the bottom of the file: **iface eth0 inet dhcp**, which enables dynamic IP address assigning.
- Press **a** to edit the file. Edit the file as follows to assign the computer a static IP Address

```

Terminal (as superuser)
File Edit View Terminal Help
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0

iface eth0 inet static
    address 192.168.6.31
    gateway 192.168.6.2
    netmask 255.255.255.0
    network 192.168.2.0
    broadcast 192.168.6.255
    ...
    ...
    ...
    ...
    ...
    ...
:x

```

- Save the changes made by to the file by pressing **Esc** to exit insert mode, then enter **:x**, then press **Enter**.

Step 3

```

Terminal (as superuser)
File Edit View Terminal Help
root@debian:/home/david# cd /cd
root@debian:# /etc/init.d/networking restart
Running /etc/init.d/networking restart is deprecated by
gain some interfaces ... (warning).
Reconfiguring network interfaces...SIOCADDRT: No such j
Failed to bring up eth0.
done.
root@debian:#

```

- Enter **/etc.init.d/networking** restart to restart the network and allow the changes to take effect.

Step 4

```

root@debian:/# ifconfig
eth0      Link encap:Ethernet HWaddr 00:0c:29:2d:d1:87
          inet addr:192.168.6.31  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe2d:d187/64 Scope:Link
             UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
             RX packets:8507 errors:0 dropped:0 overruns:0 frame:0
             TX packets:5229 errors:0 dropped:0 overruns:0 carrier:0
             collisions:0 txqueuelen:1000
             RX bytes:12318261 (11.7 MiB)  TX bytes:307651 (300.4 KiB)

```

- Enter **ifconfig** to check the changes have been made. The IP address is written as **inet addr:** (see above screenshot)
- The computer is now statically assigned an IP address.

5.3 Demonstrate communications between the two machines

XP Machine IP address: 192.168.6.30
 Debian Machine IP address: 192.168.6.31

To demonstrate communications between the two machines we can use the **ping** command which sends packets to a specified IP address and reports if they have been received correctly or not.

Step 1

```

C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\SGrace>cd\
C:\>ping 192.168.6.31

Pinging 192.168.6.31 with 32 bytes of data:

Reply from 192.168.6.31: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.6.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

```

- Open the **Command Prompt** from the **Start Menu**
- Enter the command **ping** followed by the IP address you want to connect to
- In this example we enter **ping 192.168.6.31** which is the IP address of the debian machine.
- The computer will send out 4 packets to the IP address specified and wait for a response.
- See above screenshot for an example of a successful ping

Step 2

```

Terminal (as superuser)
File Edit View Terminal Help
root@debian:/home/david# ping 192.168.6.30 -c 4
PING 192.168.6.30 (192.168.6.30) 56(84) bytes of data.
64 bytes from 192.168.6.30: icmp_req=1 ttl=128 time=0.407 ms
64 bytes from 192.168.6.30: icmp_req=2 ttl=128 time=0.225 ms
64 bytes from 192.168.6.30: icmp_req=3 ttl=128 time=0.229 ms
64 bytes from 192.168.6.30: icmp_req=4 ttl=128 time=0.262 ms

--- 192.168.6.30 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3025ms
rtt min/avg/max/mdev = 0.225/0.280/0.407/0.077 ms
root@debian:/home/david#

```

- Open the **Root Terminal**
- Enter the command **ping** followed by the IP address followed by **-c 4**
- In this example we enter **ping 192.168.6.30** which is the IP address of the windows machine.
- The **-c 4** specifies how many packets to send out. If it is left out the computer will ping indefinitely.
- The computer will send out 4 packets to the IP address specified and wait for a response.
- See above screenshot for an example of a successful ping

5.4 Benefits and Requirements to implement TCP/IP using Dynamic Connectivity.

⁹(Microsoft's Technet, 2013) states:

"Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address and other related configuration information such as the subnet mask and default gateway. ... DHCP allows hosts to obtain required TCP/IP configuration information from a DHCP server."

In the above example we disabled DHCP and assigned the IP addresses statically. DHCP (Dynamic Host Control Protocol) is the protocol used to dynamically assign IP addresses. It requires the network to have a DHCP server. On a home network this would usually be contained within the router whereas on a larger enterprise level network they are often a separate device. The DHCP server

is assigned a specific pool of IP addresses. When a computer wants to join a network it finds the DHCP server and is assigned a temporary IP address for the duration of the session. When the computer disconnects, the IP address put back in the pool of available addresses and can be handed out again to another computer.

Benefits of DHCP

- Reduced Network Administration - instead of going to each computer and assigning IP addresses manually, let the DHCP server manage it. If a computer breaks down there is no need to find out the IP address and manually assign it to the replacement. DHCP makes the whole process a lot easier.
- Reduces human error - manually entering IP addresses very vulnerable to human error by entering the wrong number etc. IP conflicts will occur when two nodes have the same IP Address. DHCP avoids all this hassle.

6 Performance Improvement and Performance Checking

¹⁰ (Meyers, 2012) states:

"Windows uses a portion of the hard drive as an extension of system RAM, through what's called a RAM cache. A RAM cache is a block of cylinders on a hard drive set aside as what's calle a page file, swap file or virtual memory. When the PC starts running out of real RAM ... the system swaps programs from RAM to the page file"

6.1 Modifying the Swap File

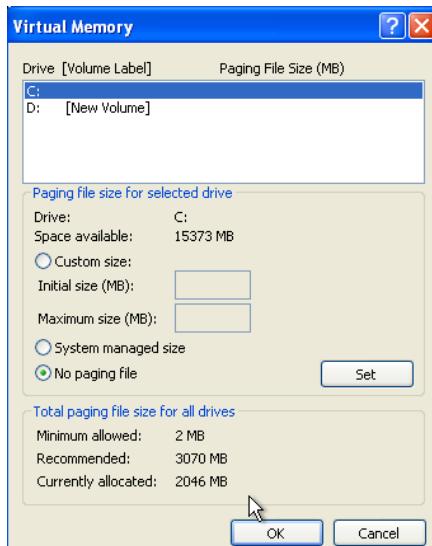
Step1

- Follow the path **Start>Control Panel>System**
- Click the **Advanced** tab
- Click **Performance**
- Click **Settings**
- Click the **Advanced** tab

Step 2

- In the **Virtual Memory** section, click **Change**

Step 3



- All the virtual memory settings can be changed from this screen (see above screenshot)
- Disable page files, change size or change location and click **Set** to change any attributes.

6.2 Verify Improved Performance using a Benchmarking Tool

Step 1

Windows

[NovaBench 3.0.4 \(12MB\)](#)
Released July 27, 2011

- **100% Freeware**
- Requires Windows XP or Higher
- Requires .NET Framework 2.0
- Requires DirectX 9.0c or Higher



- Go to <http://novabench.com>
- Download and install NovaBench
- You may need to install .net framework if it's not already on your machine. If so follow the instructions and install it.

Step 2

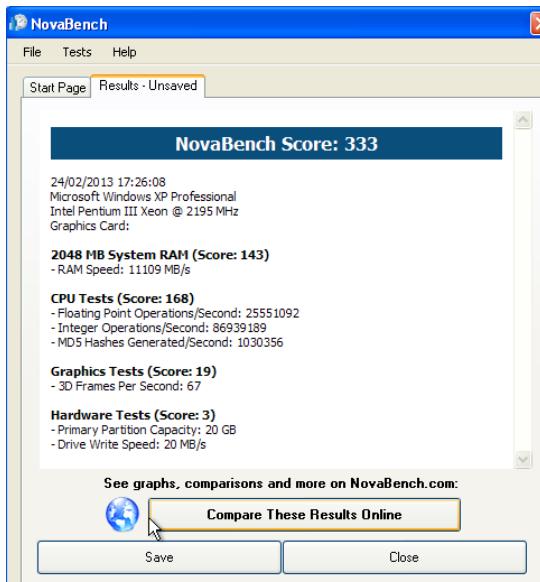
- Open Novabench by clicking **Start>All Programs>Novabench>Novabench**

Step 3

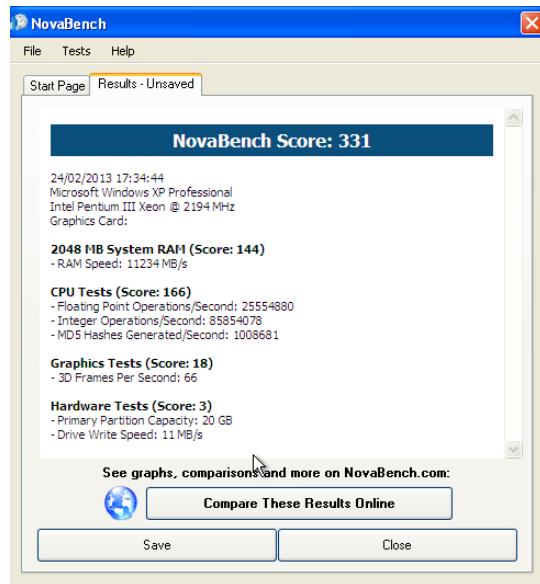
- Click **Start** to start the test
- The test will run and display the results on screen. (See screenshots below)

Step 4

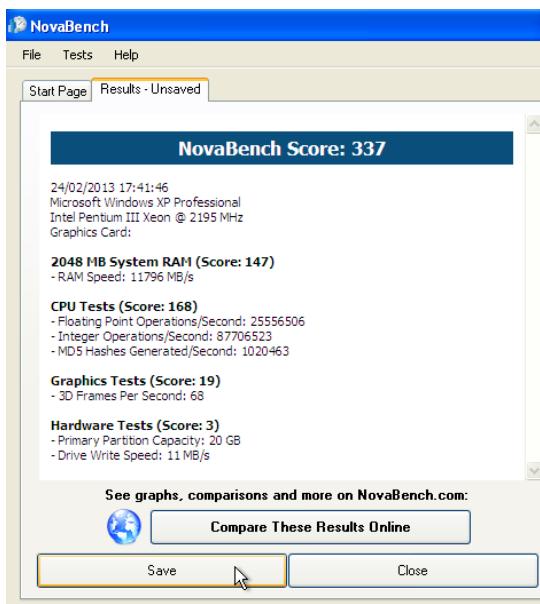
- Change the settings of the swap file and repeat the test
- Repeat this step numerous times and compare the results.



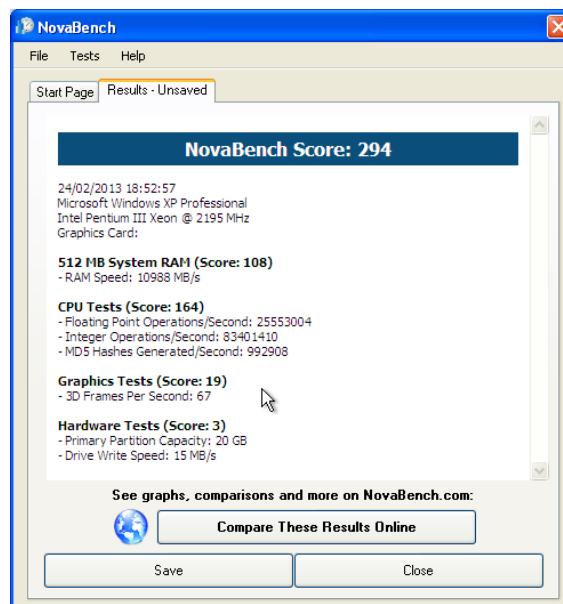
2GB RAM
Swap file on C:
System managed size



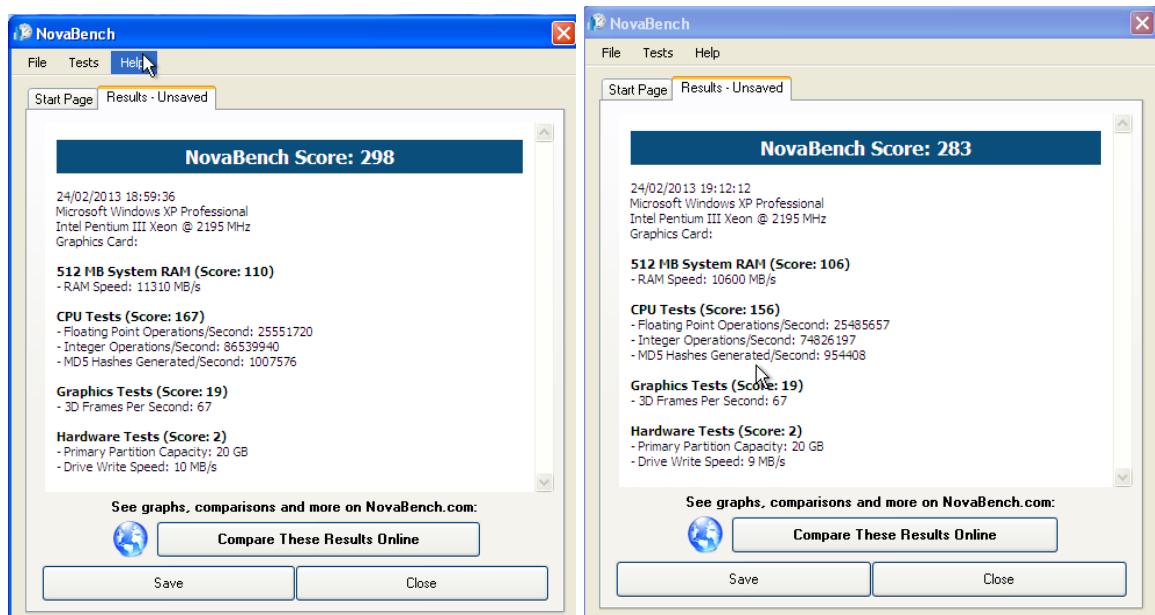
2GB RAM
No Swap file



2GB RAM
Swap file on D:/
System Managed Size

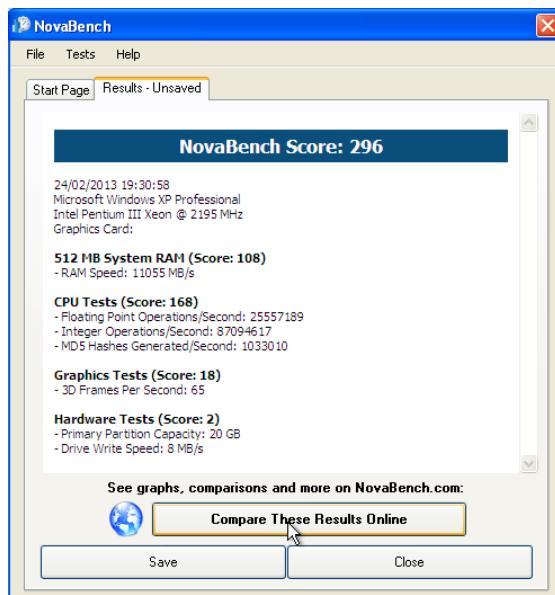


512 MB RAM
Swap file on D:/
System Managed Size



512 MB RAM
Swap file on C:/
System Managed Size

512 MB RAM
No Swap file



512 MB RAM
Swap file on D:/
Swap file size 3GB Maximum

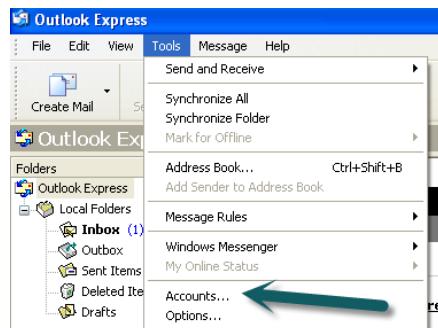
Results:

The results show a definite improvement of a swap file over no swap file. For 2GB RAM system the scores were 337 with swap file on D:\ against 331 with no swap file. This difference is even more pronounced when we reduced the amount of RAM on the system to 512MB - 298 with swap file and 283 without a swap file. In theory there should be an increase in performance when we change the swap file to another partition or increase the size of the swap file. These tests do not show a big increase for either of these factors.

7 Setting up Email Accounts

7.1 Set up a new Account

Step 1



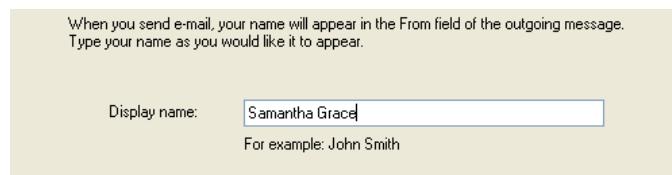
- Open Outlook Express by Clicking **Start>Outlook Express**
- Click **Accounts**

Step 2



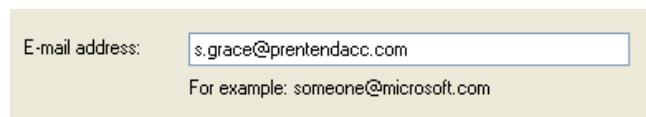
- Click **Add**
- Click **Mail**

Step 3



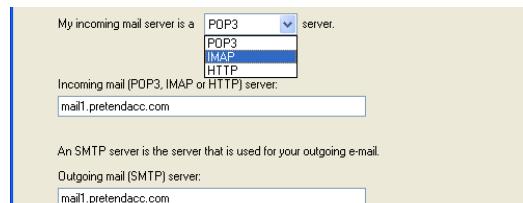
- Enter the account holder's name.
- Click **Next**

Step 4



- Enter the email address of the account holder.
- Click **Next**

Step 5



- Enter the server settings of the email server
- Click **Next**

Step 6

- Enter and account name and password for the account .
- Click **Next**.
- Click **Finish**
- The email account should now be set up and you can send and receive messages using Outlook Express.

8 Overview of System Restore

¹¹(Microsoft, 2013) states:

" System Restore helps you restore your computer's system files to an earlier point in time. It's a way to undo system changes to your computer without affecting your personal files, such as e-mail, documents, or photos."

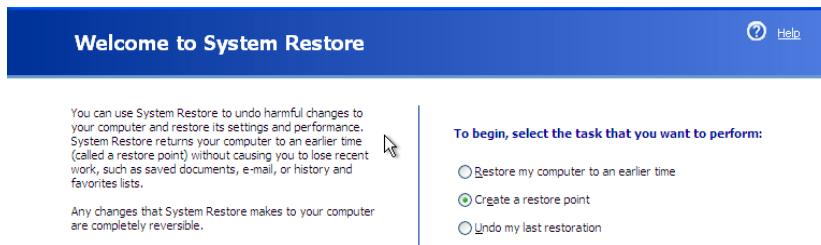
System restore is an invaluable tool that allows the user to create a restore point. This restore point takes a backup of all the important Windows settings. If there is a problem in the future, e.g. virus, corruption of some files, accidental changes to system files etc., the user restore the computer to that point in time, i.e. change the settings back to the state they were in at the restore point. Restoring the system does not effect any user files.

8.1 Create a Restore Point

Step 1

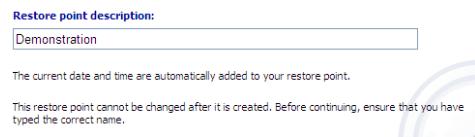
- Open the **System Restore** utility by following the path **Start>All Programs>Accessories>System Tools>System Restore**

Step 2



- Choose **Create a restore point** and click **Next**

Step 3



- Enter a description for the restore point
- Click **Create**
- The restore point is now created.

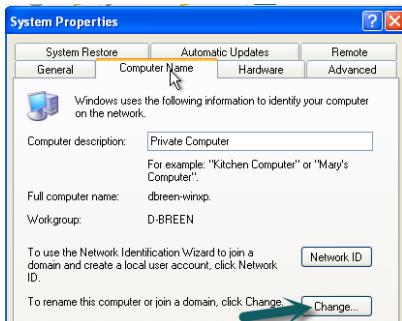
8.2 Change the Name of the Machine

Step 1

- Follow the path **Start>Control Panel>System**

- Click the **Computer Name** tab.

Step 2



- Click **Change**

Step 3

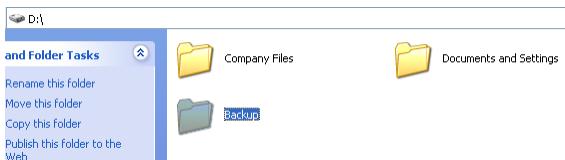


- Change the Computer name and click **OK**

Step 4

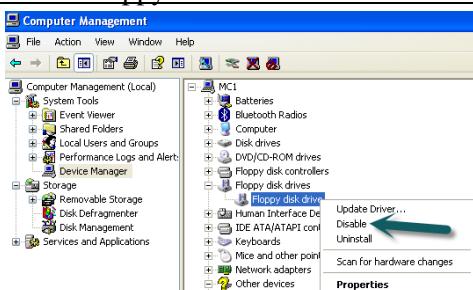
- You will be asked to restart the computer for the settings to take effect, click **Yes** to restart.

8.3 Create a New folder on the Data Partition called Backup

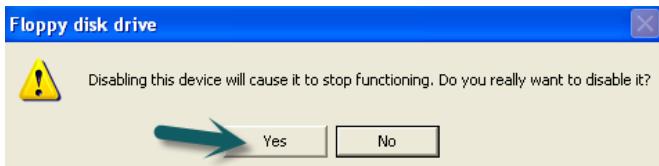


- Follow the path **Start>My Computer> D:**
- Right click within the within the window and click **New, then Folder**
- Rename the folder to **Backup**.

8.4 Disable the floppy diskette within the machine



- Right click on **My Computer** in the **Start Menu** and click **Manage**.
- Click on **Device Manager** on the right hand side of the screen.
- Expand the **Floppy disk drives**.
- Right click on the **Floppy disk drive** and click **Disable**.



- Click Yes
- The floppy disk drive is now disabled

8.5 Restore the Computer to the Restore Point

Step 1

To begin, select the task that you want to perform:

- [Restore my computer to an earlier time](#)
- [Create a restore point](#)
- [Undo my last restoration](#)

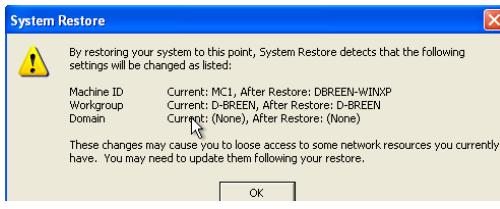
- Navigate to the **System Restore** utility as before.
- Choose **Restore my computer to an earlier time**
- Click **Next**

Step 2



- Highlight the restore point we created earlier, i.e. **Demonstration**
- Click **Next**

Step 3



- Click **OK** to continue with the system restore
- The computer will restart



Your computer has been successfully restored to:
24 February 2013
Demonstration

If this restoration does not correct the problem, you can:

- Choose another restore point
- Undo this restoration

- Click **OK** to accept the restore. (It's possible to undo the restore point or choose another restore point)

8.6 Results of the system restore

- The Computer name was changed back to the original name
- The Floppy Drive was re-enabled

- The Empty Folder we created was discarded. If there had been any file within the folder it would not have deleted the folder.

9 System Registry

¹² (Meyers, 2012) states:

"The Registry is a huge database that stores everything about your PC, including information on all of the hardware in the PC, network information, user preferences, file types, and virtually anything else you might run into in Windows"

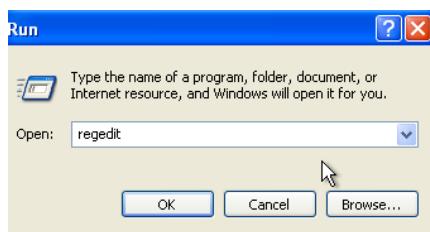
The registry is integral to the running of Windows. The settings stored within the Registry can be changed using regedit (see section 4.2 on changing the default port of Remote Desktop). The more common way of changing the registry is by using more user friendly interfaces like the Control Panel.

9.1 Create a Backup of the Registry

Step 1

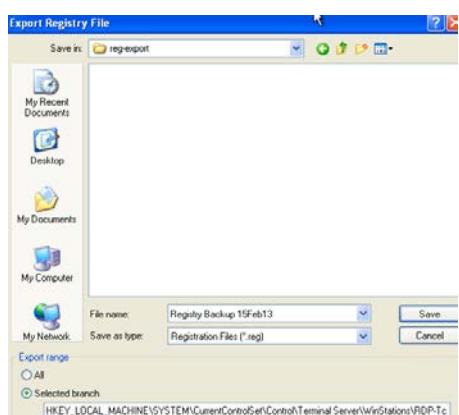
- Create a folder on the desktop called **reg-export** to hold the backup

Step 2



- Click **Start** then **Run**.
- Type **regedit** to run the registry editor.

Step 3



- Click **File** then **Export**.
- Navigate to the folder you created on the desktop in step 1.
- Give the file a meaningful name, e.g. the date.
- Click **Save**.
- You have now created a backup of the registry.

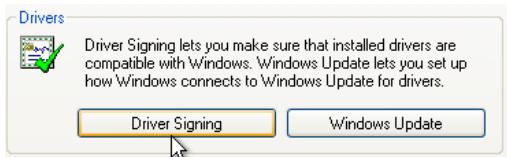
10 Driver compatibility

Unsigned drivers are drivers that have, for one reason or another, not been certified by Microsoft.
¹³(Microsoft, 2013) states a common reason:

"A common problem is power management features, and Microsoft requires power management support to certify drivers."

10.1 Prevent unsigned drivers being installed

Step1

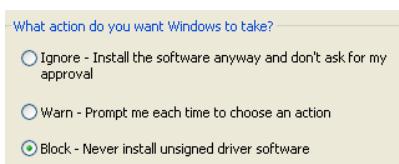


- Follow the path **Start>Control Panel>System**.
- Click the **Hardware** tab.

Step 2

- Click **Driver Signing**

Step 3



- Choose **Block-Never install unsigned driver software**
- Click **OK**
- Unsigned Drivers are now blocked from the system.

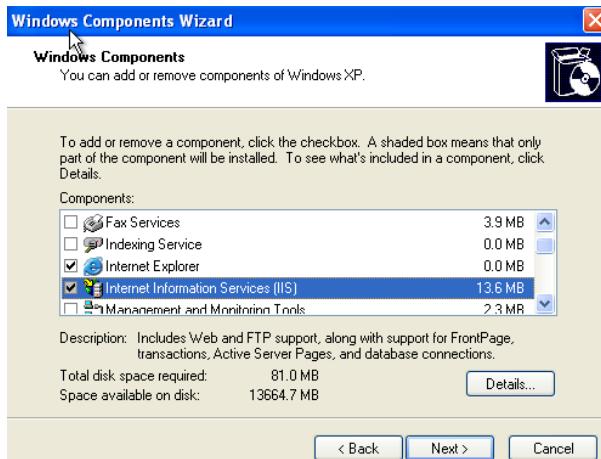
Section B

1 Creating the Linux Debian environment using VM Workstation

The following is a step by step guide to setting up a Linux Debian operating system on VM Workstation 9.0

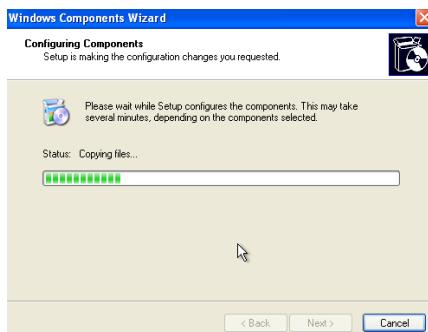
1.1 Install Microsoft's Web Server on the XP Machine

Step 1



- Follow the path **Start>Control Panel>Add or Remove Programs**
- Click **Add/Remove Windows Components**
- Tick the **Internet Information Services (IIS)** box and click **Next**

Step 2



- When prompted insert the Windows XP installation disk (For Virtual Machines mount the ISO file you used to set up the machine)
- IIS will automatically start installing.

Step 3



- When finished the installation click **Finish**

Step 4



Microsoft Internet Information Services

Getting Started

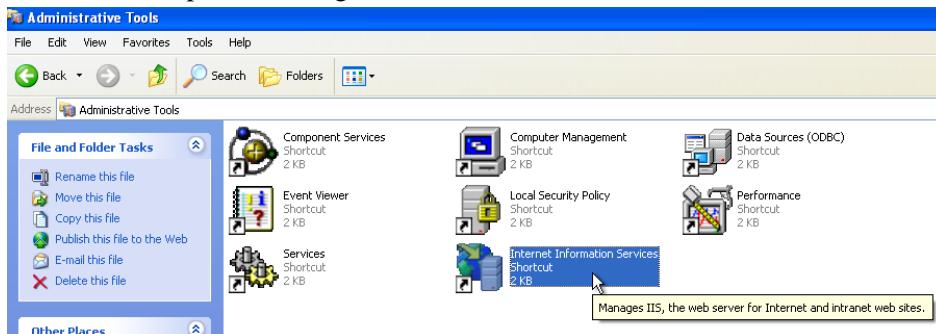
Internet Information Services 5.1 (IIS) is the Windows XP Web service that makes it easy to publish information on your intranet.

You can click the **Synchronize** button on the **Contents** tab to align the content and navigation panes of the documentation. Use the **Search** tab to locate a topic and you want to see, click the topic link, click the **Contents** tab, and click the **Synchronize** button. The table of contents displays where that topic is located.

- Release Notes:** Includes the latest information for ensuring proper installation and use of Internet Information Services.
- Installing IIS:** Describes how to install IIS, add or remove components, and lists directories remaining after uninstall.
- Features:** Lists the newly-introduced features in Internet Information Services 5.1 and highlights the ones from prior releases.
- What's Changed:** Lists important changes between versions 4.0, 5.0, and 5.1 of IIS.
- Web Resources:** Lists IIS-related resources available on the Internet.
- Quick Site Setup with IIS:** Explains how to use the default settings to create a Web and FTP site.
- Using the Documentation:** Highlights the tools in this documentation that will help you find the information you need.
- The IIS snap-in:** Explains the primary dialog box where you will administer and set options for IIS.
- Frequently Asked Questions:** Answers common questions about Internet Information Services.
- Glossary:** Defines common Internet and intranet terms.

- To check the web server has been installed and is running open a web browser
- Go to the address 127.0.0.1
- Enter an administrator's username and password when prompted.

- You will be redirected to two local websites (see screenshot above). This indicates that the Web server is up and running.



- The ISS console can be found in **Administrative Tools** in the Control Panel.

1.2 Windows v Linux as a Hosting Platform

If a company wants to implement a web-server in-house to share company documents on an intranet there have a choice between a Windows based web server and a Linux based server. The web server is the machine that will look after the server side processes involved in running an intranet. Both use versions of MySQL for database storage. The main consideration when making this decision is what type of web pages will be stored on the web-server and what scripting languages will be used.

¹⁴(brainhost.com, 2013) states:

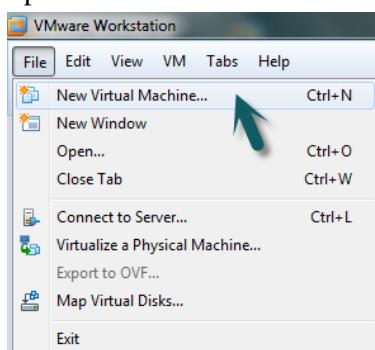
"The real difference between the two systems lies in the scripting languages that Windows and Linux use in webpage production. PHP scripting is more often found on Linux systems, while ASP scripting is more often found on Windows. While CGI and Perl access are often found on both Windows and Linux servers, it is more typically found on Linux. Bottom line; you should choose a Linux Hosting account if you're going to use PHP, Ruby, Perl, Python, or CGI scripting. Or, choose a Windows Hosting account if you're going to use ASP, ASP.NET, or ASP.NET 2.0."

1.3 Creating the Virtual Machine

NB: This step can be disregarded if you are installing the operating system onto a physical machine. Just insert the installation media, i.e. CD or USB Drive and power on the machine and skip to step 1.2.

Step 1:

Open VM Workstation



- Click **File**

- Click **New Virtual Machine**

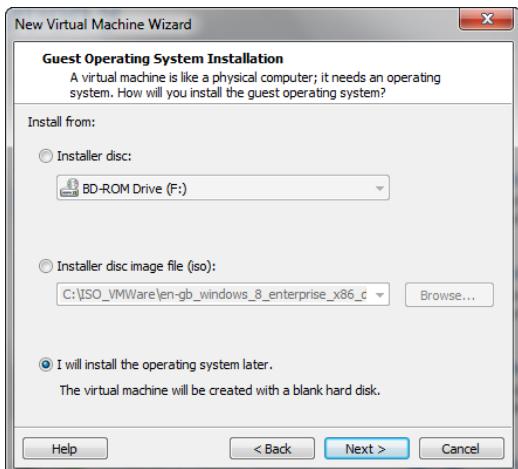
Step 2:



- Chose **Typical** configuration and click **Next**.

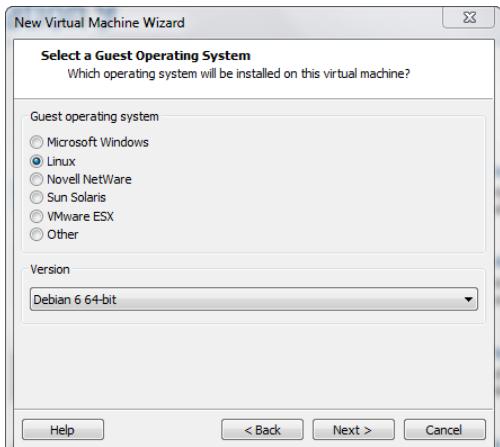
The custom configuration is used for more advanced options or when you need to create a machine compatible with older VM Workstation versions, e.g. Workstation 8.

Step 3



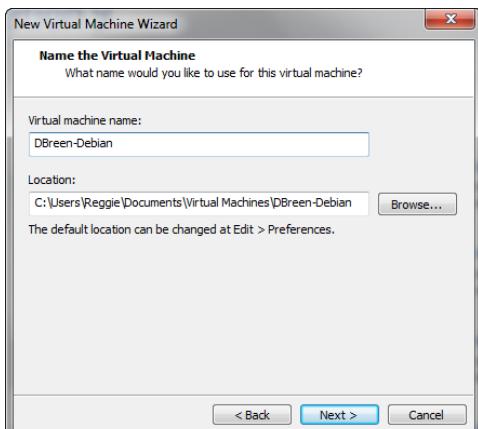
- Chose **I will install the operating system later.**
- Click **Next**

Step 4



- Choose **Linux** and Version **Debian 6 64-bit**

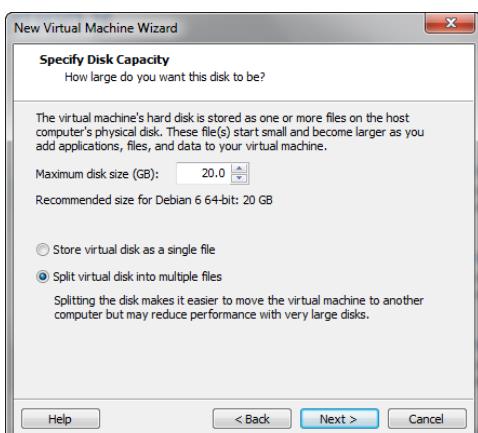
Step 5



- Enter the machine name
- Browse to the location where you want to save the virtual machine

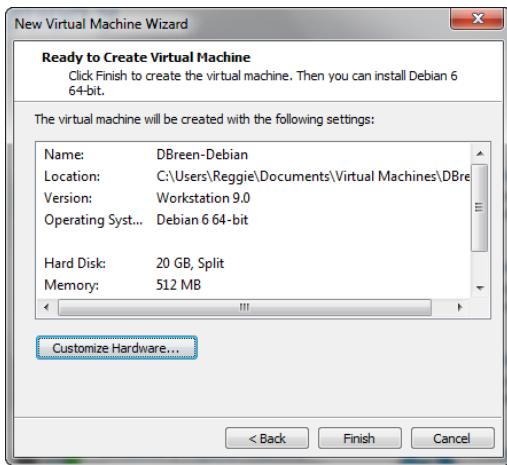
Give the machine a meaningful name and store it somewhere you will remember. Default is a Virtual Machines folder in the Documents folder.

Step 6



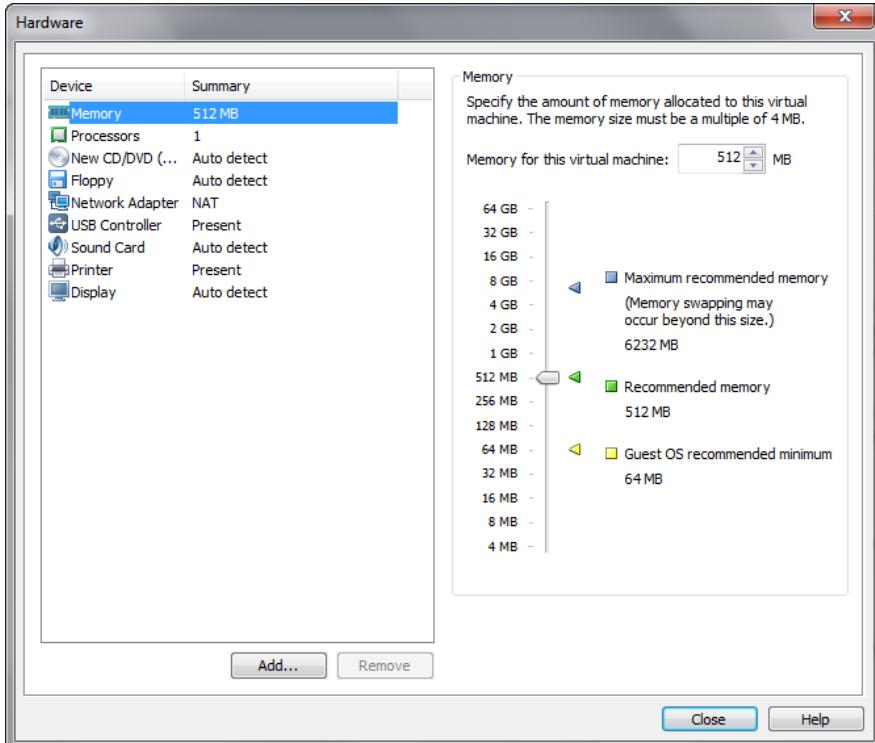
- Chose the size of the hard drive.
- Chose **Split virtual disk into multiple files**.
- Choice between thick and thin provisioning. Multiple = Thin. Single = Thick

Step7



- Click Customize Hardware

Step 8

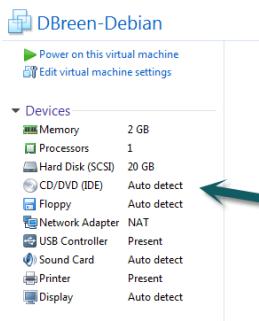


- To increase RAM click on the **Memory**
- Slide the pointer up to 2GB

Depending on your machine's capabilities, you have the option to increase the RAM of the Machine. My computer has 8GB RAM so it can easily run this virtual machine with 2GB Ram assigned to it while it is running.

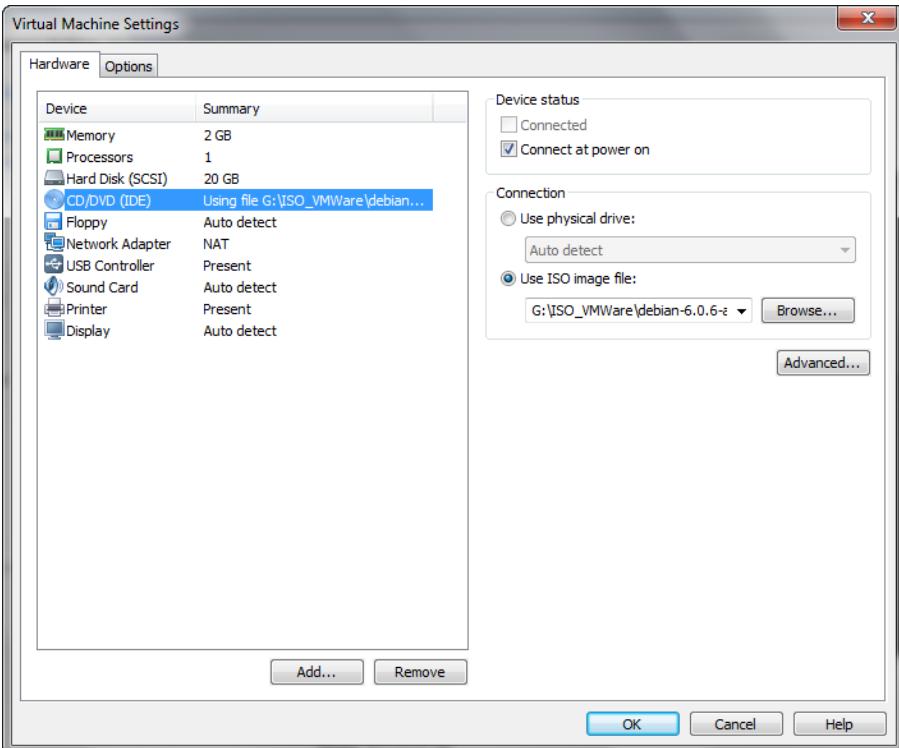
Minimum and Maximum recommended RAM are shown on the right, min 64MB and Max 6232MB.

Step 9



- Click on the **CD/DVD** tab.

Step 10



- Click on the **CD/DVD** tab.
- Choose **Use ISO image file**
- Ensure **Connect at power on** is ticked
- Browse to the location you have downloaded the ISO file for Debian
- Click **OK**

This step mounts the installation disk image file to the CD/DVD drive on the virtual machine and it will run the disk when the machine is powered on and boot from the CD/DVD drive.

Step 11

- Click **Power on this virtual machine**

1.4 Setting up the Debian Operating System

Step 1



Step 2

- Select a **language**
- Click **Continue**

Step 3

- Select your **location**
- Click **Continue**.

Step 4

- Select the Keymap to use (suggestion for Ireland: British English)
- Click **Continue**.

Step 5

- Enter a **Hostname** for your system
- Click **Continue**

The hostname is a single word that identifies your system to the network. If you don't know what your hostname should be, consult your network administrator, if you are setting up your own home network, you can make something up.

Step 6

- Enter a **domain name** for your system.
- Click **Continue**

The domain name is the part of your internet address to the right of your host name. It is often something ending in .com or similar. If you are setting up a home network, you can make something up, but you must use the same on all your computers.

Step 7

- Set a password for **Root**
- Re-enter the password to verify
- Click **Continue**.

The root is the administrative account on the system.

Step 8

- You will be asked to create an account to use for non-administrative activities.
- Enter a name to use for the account. (e.g. Your full name)
- Click **Continue**

Step 9

- Enter a username for the new account
- Click **Continue**

Step 10

- Enter the **password** of the new account
- Re-enter it to verify
- Click **Continue**.

Step 11

Partition disks

The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.

If you choose guided partitioning for an entire disk, you will next be asked which disk should be used.

Partitioning method:

Guided - use entire disk
Guided - use entire disk and set up LVM
Guided - use entire disk and set up encrypted LVM
Manual

- Select **Guided – use entire disk**
- Click **Continue**

Step 12

Partition disks

Note that all data on the disk you select will be erased, but not before you have confirmed that you really want to make the changes.

Select disk to partition:

SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S

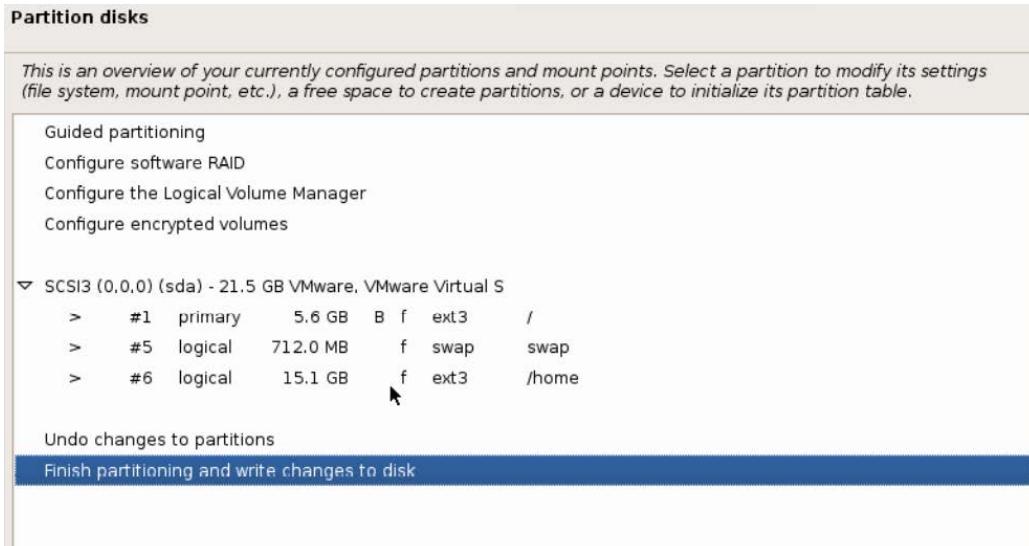
- Select the drive you wish to partition.
- Click **Continue**.

Step 13

- Select **Separate /home partition**
- Click **Continue**

This option will partition the drive into 3 partitions (see next step)

Step 14



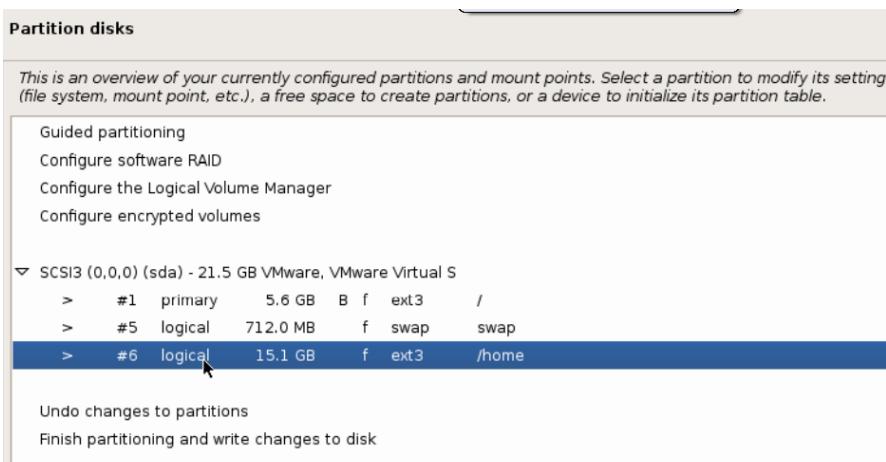
- The disk is now split into three partitions, The primary partition is where the system boots from and holds the operating system. There other two partitions are logical drives, one for the swap files/virtual memory, and the other for all the other files and applications on the system.

NB Beginner users should click **Finish partitioning and write changes to disk** and skip to **step 35**

Step 15

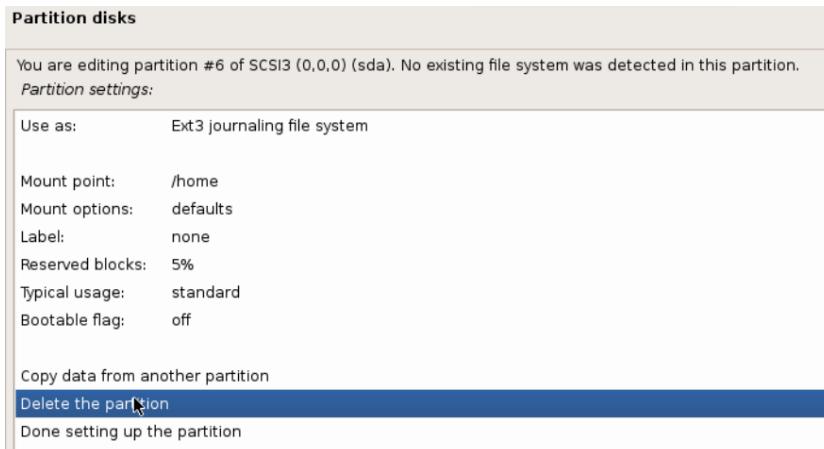
- For more advanced users we can improve efficiency by increasing the size of the partition to 1.25 times the size of the RAM on the system. i.e. for 2GB RAM, increase the swap files to 2.5GB.
- Double Click **Guided Partitioning**

Step 16



- To alter the two logical drives we must first delete them
- Double click on one of the **logical** partitions

Step 17

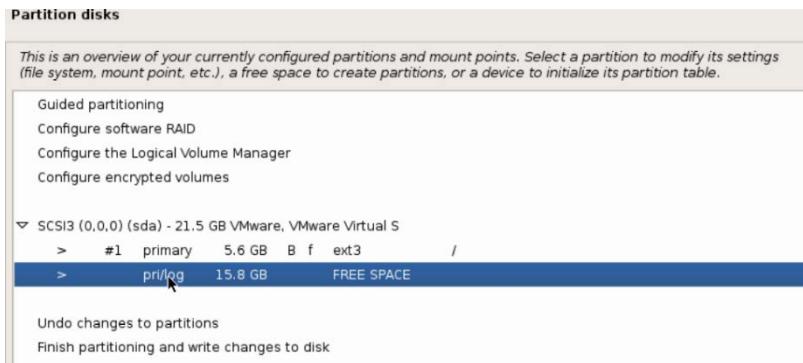


- Double click on **Delete the partition**

Step 18

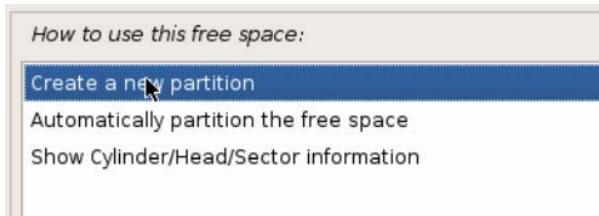
- Delete the remaining logical partition by repeating step 25 and 26

Step 19



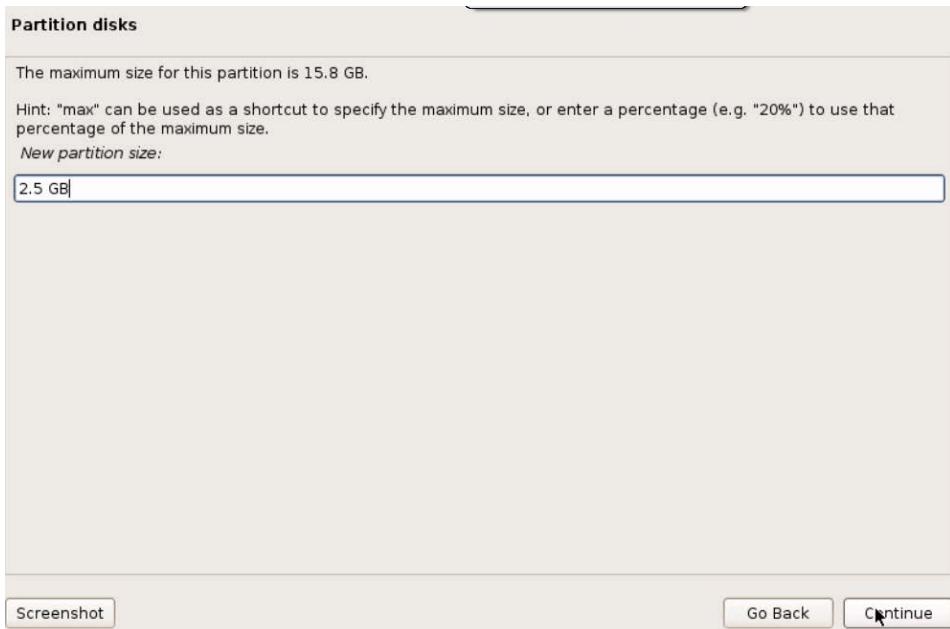
- Now we will set back up the partitions with the required space
- Double click on the **Free Space**

Step 20



- Click on **Create a new partition**

Step 21



- First we will set up the drive for our swap files. We have already calculated that we need 2.5 GB for a 2 GB RAM machine.
- Enter 2.5GB in the **New partition size** box.
- Click **Continue**

Step 22

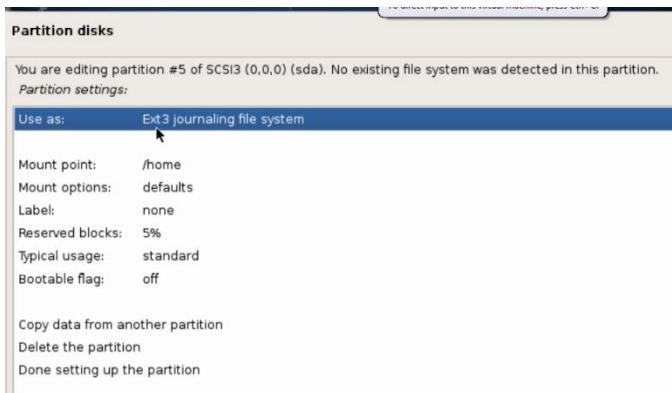


- Double click **Logical** for Type of new partition

Step 23

- Double click **Beginning** to create the partition at the beginning of the available space

Step 24



- Double click on **Use as:**

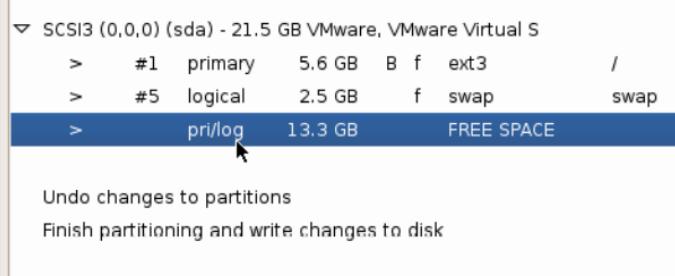
Step 25

- Double click on **swap area**

Step 26

- Double click on **Done setting up the partition**

Step 27

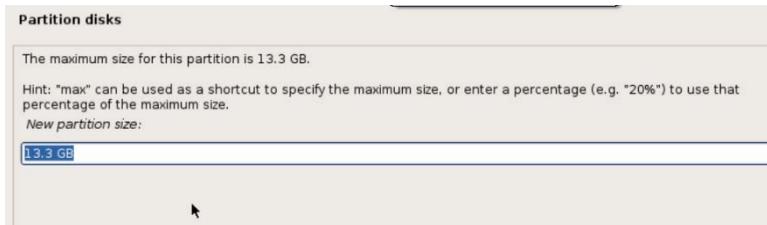


- Now we will create the partition which holds all the rest of the files/applications on the computer.
- Like before, double click on **FREE SPACE**

Step 28

- Double Click on **Create a new partition**

Step 29



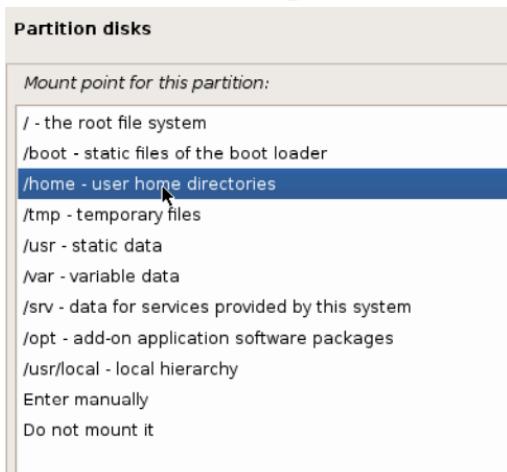
- By default the maximum size for the new partition will be entered in the box.
- Click **Continue**

Step 30

- Double Click on **Logical**

Step 31

- Double click on **Mount point:**

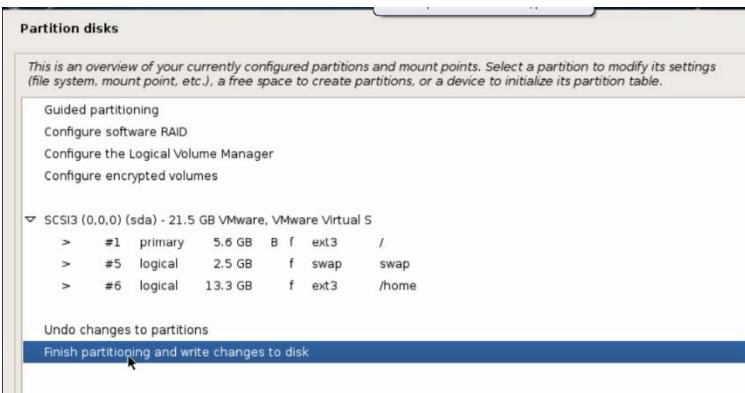


- Double click on **/home - user home directories**

Step 32

- Double click on **Done setting up the partition**

Step 33



- Double click on **Finish partitioning and write changes to disk**

Step 34

- Select **Yes** when asked to **Write the changes to disks**
- Click **Continue**.

Step 35



- Select **No** when asked to **Scan another CD or DVD**
- Click **Continue**

Step 36

- Select **Yes** to using a network mirror
- Click **Continue**

A network mirror can be used to supplement the software that is included on the CD-ROM. This may also make newer versions of software available.

Step 37

- Select the Debian archive mirror from the closest country to you
- Click **Continue**

You should use a mirror in your country or region if you do not know which mirror has the best Internet connection to you

Step 38

- Select one of the mirrors from the list. Usually `ftp.<your country code>.debian.org` is a good choice

Step 39

- If you need to use a **HTTP proxy** to access the outside world, enter the proxy information here. Otherwise, leave **HTTP proxy information** field **blank**.
- Click **Continue**

Step 40

- If you wish to participate in a **package usage survey**, select **Yes** radio button, otherwise click **No**
- Press **Continue**

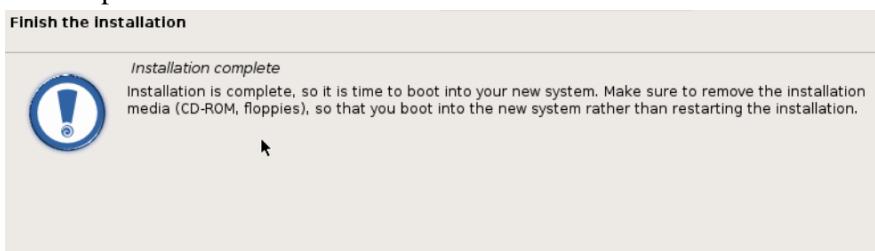
Step 41

- Choose the type of services you will need on the system, e.g. web server.
- You can choose as many or as little as you want, the extra software to be installed on the system depends on your choices.

Step 42

- Select **Yes**
- Click **Continue**
- This will complete the installation, and Debian Linux will boot.

Installation Complete



1.5 Installation of Apache Server

note on apache server

Step 1

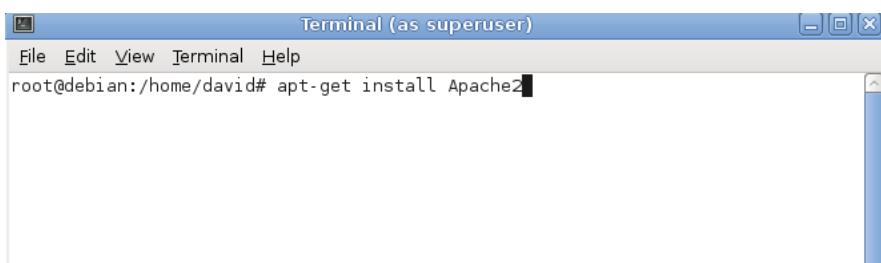


- Open the **Root Terminal** by clicking **Applications > Accessories > Root Terminal**

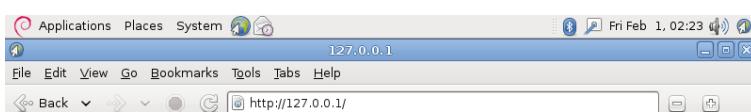
Step 2

- Enter the **administrative password**
- Click **Ok**

Step 3



- Enter **apt-get install Apache2**
- Press **Enter**



- To check Apache Web Server is installed open the web browser

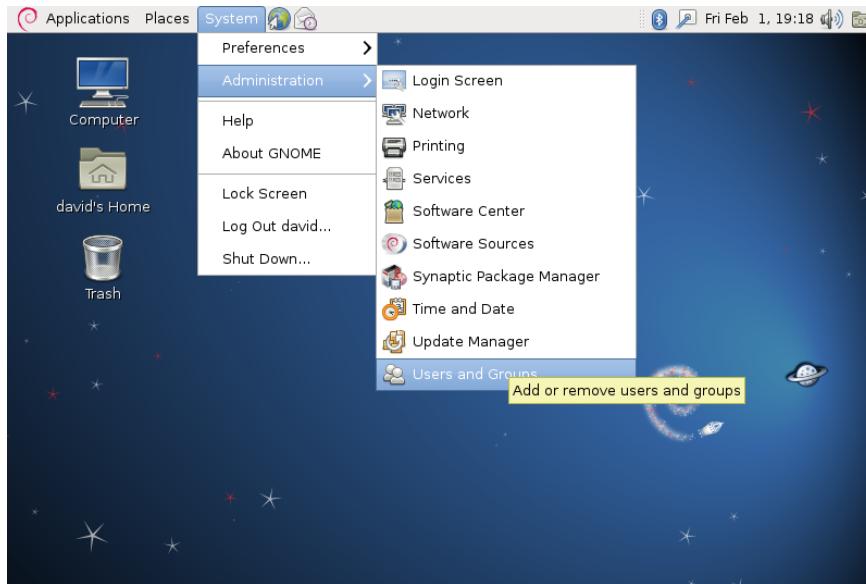
- Enter the loopback address **127.0.0.1** into the address bar.
- If it is installed correctly the above screen will be displayed.

2 Creating Users, Groups and Permissions

2.1 Creating Users and Groups

Note on creating users and account structures in debian

Step 1



- Click **System > Administration > Users and Groups** (see above screenshot)
- This will bring you to the **User Settings** screen

Step 2



- To add a new user click **Add**
- Then Enter the **Password for root** as Authentication as the super user is required to perform this action.

Step 3



- Enter the new user's name and a short name and Click **OK**

Step 4



- Set the users password and click **OK**

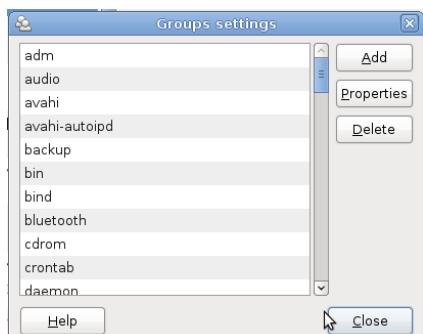
Step 5

- Repeat steps 2-4 for additional users

Step 6

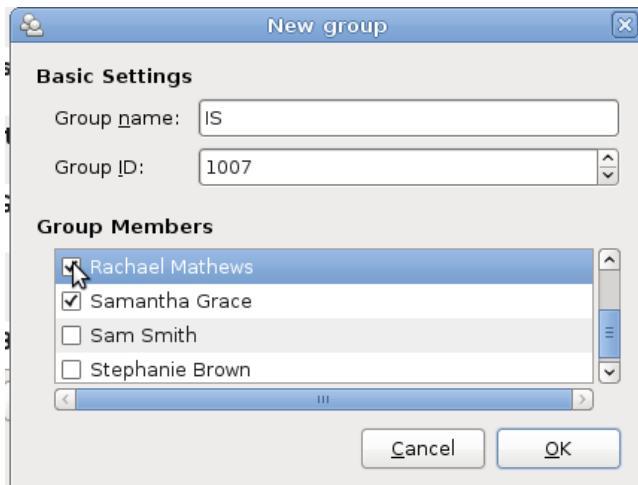
- To add groups, click **Manage Groups** on the User Settings screen (see screen on step 2)

Step 7



- click **Add** to add a new group

Step 8



- Enter a **Group Name**
- Enter a **Group ID** or leave it as the automatically generated number
- Click the box beside the name of the group members to add them to the group
- Click **OK**
- You may need to enter the root password again, if so enter the password and click **Authenticate**

Step 9

- You have now set up a group
- Repeat steps 6-8 to set up additional groups

2.2 Setting Permissions for Users Home Directories



Step 1

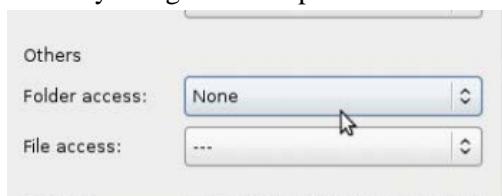
- Each user already has a home directory, easily accessible from the front screen (see above home directory of fbrennan)

- The home directory of each user is also accessible from the command line at /home/username (e.g. /home/fbrennan)

Step 2



- These home directories are owned by the user permissions can be set easily by each user according to their own preferences.
- The user can **right click** on any folder they are the **owner** of and select **properties**
- Click Permissions tab**
- Set the permissions accordingly to groups or to all other users, see below where now access is given to other users. Permissions can be changed for all the folders with in the users home directory using the same process.

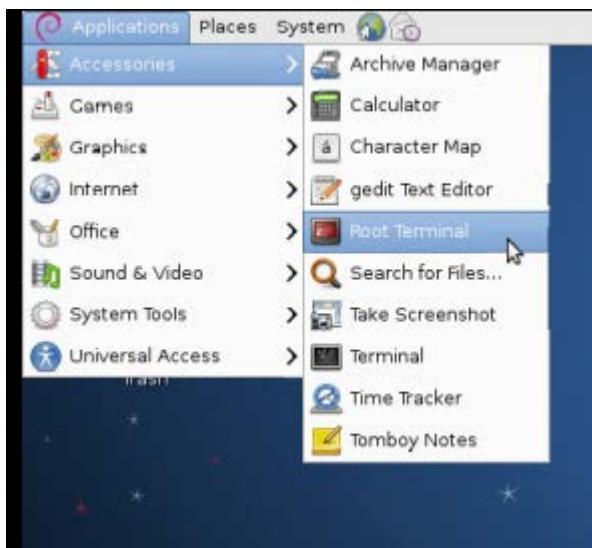


- Click Apply Permissions to Enclosed Files**

2.3 Setting up new Directories and Sub-directories

Step 1

- The above steps show how the individual user can change their own permissions of their personal files, this may not be suitable for the business environment.
- Now we will show how to set up the directory system and permissions for a enterprise environment with different directories for each department and set the permissions accordingly.



- Open the **Root Terminal** and enter the root password

Step 2

```

root@debian:/home/david# cd /
root@debian:# pwd
/
root@debian:# ls
bin etc lib lost+found opt sbin sys var
boot home lib32 media proc selinux tmp vmlinuz
dev initrd.img lib64 mnt root srv usr
root@debian:# mkdir company
root@debian:# ls
bin dev initrd.img lib64 mnt root srv usr
boot etc lib lost+found opt sbin sys var
company home lib32 media proc selinux tmp vmlinuz
root@debian:# cd company
root@debian:/company#
root@debian:/company# mkdir IS
root@debian:/company# mkdir Finance
root@debian:/company# mkdir HR
root@debian:/company# ls
Finance HR IS
root@debian:/company# █

```

- Enter **cd / cd** to go to the root directory
- Enter **mkdir company** to make the main directory for the company
- Enter **cd company** to change the current directory to /company
- Create a directory in /company for each department (3 departments in this example HR IS and Finance. See screenshot above.)

Step 3

```

root@debian:/company# cd Finance
root@debian:/company/Finance# dir
pdaniels ssmith
root@debian:/company/Finance# mkdir common
root@debian:/company/Finance# ls
common pdaniels ssmith
root@debian:/company/Finance# cd ..
root@debian:/company# cd IS
root@debian:/company/IS# mkdir sgrace
root@debian:/company/IS# mkdir rmathews
root@debian:/company/IS# mkdir common
root@debian:/company/IS# cd..
bash: cd..: command not found
root@debian:/company/IS# cd ..
root@debian:/company# cd HR
root@debian:/company/HR# mkdir sbrown
root@debian:/company/HR# mkdir fbrennan
root@debian:/company/HR# mkdir common
root@debian:/company/HR# ls
common fbrennan sbrown
root@debian:/company/HR# cd ..
root@debian:/company# dir
Finance HR IS
root@debian:/company# █

```

- Now we will make sub directories inside the department folders. In case we will make two user directories and a common directory for each department.
- Enter **cd Finance** to change to the Finance directory
- Using **mkdir username** make the three directories.. see screenshot above.
- When finished making directories for the department enter **cd ..** to back out one level (in this case to /company again)
- Repeat the process for all the departments

2.4 Changing Ownership of the Directories

Before setting the permissions we must first change the ownership of the directories and subdirectories.

More detailed information can be found ¹⁵ at www.linuxtopia.org.

*Both **chown** and **chgrp** can be used to change ownership recursively, using the **-R** option. In that case, all underlying files and subdirectories of a given directory will belong to the given user and/or group.*

```

root@debian:/home/david# cd ..
root@debian:/home# cd ..
root@debian:# cd company
root@debian:/company# ls
Finance HR IS
root@debian:/company# chgrp -R finance Finance
root@debian:/company# chgrp -R hr HR
root@debian:/company# chgrp -R is IS
root@debian:/company# cd Finance
root@debian:/company/Finance# ls
common pdaniels ssmith
root@debian:/company/Finance# chown -R pauld pdaniels
root@debian:/company/Finance# chown -R sams ssmith
root@debian:/company/Finance# cd..
bash: cd..: command not found
root@debian:/company/Finance# cd ..
root@debian:/company# cd HR
root@debian:/company/HR# ls
common fbrennan sbrown
root@debian:/company/HR# chown -R fbrennan fbrennan
root@debian:/company/HR# chown -R stephanieb sbrown
root@debian:/company/HR# cd ..
root@debian:/company# cd IS
root@debian:/company/IS# ls
common rmathews sgrace
root@debian:/company/IS# chown -R rachelm rmathews
chown: invalid user: `rachelm'
root@debian:/company/IS# chown -R rachaelm rmathews
root@debian:/company/IS# chown -R samanthg sgrace
chown: invalid user: `samanthg'
root@debian:/company/IS# chown -R samanthag sgrace
root@debian:/company/IS# █

```

Step 1

- From the /company directory enter **chgrp -R finance Finance**
- This command changes the group ownership of the directory "Finance" and all its subdirectories to the group "finance"
- Adding the **-R** to the command makes the operation recursive, i.e. changes the group ownership of all the directories and folders below it too.
- Repeat the process for all the departments. In the screenshot above, the operation is performed on the HR and IS departments too.

Step 2

- Now we must change the individual ownership of the individuals directories within the sub-directories.
- This is done using the **chown** (change ownership) command again we put in the **-R** to make the command recursive
- First change directory to one of the department directories, e.g. **cd IS**
- Enter **ls** to list the files and directories within.
- Enter **Chown -R rachaelm rmathews**
- This command changes ownership of the **directory rmathews** to the **user rachelm**
- Each user's directory must be changed in the same way. (See above screenshot)

2.5 Changing Permissions of the Directories

According to ¹⁶ (wiki.debian.org, 2013)

" Chmod is one of sysadmin's best friends and the standard tool for manipulating file permissions"

This method of changing permissions for files and directories involves using the **chmod** command. According to ¹⁷ (rohan.sdsu.edu, 2013):

"In addition to being owned by one user and one group, every file and directory also has a mode, which determines who's allowed to read, write, and execute the file."

The chmod command changes the mode of the file or directory, specifically it changes the read, write and execute permissions for

- (a) The owner user
- (b) The owner group
- (c) Everybody else

e.g. **chmod 0774 file1** changes the permissions of the **file1** to 770. The first 7 represents the sum of permissions for the owner, the second 7 represents the permissions for the owner group and the third 4 represents the permissions for everyone else. The 3 permissions, read, write and execute have a unique numerical value shown below.

the read = 4

the write = 2

and the execute = 1

Therefore chmod 0775 means

Owner permission = $7 = 4+2+1 = \text{read, write and execute.}$

Group permission = $7 = 4+2+1 = \text{read, write and execute..}$

Everyone permission = 5 = read only.

```
root@debian:/home/david# cd /
root@debian:# cd company
root@debian:/company# ls
Finance HR IS nano.save
root@debian:/company# ls -l
total 16
drwxrwxr-x 5 root finance 4096 Feb 20 08:51 Finance
drwxr-xr-x 5 root hr 4096 Feb 20 08:53 HR
drwxr-xr-x 5 root is 4096 Feb 20 09:43 IS
-rw----- 1 root root 1 Feb 20 09:45 nano.save
root@debian:/company# chmod 0770 Finance
root@debian:/company# ls -l
total 16
drwxrwx--- 5 root finance 4096 Feb 20 08:51 Finance
drwxr-xr-x 5 root hr 4096 Feb 20 08:53 HR
drwxr-xr-x 5 root is 4096 Feb 20 09:43 IS
-rw----- 1 root root 1 Feb 20 09:45 nano.save
root@debian:/company# chmod 0770 HR
root@debian:/company# chmod 0770 IS
root@debian:/company# ls -l
total 16
drwxrwx--- 5 root finance 4096 Feb 20 08:51 Finance
drwxrwx--- 5 root hr 4096 Feb 20 08:53 HR
drwxrwx--- 5 root is 4096 Feb 20 09:43 IS
```

Step 1

- Open the root terminal like before
- Navigate to the company directory like before
- Enter **ls -l** to list the contents of the directory along with the permissions
- e.g. finance permissions rwxrwxr-x means owner has full permission, group has full and everyone else has read and execute permission.
- We want to change permission for these department folders to have full permission for members of the department and none for anyone else. i.e. 0770
- Enter **chmod 0770 Finance** to achieve these permissions

- Repeat for the other departments and check its done correctly by entering **ls -l** on the command line when finished.

Step 2

```
root@debian:/company# cd Finance
root@debian:/company/Finance# ls -l
total 12
drwxrwxr-- 2 root  finance 4096 Feb 20 08:51 common
drwxr-xr-- 2 pauld finance 4096 Feb 20 08:49 pdaniels
drwxrwxr-- 2 sams  finance 4096 Feb 20 08:49 ssmith
root@debian:/company/Finance# chmod 0774 common
root@debian:/company/Finance# chmod 0740 pdaniels
root@debian:/company/Finance# chmod 0740 ssmith
root@debian:/company/Finance# ls -l
total 12
drwxrwxr-- 2 root  finance 4096 Feb 20 08:51 common
drwxr---- 2 pauld finance 4096 Feb 20 08:49 pdaniels
drwxr---- 2 sams  finance 4096 Feb 20 08:49 ssmith
root@debian:/company/Finance# cd ..
root@debian:/company# cd HR
root@debian:/company/HR# ls -l
total 12
drwxr-xr-x 2 root      hr 4096 Feb 20 08:53 common
drwxr-xr-x 2 fbrennan   hr 4096 Feb 20 08:53 fbrennan
drwxr-xr-x 2 stephanieb hr 4096 Feb 20 08:53 sbrown
root@debian:/company/HR# chmod 0774 common
root@debian:/company/HR# chmod 0740 fbrennan
root@debian:/company/HR# chmod 0740 sbrown
root@debian:/company/HR# ls -l
total 12
drwxrwxr-- 2 root      hr 4096 Feb 20 08:53 common
drwxr---- 2 fbrennan   hr 4096 Feb 20 08:53 fbrennan
drwxr---- 2 stephanieb hr 4096 Feb 20 08:53 sbrown
```

- Now we will set the permissions for the common folder and the individual user folder in each department's directory
- Change directory to the Finance Directory by entering **cd Finance**
- Enter **ls -l** to list the contents and permissions.
- For the common folder enter **chmod 0774 common** to allow full access to the owner and the group and read only access to everyone else.
- For each individual employee's folder enter **chmod 0740** to allow full access for the owner, read only access to other members of the group and no access for anyone else.
- Different permutations of these permissions are achievable to suit any needs a company might have.
- Repeat the process for all the departments. (See Screenshot above)



- The permissions are now set and you will not be able to access the folders without the appropriate permissions.

3 Installing open source software

The easiest way of installing software is by using APT (Advanced Packaging Tool) either on the command line (`apt-get`) or a GUI interface to APT, e.g. Software Centre. In this case we will use the

command line to demonstrate downloading the Email Client and the Software Centre to install the other programs.¹⁸ (debian.org, 2013)

"apt-get is the command-line tool for handling packages, and may be considered the user's "back-end" to apt. apt-get is very straightforward to use."

3 Installing Open Source Programs

3.1 Installation of an Email Client

IceDove is the Debian equivalent of the Mozilla Thunderbird email client.

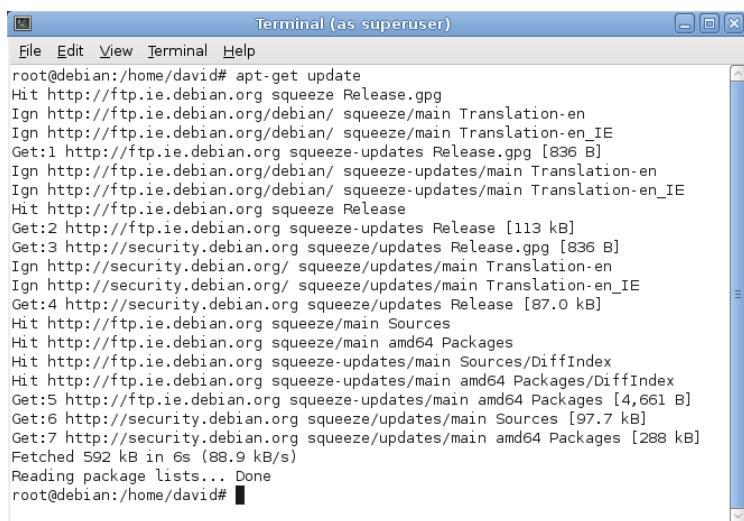
¹⁹ (wiki.debian.org, 2013)

"IceDove is a free, open-source and cross-platform mail client for most operating systems based on the Mozilla codebase."

Step 1

- Open the root terminal as before

Step 2



```
root@debian:/home/david# apt-get update
Hit http://ftp.ie.debian.org squeeze Release.gpg
Ign http://ftp.ie.debian.org/debian/ squeeze/main Translation-en
Ign http://ftp.ie.debian.org/debian/ squeeze/main Translation-en_IE
Get:1 http://ftp.ie.debian.org squeeze-updates Release.gpg [836 B]
Ign http://ftp.ie.debian.org/debian/ squeeze-updates/main Translation-en
Ign http://ftp.ie.debian.org/debian/ squeeze-updates/main Translation-en_IE
Hit http://ftp.ie.debian.org squeeze Release
Get:2 http://ftp.ie.debian.org squeeze-updates Release [113 kB]
Get:3 http://security.debian.org squeeze/updates Release.gpg [836 B]
Ign http://security.debian.org/ squeeze/updates/main Translation-en
Ign http://security.debian.org/ squeeze/updates/main Translation-en_IE
Get:4 http://security.debian.org squeeze/updates Release [87.0 kB]
Hit http://ftp.ie.debian.org squeeze/main Sources
Hit http://ftp.ie.debian.org squeeze/main amd64 Packages
Hit http://ftp.ie.debian.org squeeze-updates/main Sources/DiffIndex
Hit http://ftp.ie.debian.org squeeze-updates/main amd64 Packages/DiffIndex
Get:5 http://ftp.ie.debian.org squeeze-updates/main amd64 Packages [4,661 B]
Get:6 http://security.debian.org squeeze/updates/main Sources [97.7 kB]
Get:7 http://security.debian.org squeeze/updates/main amd64 Packages [288 kB]
Fetched 592 kB in 6s (88.9 kB/s)
Reading package lists... Done
root@debian:/home/david#
```

- Enter **apt-get update** to update all the software packages available to APT

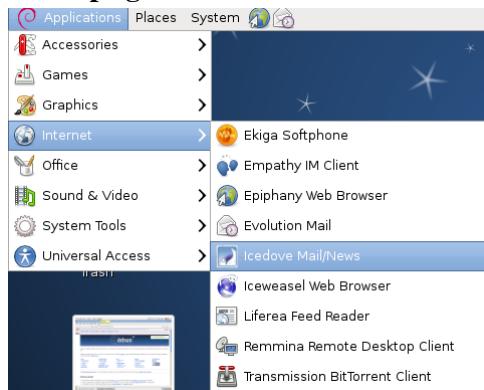
Step 3

```

root@debian:/home/david# apt-get install icedove
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  icedove
0 upgraded, 1 newly installed, 0 to remove and 16 not upgraded.
Need to get 12.5 MB of archives.
After this operation, 39.6 MB of additional disk space will be used.
Get:1 http://security.debian.org/ squeeze/updates/main icedove amd64 3.0.11-1+squeeze15 [12.5 MB]
Fetched 12.5 MB in 37s (333 kB/s)
Selecting previously deselected package icedove.
(Reading database ... 129134 files and directories currently installed.)
Unpacking icedove (from .../icedove_3.0.11-1+squeeze15_amd64.deb) ...
Processing triggers for desktop-file-utils ...
Processing triggers for gnome-menus ...
Processing triggers for menu ...
Processing triggers for man-db ...
Setting up icedove (3.0.11-1+squeeze15) ...
Processing triggers for menu ...
root@debian:/home/david#

```

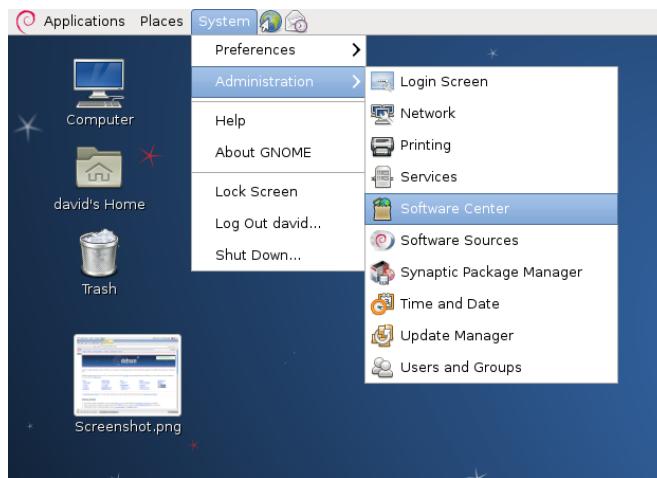
- Enter **apt-get install icedove** to install icedove email client



- The program is now installed and can be opened through **Applications>Internet>Icedove Mail/News**

3.2 Installation of a Firewall

Step 1

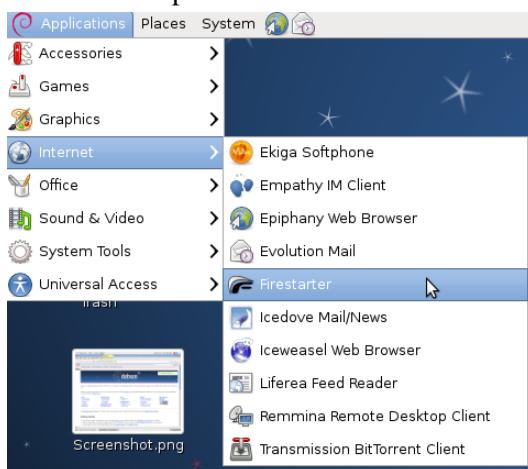


- Open the **Software Center** by clicking **System>Administration>Software Center**

Step 2



- Search for "firewall" in the search box
- Click **Install** on the **Firestarter** program at the top of the list (or another program if you prefer).
- Enter the root password



- The program will automatically install and can be opened from the **Applications>Internet>Firestarter**

Step 3



- To start the configuration, click **Forward**

Step 4



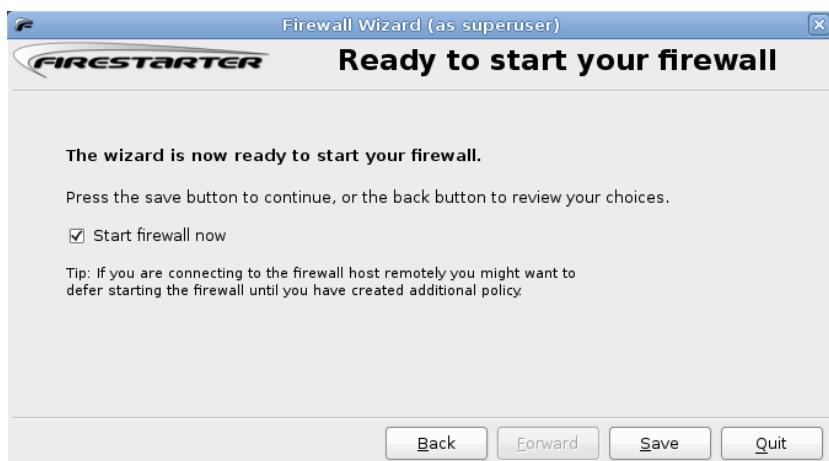
- Choose your network device setup and click **Forward**

Step 5

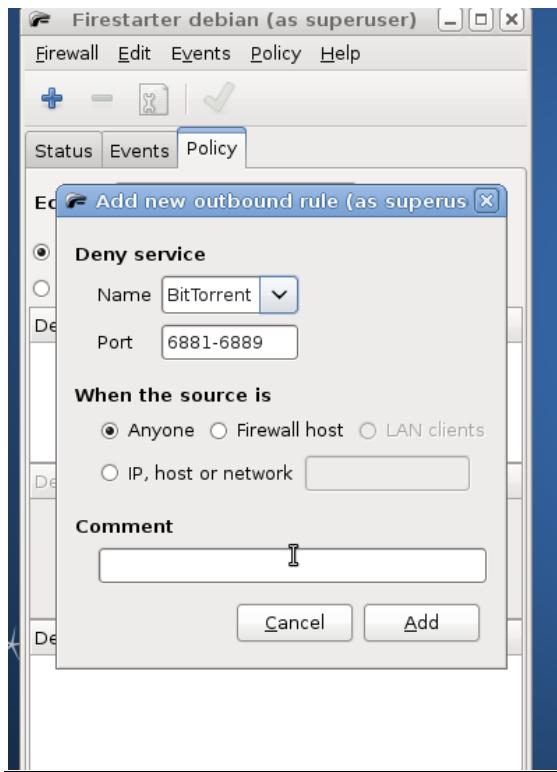


- For a single computer untick **Enable Internet connection sharing**
- Click **Forward**

Step 6

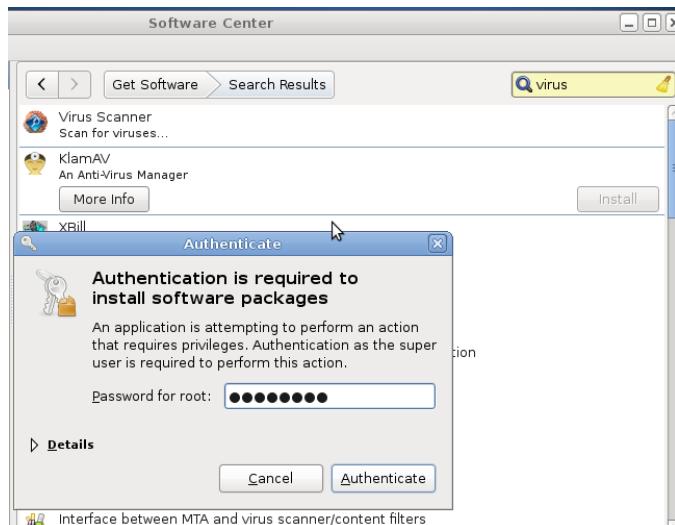


- The firewall is now configured and the settings can be changed to block ports etc by opening the program and specifying the changes. (see example screenshot below)



3.3 Installation of Anti Virus Software

Step1



- Open the Software Center as before
- Search for **virus** using the search box

Step 2

- Click **Install** on the Anti-Virus program of your choice (KlamAV in this example)
- Enter the **Password for root** when prompted and click **Authenticate**
- The program will download, see above screenshot.

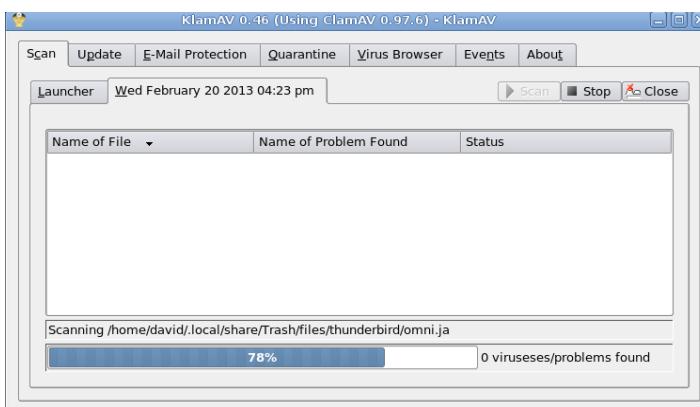
Step 3

- KlamAV can now be opened by clicking **Applications>System Tools>KlamAV**



- Click to open to start the initial configuration process
- Click Next
- Leave default locations for **Signature Database Location** and **Quarantine Location** (unless you are an advanced user and want to choose other locations)
- Tick **Check for updates to the signature database now**
- Click **Finish**

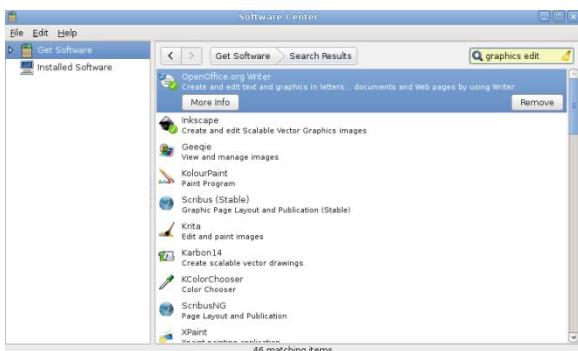
Step 4



- KlamAV is now ready to protect your computer (See the scan in progress in screenshot above)

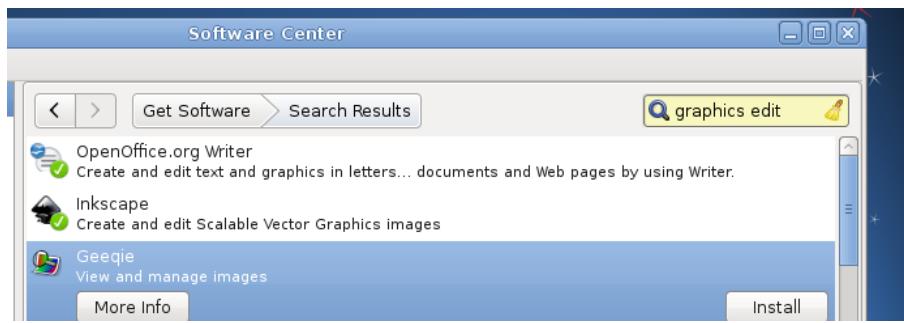
3.4 Installation of a Graphics and Image Editing Package

Step1



- Go to **Software Center** as before
- Search for **graphics edit** or similar term
- Choose an appropriate program from the list (**Geeqie** in this example)

Step 2



- Click **Install**
- Enter the **root password**

Step 3



- The program will download and install automatically and can be opened by clicking **Applications>Graphics>Geeqie**

References

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- ² Dawson, J. (2013, Febuary 16). *Virtualisation Introduction*. Retrieved from <http://misblogshog.blogspot.ie/2012/04/pros-and-cons-of-virtualization.html>
- ³ Meyers, M. (2012). *CompTIA A+ Certification Exam Guide*. McGraw Hill (p1352)
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- ⁵ XP, M. W. (n.d.). Explain this Setting Tab. *Microsoft Windows XP Local Security Settings*.
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- ⁷ how-to. (2013, Febuary 15). Retrieved from helpdeskgeek.com: <http://helpdeskgeek.com/how-to/block-websites-using-hosts-file/>
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- ¹⁶ wiki.debian.org. (2013, Feburary 15). Retrieved from <http://wiki.debian.org/Permissions>
- ¹⁷ (2013, Feburary 15). Retrieved from rohan.sdsu.edu: <http://www-rohan.sdsu.edu/doc/debian/ch-files.htm>
- ¹⁸ debian.org. (2013, Febuary 15). Retrieved from <http://www.debian.org/doc/manuals/debian-tutorial/ch-dpkg.html>
- ¹⁹ wiki.debian.org. (2013, Febuary 15). Retrieved from <http://wiki.debian.org>EmailClients>