ASSIGNMENT – FOUNDATIONS IN HARDWARE AND SOFTWARE

MSc in Computer Science

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A1- Installing Windows 7

Before you begin:

1. This installation of Windows 7 gives you the option to upgrade from a previous version of Windows or to install a new copy of Windows 7.

   If you are running an earlier version of windows and you want to upgrade to Windows 7, you will be able to keep your files, settings and programs. It is recommended that you back up your entire computer before performing this operation. Please note that if you are running Windows XP (or any earlier version of Windows), you cannot do a direct update. In this situation you have to install a new copy of Windows 7.

   If you are installing a new copy of windows, this option does not keep your files, settings or programs. Back up any files and settings you want to keep to a disk, USB device or another drive, so that you can restore them after the installation is complete. You'll need to reinstall your programs, so make sure you have the installation disks and product keys for the programs you want to use in Windows 7, or setup files for any programs you downloaded from the Internet

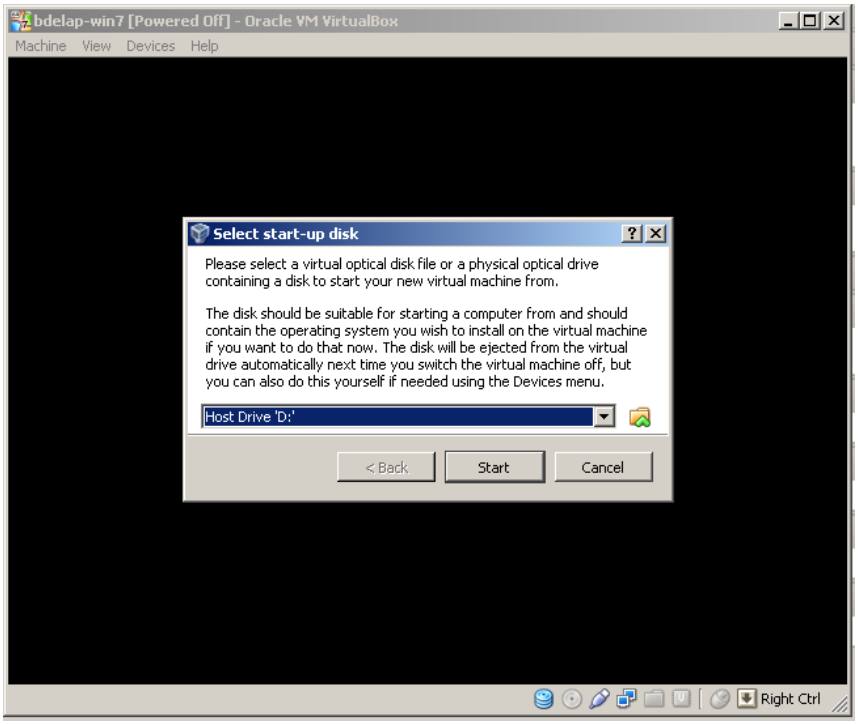
   When you're absolutely sure that everything from your computer that you want to keep is backed up, start the Windows 7 installation.

2. You must determine whether to install 32 bit or 64 bit version of Windows 7. If you are unsure about which version to install see Appendix B – 32 or 64 bit version of Windows.

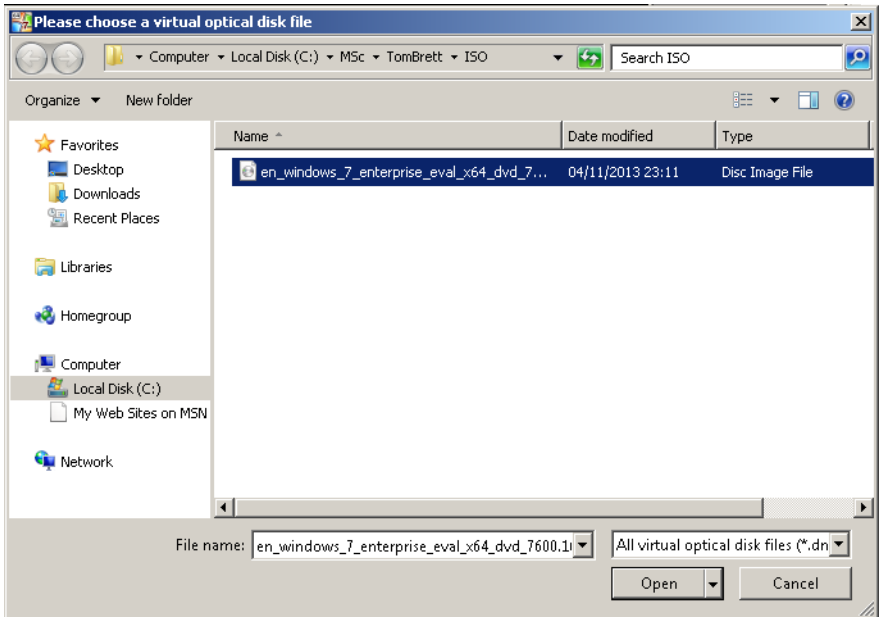
3. You must disable your firewall before installing Windows 7. See Appendix C – Disabling Firewall.

Windows 7 Installation

If you are using a CD/DVD to install Windows 7, please insert that CD/DVD now into the CD/DVD drive. Power on your computer. If your computer does not boot from the CD/DVD drive, you may need to change some settings in the system CMOS settings. See Appendix D – CMOS changes to boot from CD/DVD. In some situations you will be installing from an .iso file on your computer. In this situation, find the .iso file and double click to run the installation program.

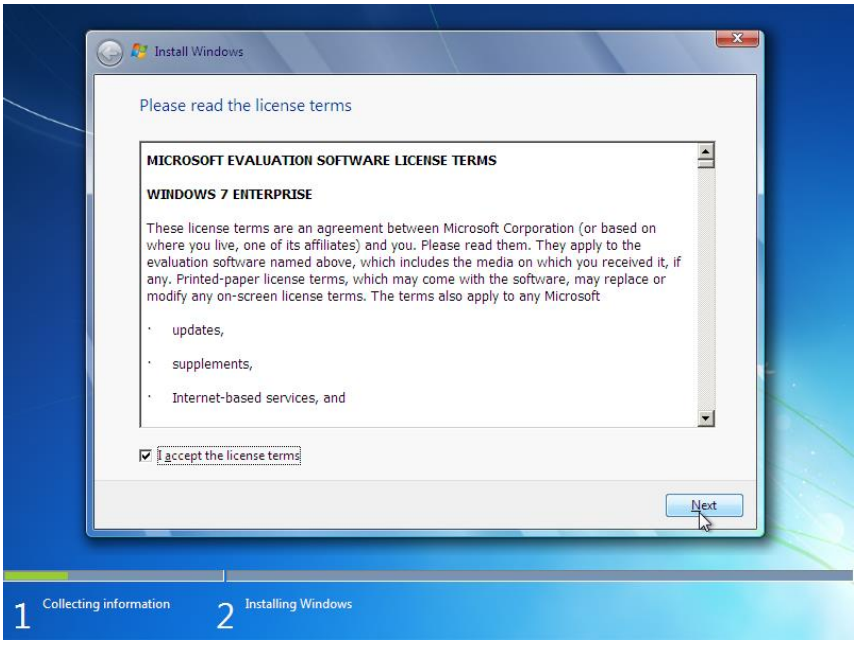


Highlight the .iso file and press **Open**. The name of the .iso file appears on your start up disk screen. Press **Start.**

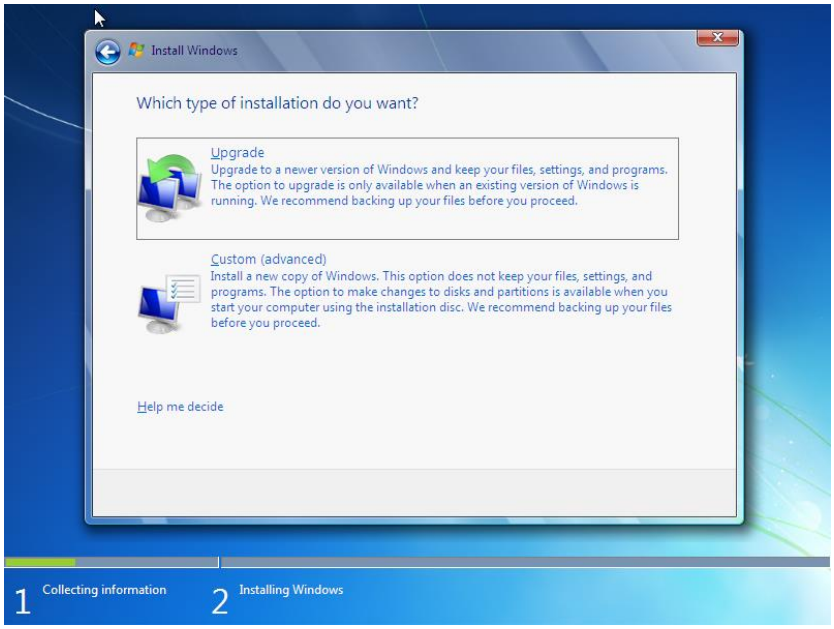


The first screen prompts you for language, time and currency format and Keyboard or input method. Input the appropriate values and press **Next.**

The Windows 7 install screen will now appear. Press **Install Now.** You are then presented with the licensing terms. Please read these terms. If you are happy with the terms, place a tick "I accept the license terms" and press **Next.**



You are then asked which type of installation you want.



Choose "Upgrade" if your current version of Windows can be upgraded and you want to keep your current files, programs and settings. If your version of Windows can't be updated, you need to choose "Custom" (See Pg 1 – Before Starting).

Choose "Custom" if:

1. You have a new machine and an operating system is being installed for the first time.
2. You wish to replace your current operating system entirely (your programs, files and settings will be erased in the process).
3. You wish to keep your current operating system but you wish to install Windows on an available separate partition of your hard drive (bootable). The custom option also includes the option to format, extend, create or delete partitions.

In this manual we are dealing only with installing a new copy of windows. As outlined above, this option does not keep your files, settings or programs. If you have not backed up any files and settings you want to keep to a disc or another drive, please close this window now and exit the installation process when prompted.

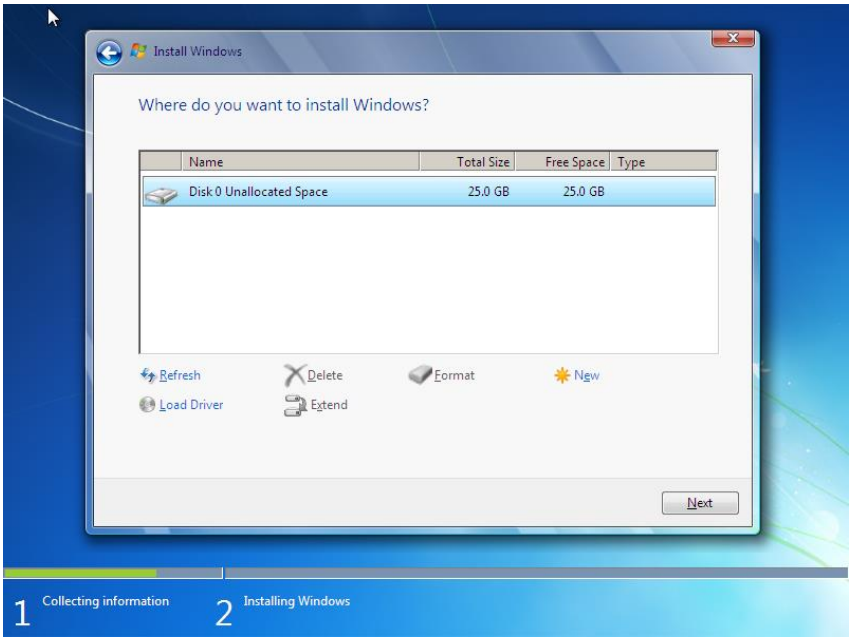
When you're absolutely sure sure that everything from your computer that you want to keep is backed up, select the option – "Custom (Advanced)".

You are then presented with a screen which shows the hard disks available and the amount of free space on each disk. You are asked where you want to install Windows.

In our installation, we actually want to partition the drive. We want to install the operating system on one partition and the second partition will be used to store the user's data files. It is recommended to install the operating system on a separate partition for the following reasons.

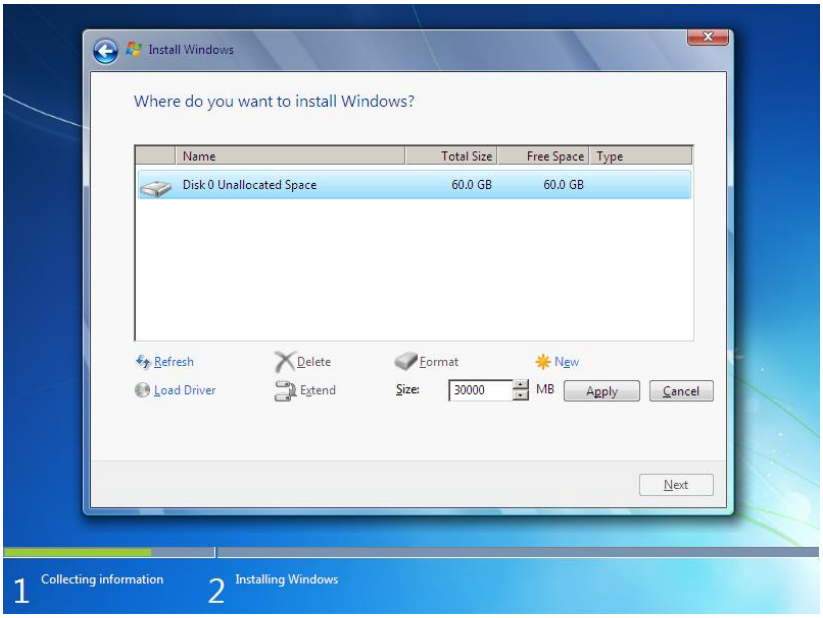
1. If a virus affects your computer, you may need to format the logical drive and reinstall the operating system to get your computer running again. This can be carried out quite easily if the data is stored on a separate logical drive.
2. If you wish to upgrade to a newer version of the operating system in future, you can do so easily without worrying about your data files.
3. If you wish to install a second operating system (bootable) on your computer.

Press the "Drive Options advanced" key, we are presented with the following screen, select **New.**

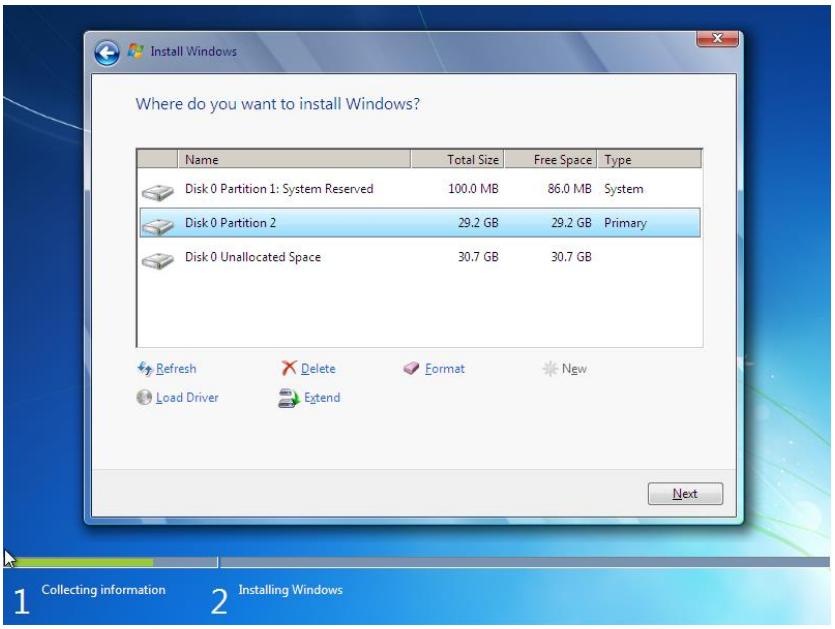


We are prompted for the size we would like for our disk partition. In our installation, we entered 30000 MB (The minimum recommended space for a partition where you want to install Windows 7 is

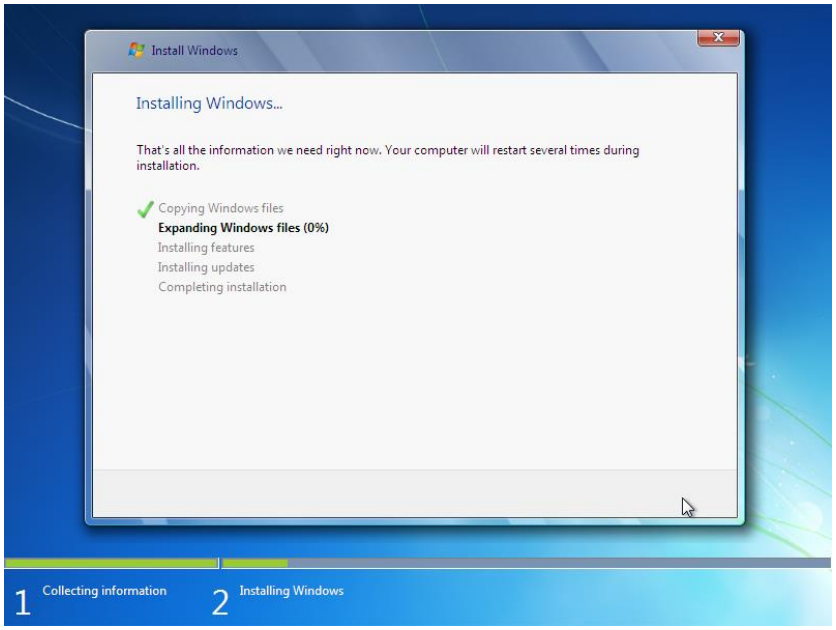
10350MB). Then press **Apply.** A popup window is shown that informs you that Windows might create additional partitions for system files, to ensure that all Windows features work correctly. Press **Ok.**



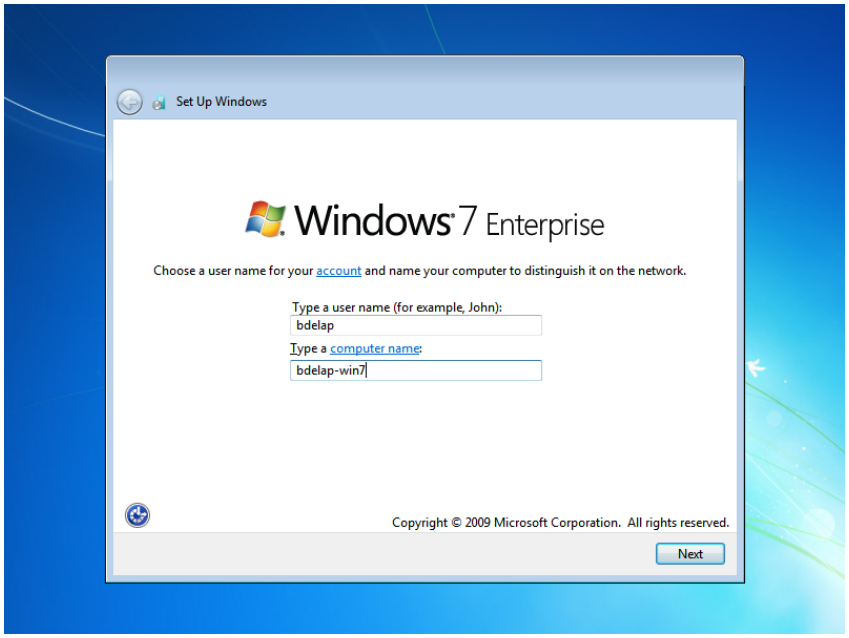
We are then presented with a list of drives again. You will notice that we are now shown three disks or partitions. The installation process has automatically created a separate partition of 100 MB for system files. An operating system must be installed in a primary partition. Select the default drive (highlighted), in our case Disk 0 Partition 2 and press **Next.**



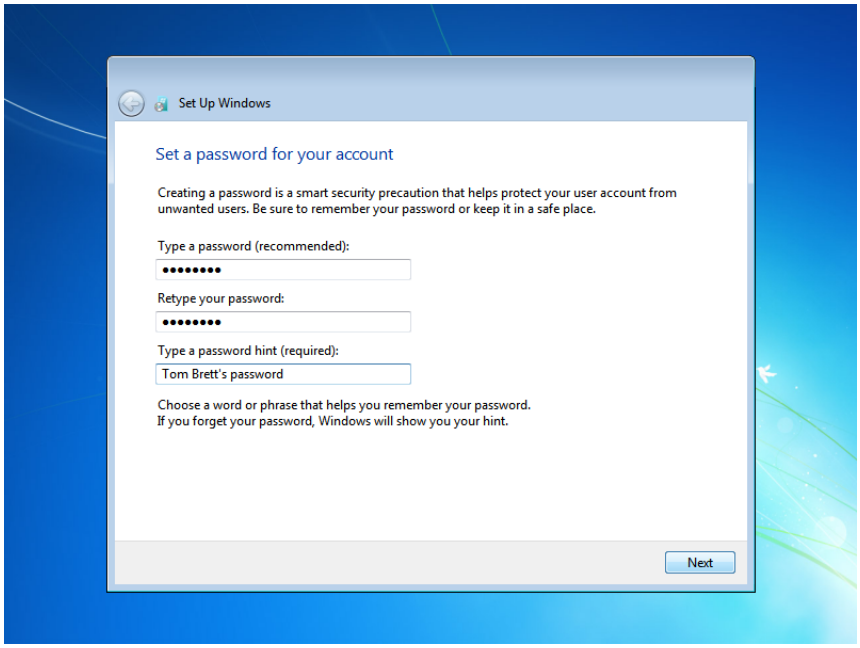
We are now presented with a screen that informs us that Windows is installing (with a list of the various stages of installation). A green tick is placed after each item on the list when it has finished. Depending on your hardware, this stage can take from 15 to 20 minutes.



Windows is restarted after about 15 minutes. You are then asked to enter a user name and a computer name. If you belong to an organisation, you will need to check if they have a user name convention in place. We will use first initial and surname. Again when entering computer name, if you work for an organisation, you should speak to the Administrator before entering this name, as they may already have a naming convention in place. If you are a home user, call this machine by a name that will identify this computer to you e.g. **KitchenComputer** or a person's name eg **John.** In some cases for security reasons you may not want the computer to be identifiable, in this situation give the host a non meaningful name. We will give our machine a name of "bdelap-win7".



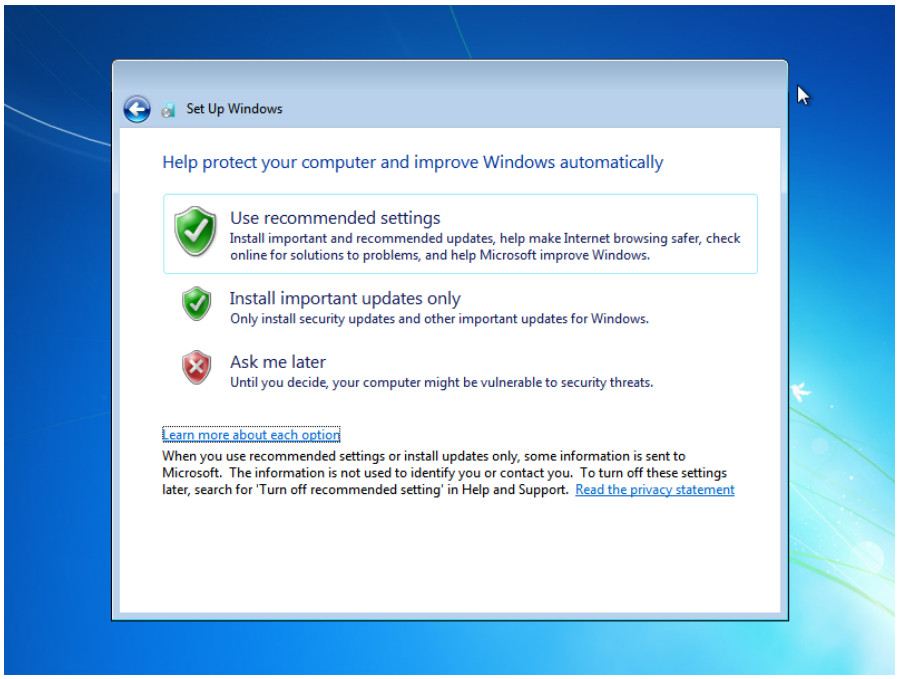
You are asked to set a password for your account. It is important to use a strong password here, one that uses a combination of capital letters, small letters, numbers and non alpha numeric characters and one that is not a word in a dictionary. In Section A3, we will set up a password policy, which ensures that users always use strong passwords. Enter a hint to help you remember the password.



The next screen prompts you to enter your Windows product key. This key is a 25-character key, which you can find on the installation disk holder inside the Windows package—or in a confirmation e-mail if you purchased and downloaded Windows 7 online. Press **Next.**

As I am using an evaluation version of Windows 7, I have not been asked for a product key.

The next screen concerns protecting and updating our computer automatically by Windows.



It is recommended that you choose the first option "**Use Recommended Settings**" as Microsoft will automatically install important and recommended updates

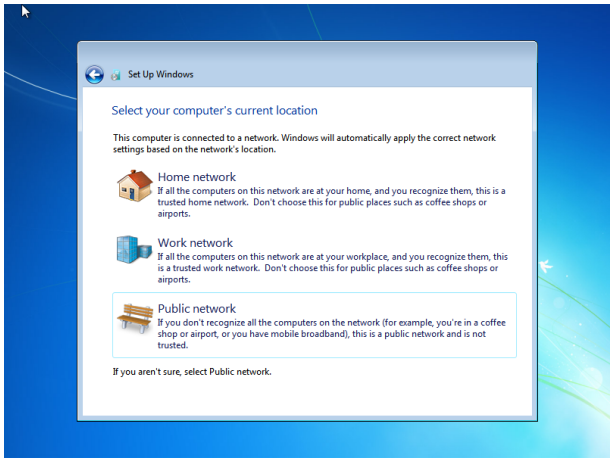
These updates are designed to keep your computer up to date, help make Internet browsing safer, allow error reports to be sent to Microsoft, check for solutions online when a problem occurs and help Microsoft improve windows. Internet browsing is safer as your computer is scanned periodically by Windows Defender (anti spyware software) which will automatically remove any software that causes severe alert levels. An anti phishing program called SmartScreen filter also runs, this warns you about unsafe websites.

If you choose the second option, "**Install Important Updates Only**", Windows will automatically install important updates, however, recommended updates will not be installed automatically and you will not automatically receive enhanced spyware, solutions to problems or the latest drivers for new hardware and devices. SmartScreen filter will not be turned on.

It is not advisable to choose the final option "**Ask me later**" as your computer might be vulnerable to security threats.

Select **Use recommended settings** (Please note that this can be changed at any time by using Control Panel settings). The next screen prompts for your time zone and current time. Enter these details and press **Next.**

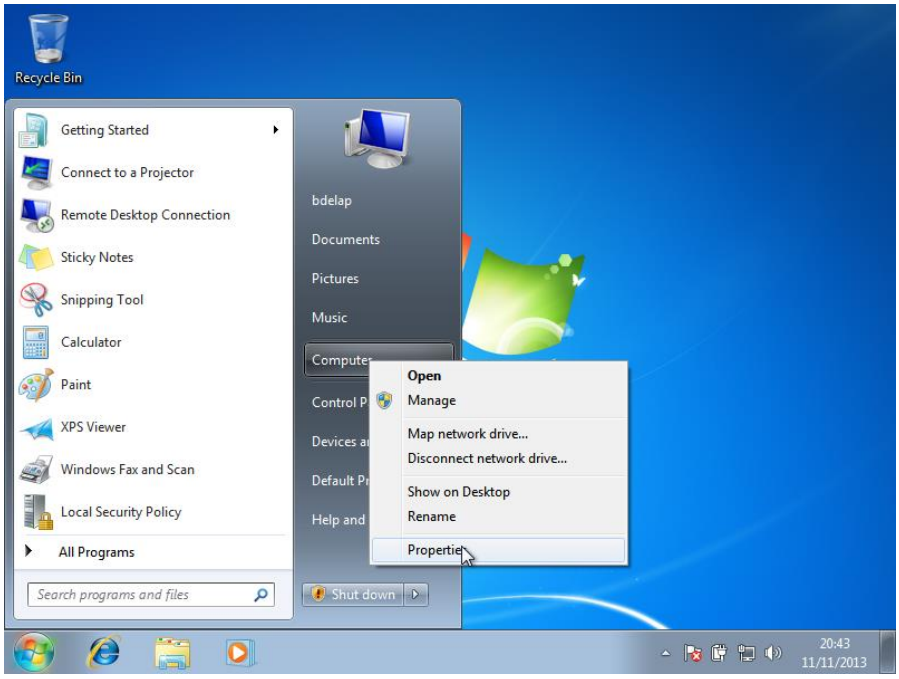
In the next screen you are prompted to enter your computer's current location. Your location will determine the firewall settings for your newly installed Windows 7. If you're not sure if the network on which you are working can be fully trusted, it is advisable to select the final option **Public Network**



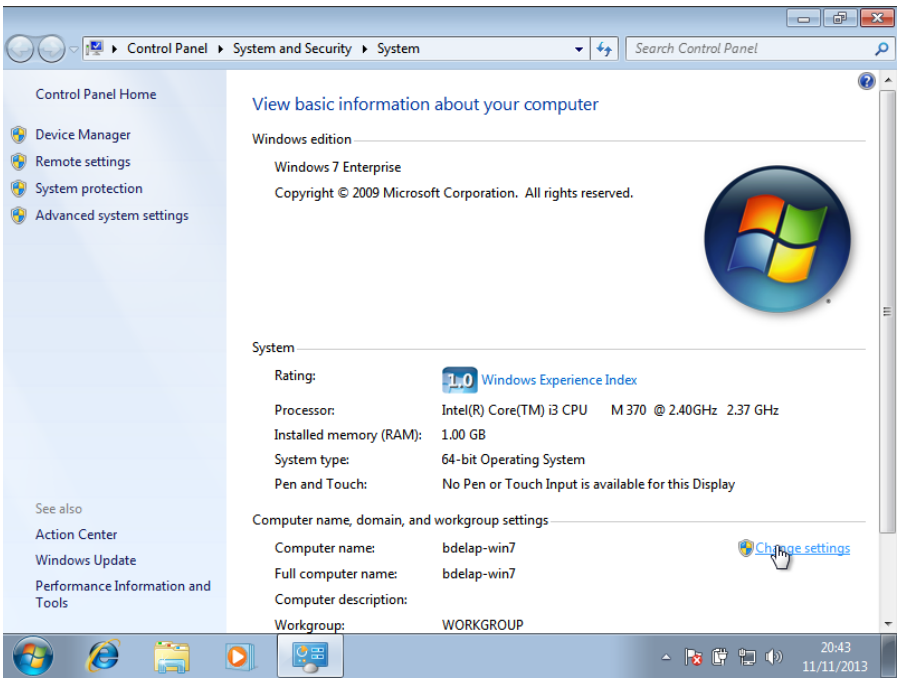
You have now finished installing Window 7. It will take a couple of minutes before Windows is finished. A message "preparing your desktop" is displayed.

Assigning machine to Workgroup: BDELAP

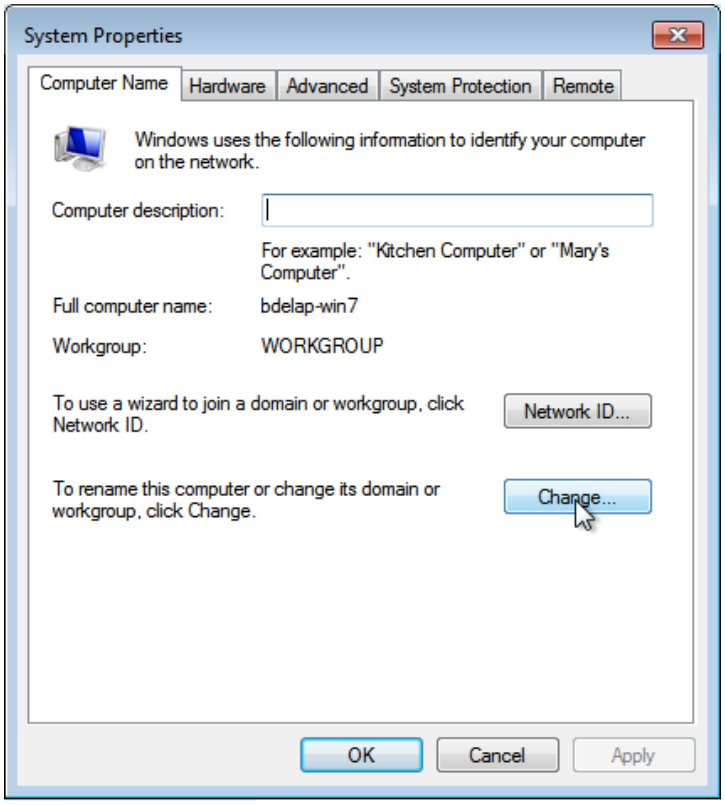
Select **Start,** right click **Computer**, select **Properties.**



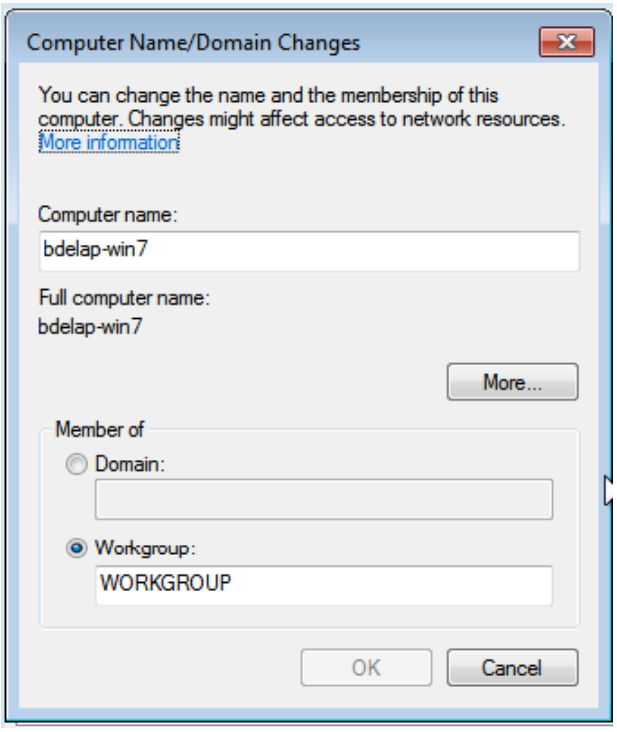
Basic Information screen is displayed. We can see that this machine has been assigned to the default workgroup **WORKGROUP.** In order to change this, select **Change Settings.**

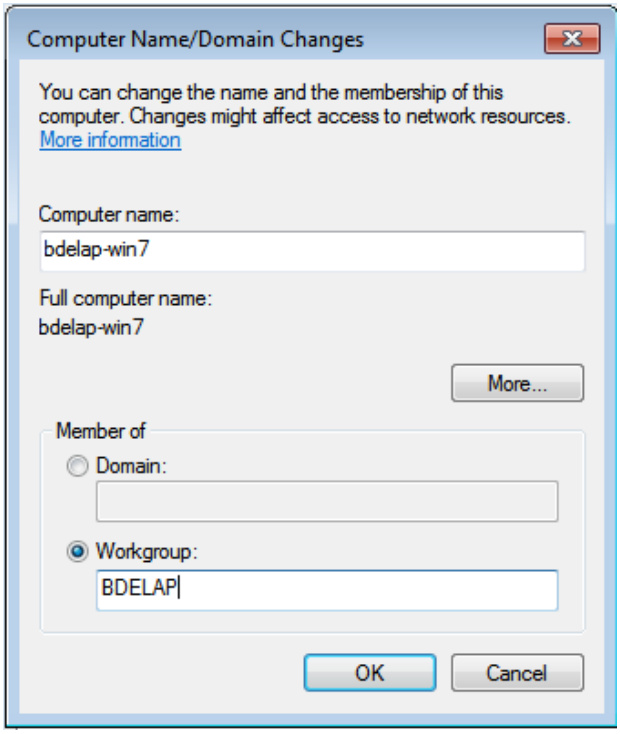


The System Properties screen shows the computer name with the default work WORKGROUP. Choose **Change.**

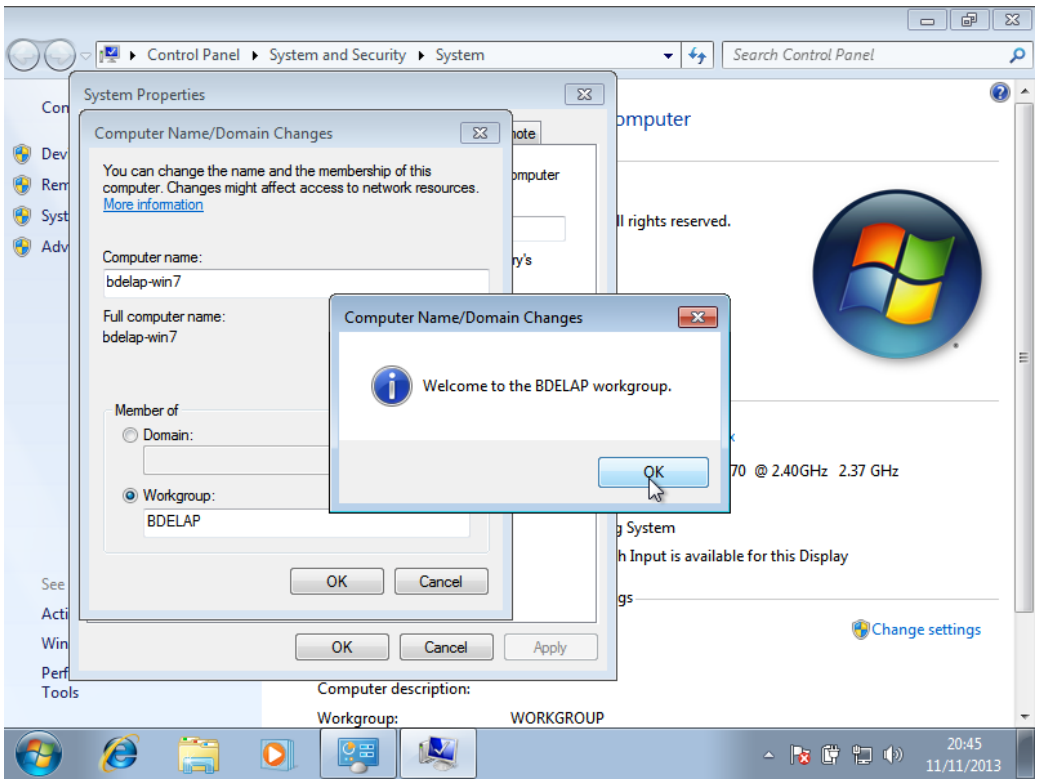


The Computer Name/Domain Changes screen is then displayed with the default WORKGROUP workgroup. Overtype WORKGROUP with the name of the required workgroup which is BDELAP and press **OK.**

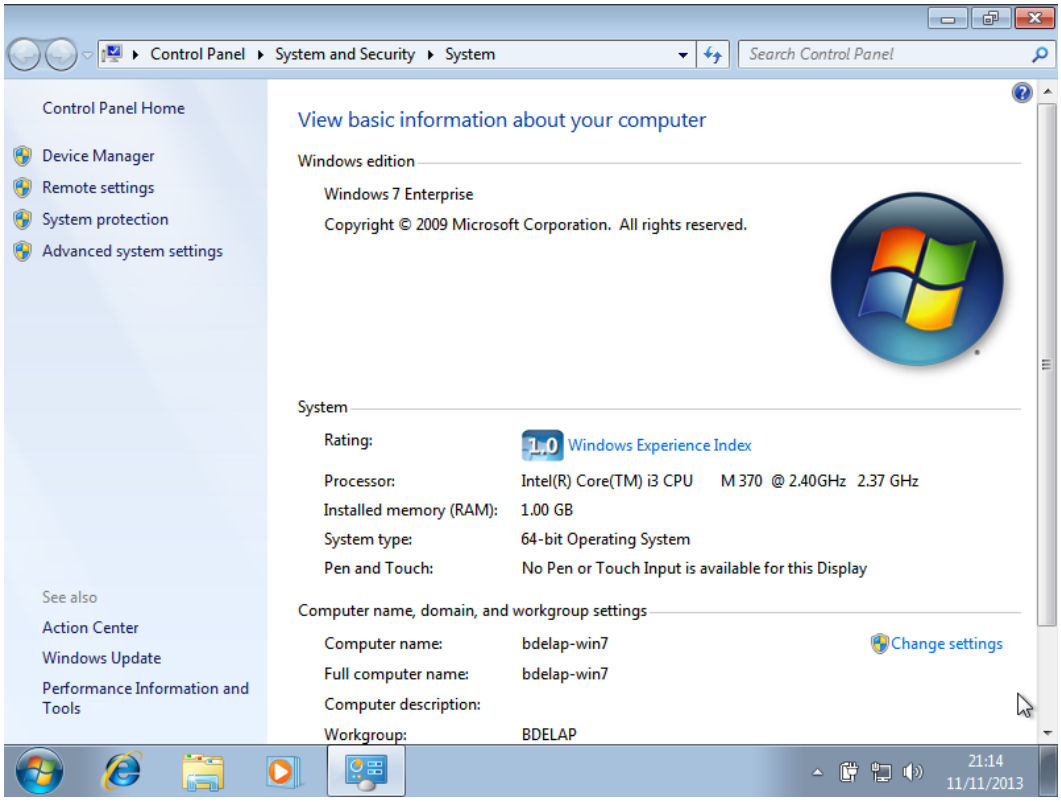




We are then welcomed to the new workgroup and informed that Windows must restart to implement the changes.



After restarting Windows, we can see that the machine is now in workgroup BDELAP by selecting **Start,** right clicking **Computer** and selecting **Properties.**

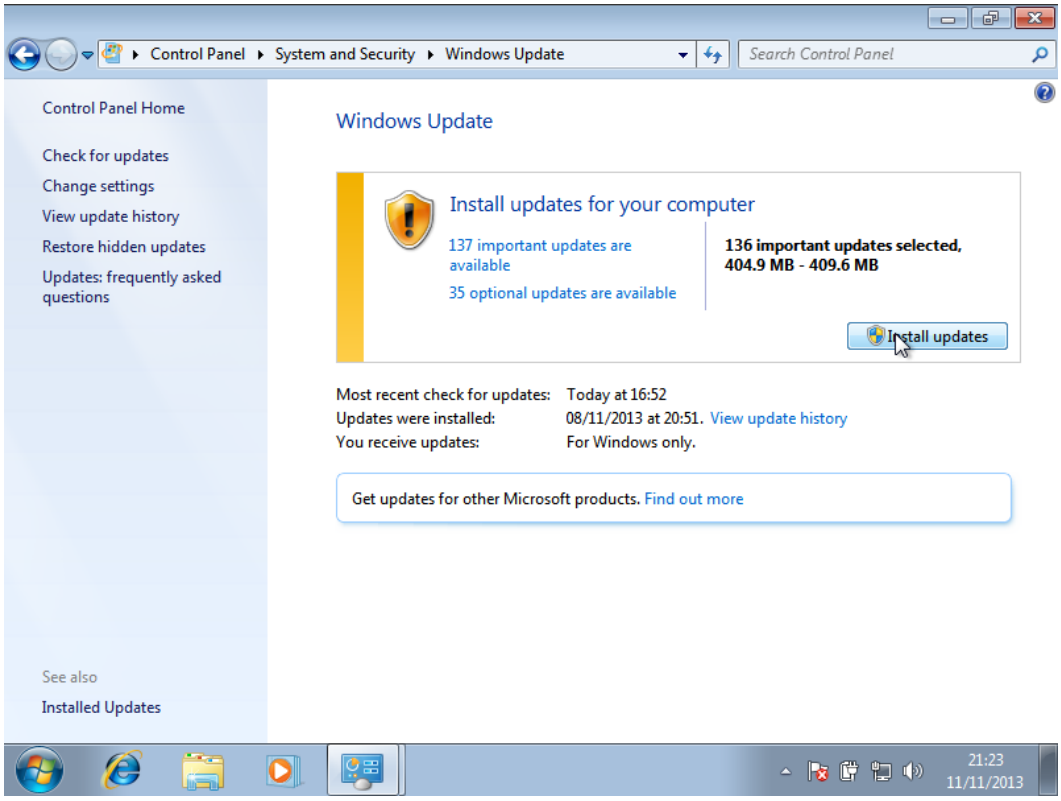


A2 Updates & Antivirus

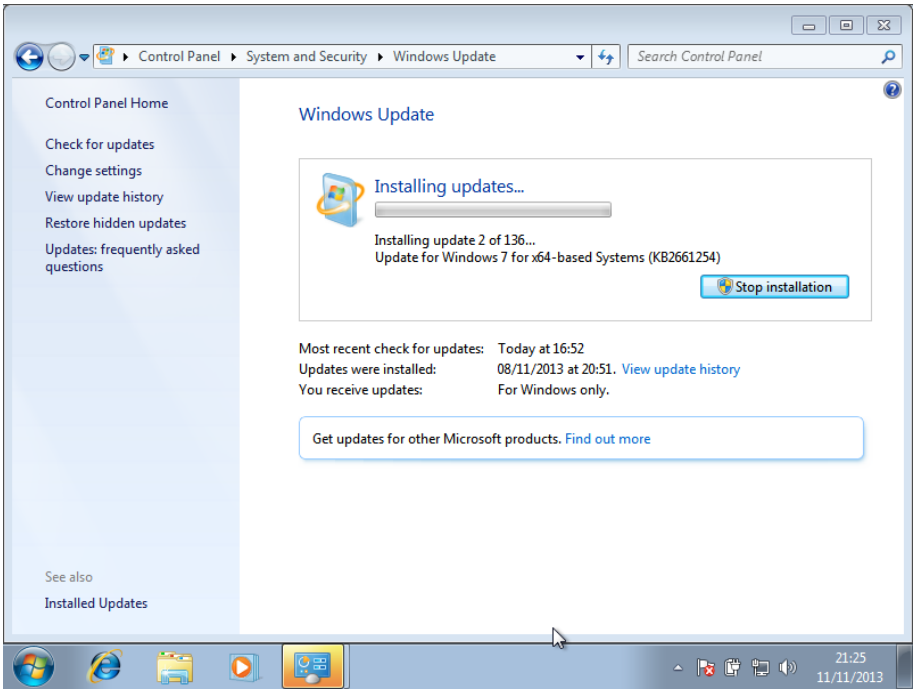
Updates

We now need to update our system with the most recent updates from Microsoft. This ensures that any problems that may have existed with Windows 7 are fixed. It is also very important from a security point of view in order to prevent the spread of viruses and malware. Please note that this update may take up to three hours, so please bear that in mind before you start. It is also advisable to create a System Restore point before installing updates. If you wish to read more about restore points and perhaps create one , I have documented this in **Section A7 – System Restore Point.**

In order to update, select **Start**, select **All Programs,** then select **Windows Update**. The screen below is then displayed informing you of the number of updates. Press **Install Updates.** There may be times when Windows is up to date, in that situation you are presented with a screen informing you of this (If that is your situation, you can ignore the rest of this section and skip to ***Installing Antivirus***). You can see from my installation that 136 updates needed to be installed. It took approximately three hours to carry out this update.

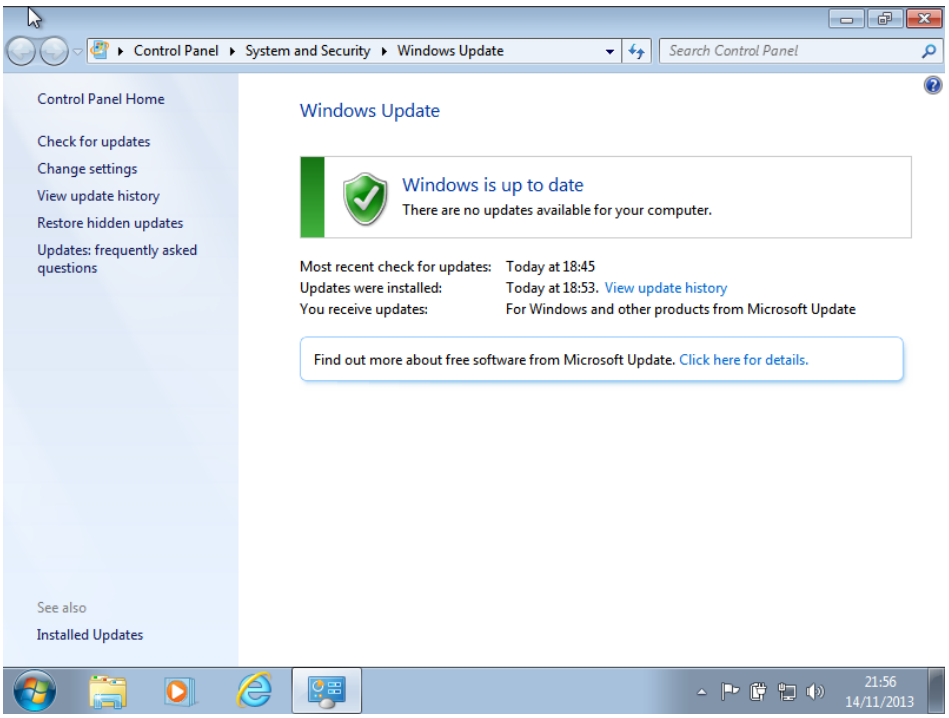


During installation of the updates, the following screen is displayed.



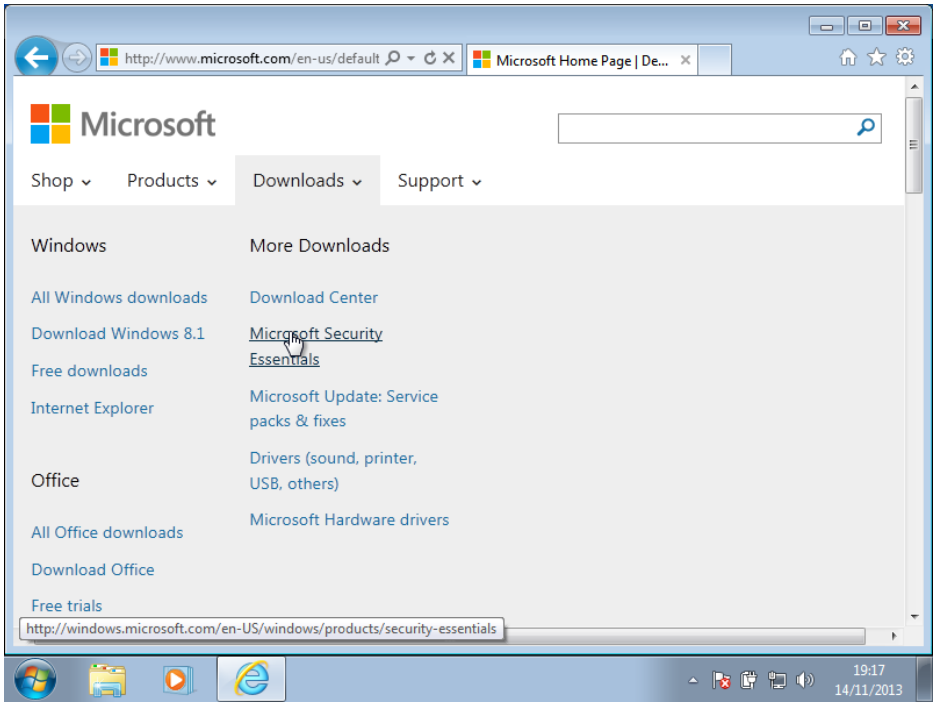
When installation of the updates is complete, you are prompted to restart your computer. Select **Restart Now.**

On restarting the computer, if you want to ensure that your computer is up to date, select **Start**, select **All Programs,** then select **Windows Update**. If your computer is up to date, you should get the following screen.

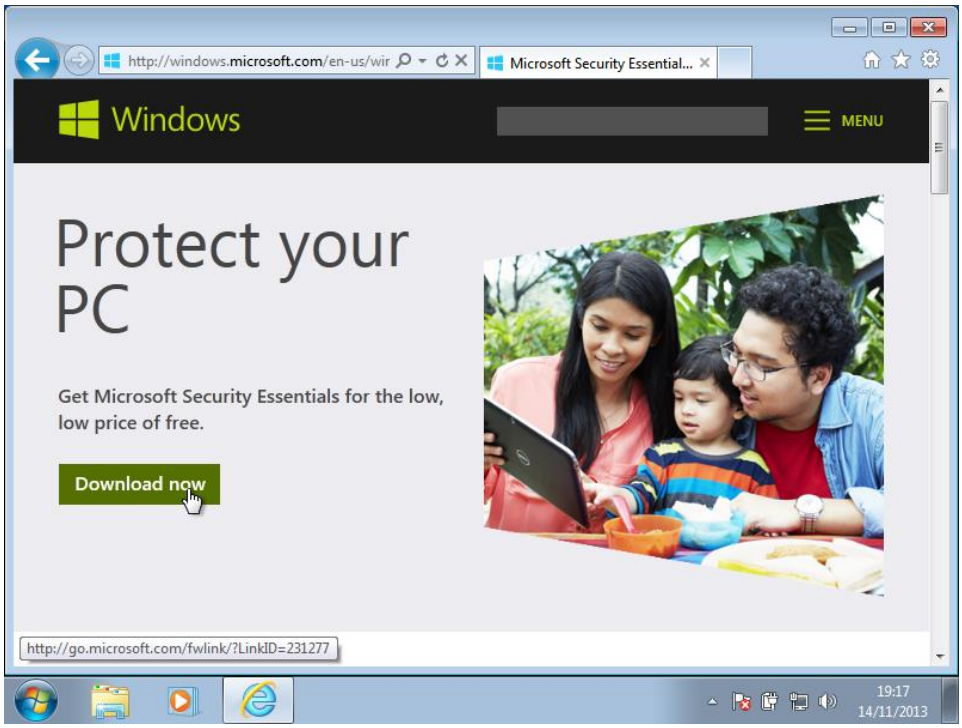


Antivirus

It is essential to install an anti virus program to help guard against viruses, spyware, and malicious software of all kinds. Microsoft offers a free antivirus package called Microsoft Security Essentials. To install this software you must go the Microsoft main webpage www.microsoft.com Click **Downloads**, then select **Microsoft Security Essentials.**



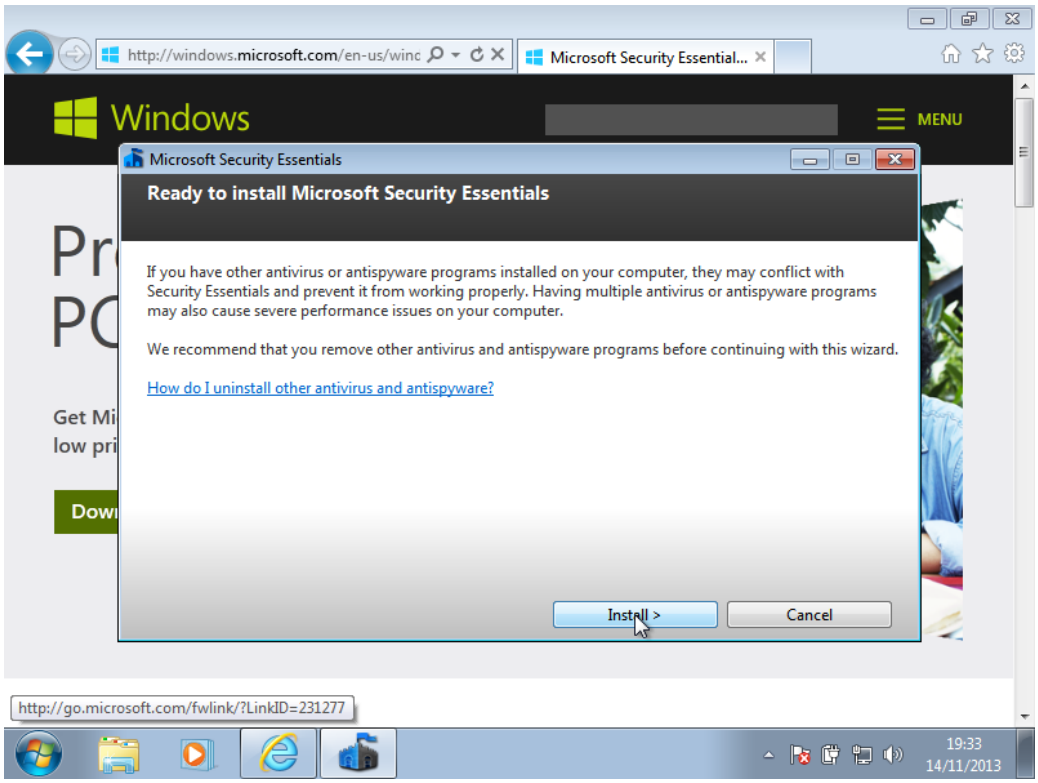
The following screen is then displayed, select **Download Now**



You will be asked if you want to **Run** or **Save** the installation program. Select **Run.** You will be asked if you want the following programs to make changes to your computer. Select **Yes.** You are welcomed to the Microsoft Security Essentials - Press **Next.** You are presented with the License Agreement – please read through the terms and conditions. If you are happy to accept the terms and conditions, press **I accept.** You are offered a chance to join the Customer Improvement Experience Program. Select whether or not you want to join and press **Next.** You are given the option to **Turn on Windows Firewall** and **Turn on Automatic Sample Submission.** Both of these options are already ticked by default. See the next section **Windows Firewall** for firewall information. The second option will set up a facility whereby if Microsoft Security Essentials (during a security scan of your system) feels a file is suspicious (i.e. a file it does not recognise), then a sample of that file will be sent to Microsoft.. Before sending the sample files, you are shown the list of files and given the option to send or not send. If you working for an organisation, you may need to speak to your Administrator to see if they have a policy with regard to this option. We will tick both these options in this demonstration. Press **Next.**

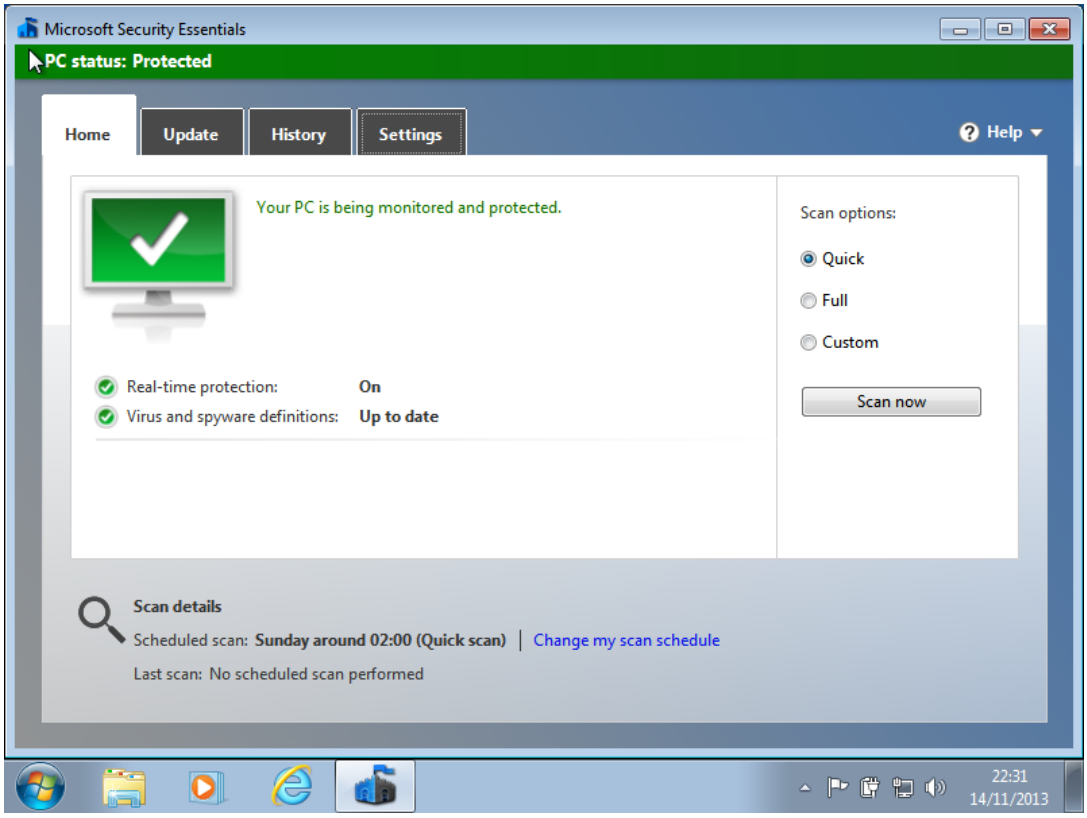
A screen is displayed informing you that if you already have any other antivirus or antispyware software that you need to uninstall it If you do already have such software on your computer, it is advisable to click the button **How do I uninstall other antivirus and antispyware** which explains in detail how to remove that software.

When ready, press the **Install** button.



A screen is displayed informing you that the application is being installed. It takes a couple of minutes to complete, then you are advised to restart your computer. Press **Restart.**

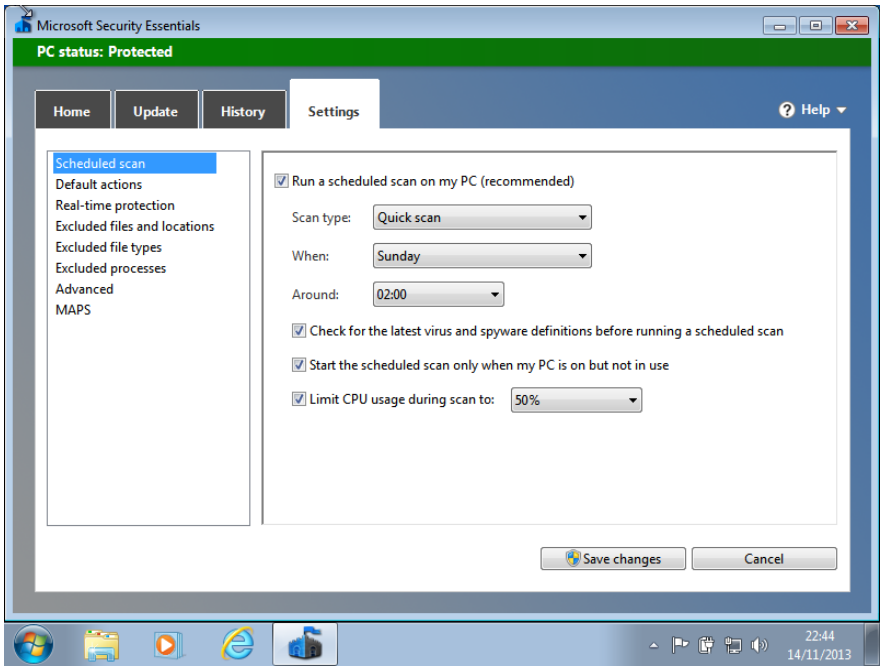
We must now setup scheduled virus scans to be run at least once a week. To do press **Start,** select **All Programs,** select **Microsoft Security Essentials.** The home screen is displayed as below.



Select the **Settings** tab. The recommendation from Microsoft regarding the selection of Quick Scan or Full Scan http://windows.microsoft.com/is-is/windows7/scan-for-spyware-and-other-potentially-unwanted-software is as follows:

> *A quick scan checks the places on your computer's hard disk that spyware is most likely to infect. A full scan checks all files on your hard disk and all currently running programs, but it might cause your computer to run slowly until the scan is complete. We recommend that you schedule a daily quick scan. If at any time you think that spyware has infected your computer, run a full scan.*

Based on the above, select the default setting of **Quick Scan.** Select the day and time when you would like the scan to run. The three tick boxes are ticked by default and the default setting to limit CPU usage during the scan is set to 50%. We will not change the defaults. Press **Save changes.** You will be asked if you want to allow the program to make changes to your computer. Press **Yes.**

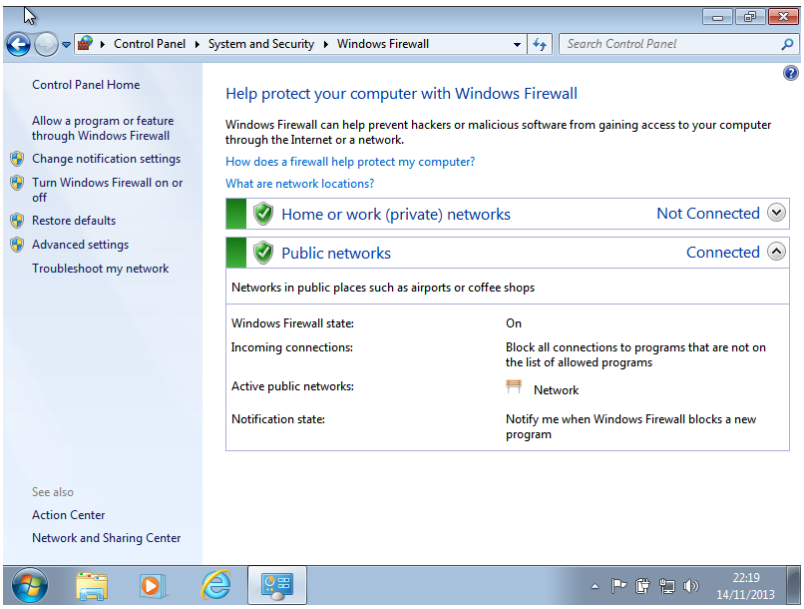


Windows Firewall

According to Microsoft http://www.microsoft.com/security/pc-security/firewalls-whatis.aspx

> *A firewall is a software program or piece of hardware that helps screen out hackers, viruses, and worms that try to reach your computer over the Internet. The most effective and important first step you can take to help protect your computer is to turn on a firewall.*

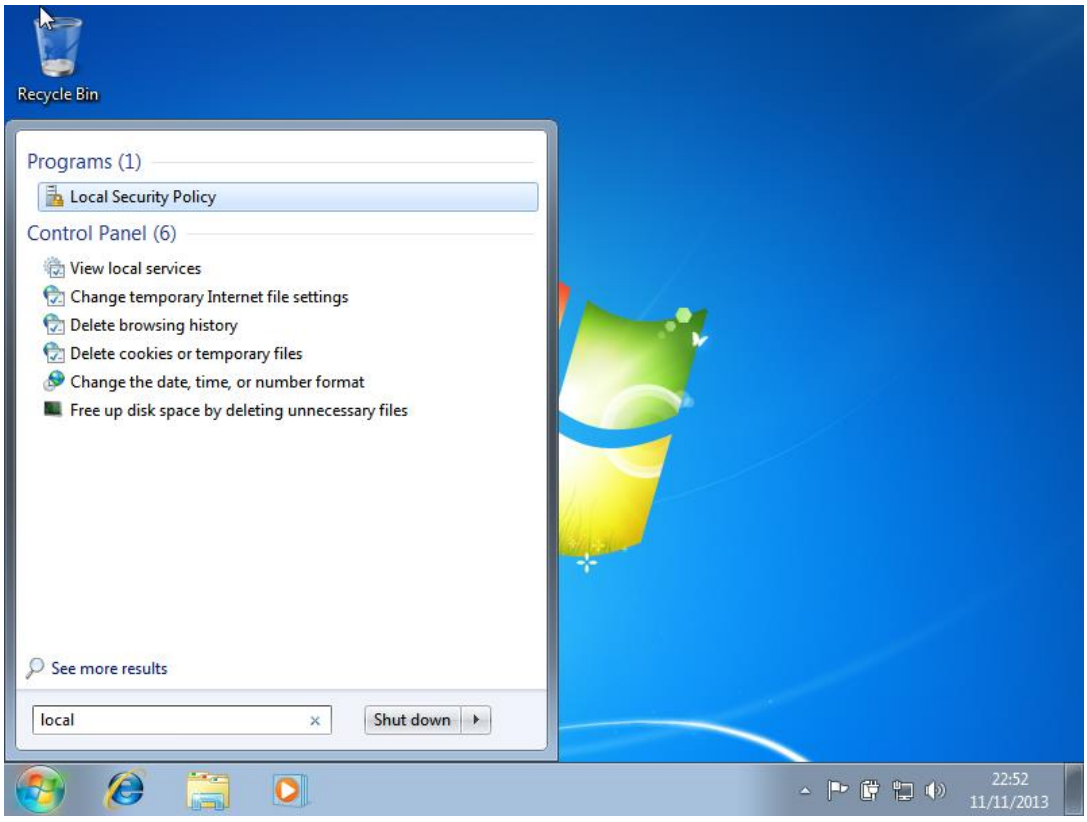
Windows Firewall is included with Windows 7. During the installation of Microsoft Security Essentials, we ticked the box to enable Windows Firewall. We must now ensure that the Windows Firewall is active by viewing the screen below. To access this screen, select **Start, Control Panel, System and Security.** Under the section **Windows Firewall,** select **Check Firewall Status.** Ensure that Windows Firewall State is on.



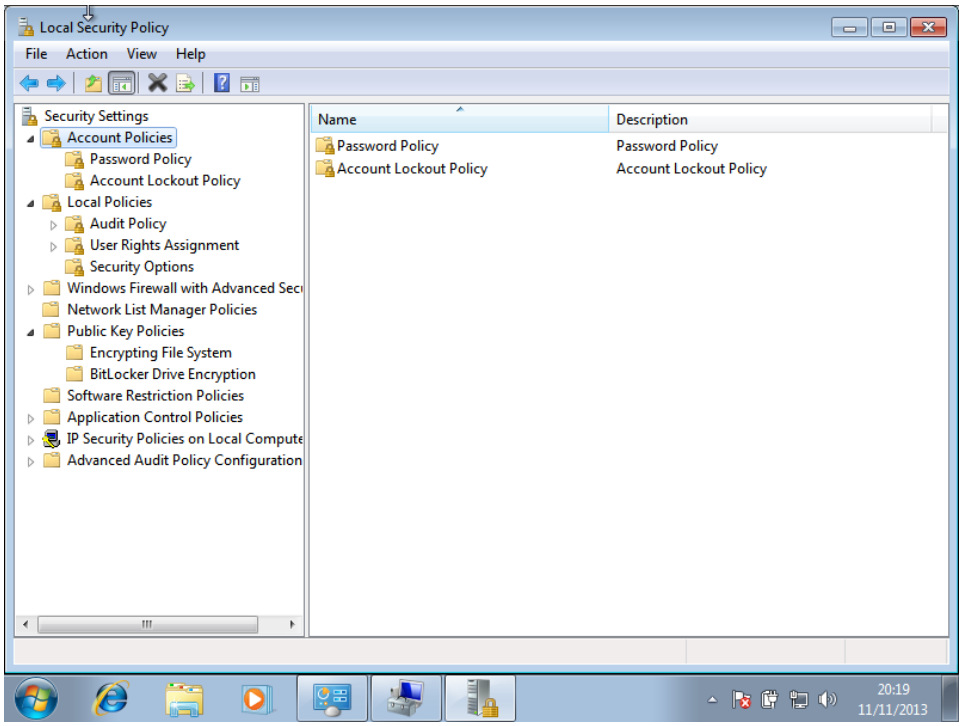
A3 Users, Groups & Security

User accounts and passwords provide the foundation for securing a Windows computer, enabling users to authenticate onto a PC.

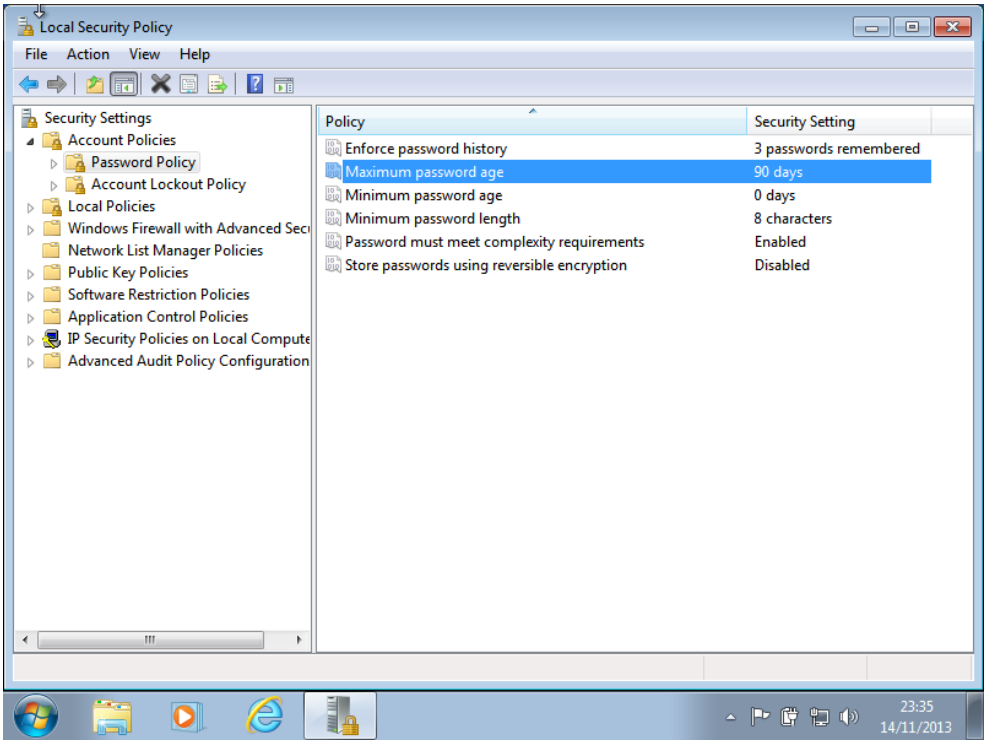
With regard to passwords, Windows by default allows weak passwords i.e. dictionary words, names, etc. However, it is good practice to choose a password at least eight characters long, include a mixture of alpha and numeric characters plus non-alphanumeric characters to create a "strong" password. It is also important to limit the number of times a user can input an incorrect password and to set a lockout time if they exceed that limit. This practice prevents hackers from using password generators to continuously try to gain access to your system. It is also essential that a user changes their password at regular intervals. In order to enforce this, we must create a User Account Policy. We will do this now before we commence adding users and groups. Press **Start.** In the **"Search program and files"** field type "Local". You will be presented with a listing of files that match your search (See below). Select **Local Security Policy.**



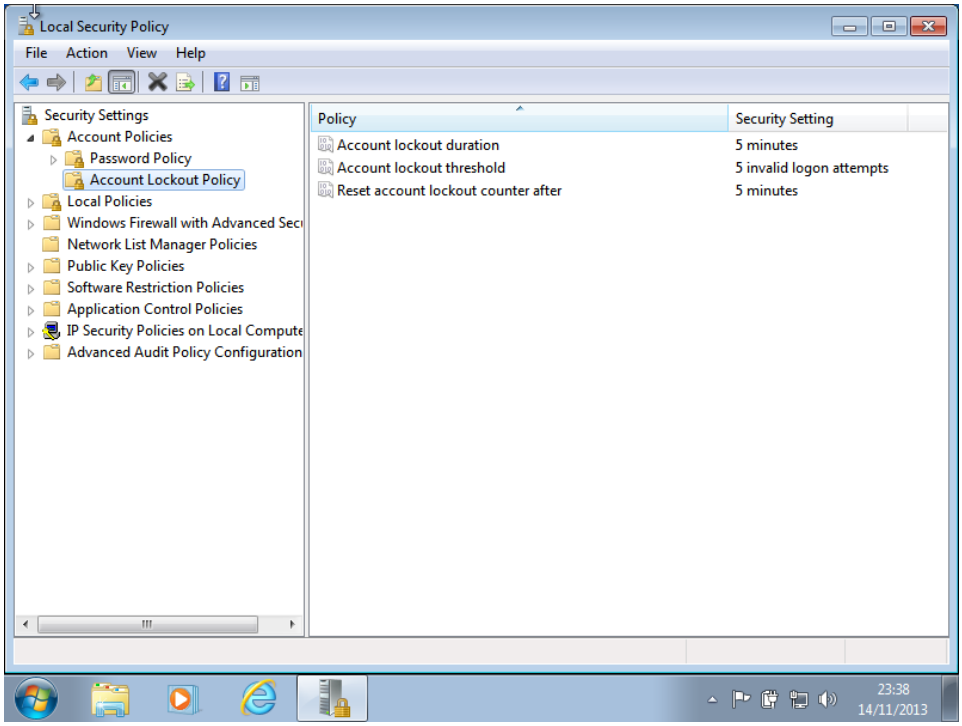
You are presented with the Security Setting Menu (see next page). Select **Account Policies.** From there select **Password Policy.**



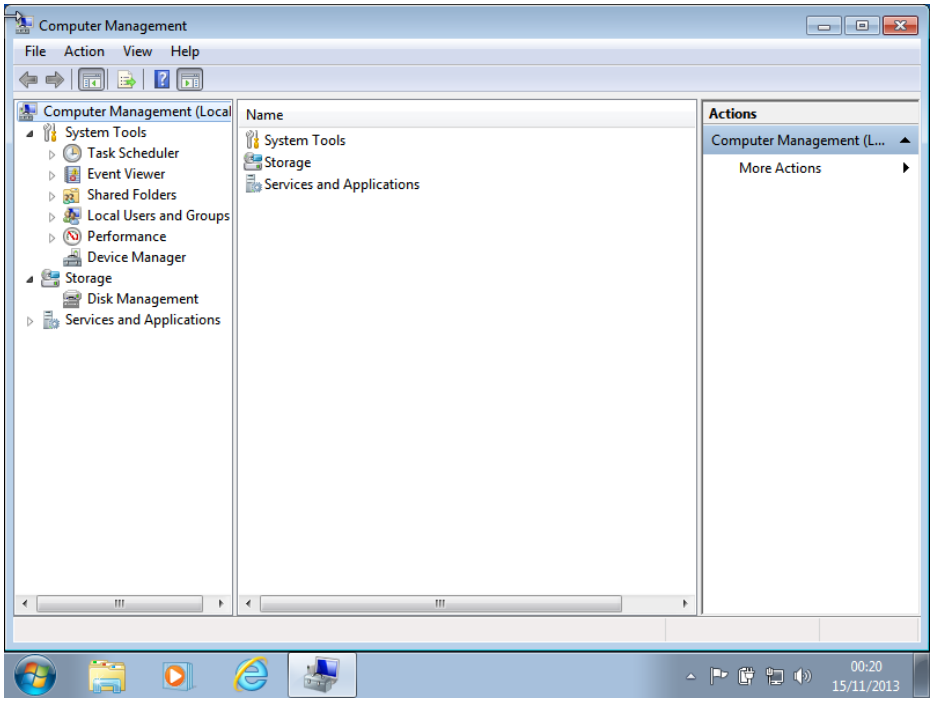
We will set **enforce password history** so that 3 passwords are remembered. This means that when a user changes a password, the system will look at the last 3 passwords used by that user and will not allow them to use any one of those passwords again. We will change the **Maximum password age** from 30 days to 90 days. We will set **Minimum password age** to 0 which means the user can change the password immediately if they wish. We will set **Minimum password length** to 8. **Password must meet complexity requirements** means that password must contain alpha, numeric and non alpha numeric characters. We will choose the default "Disabled" for the final option **– Store passwords using reversible encryption**.



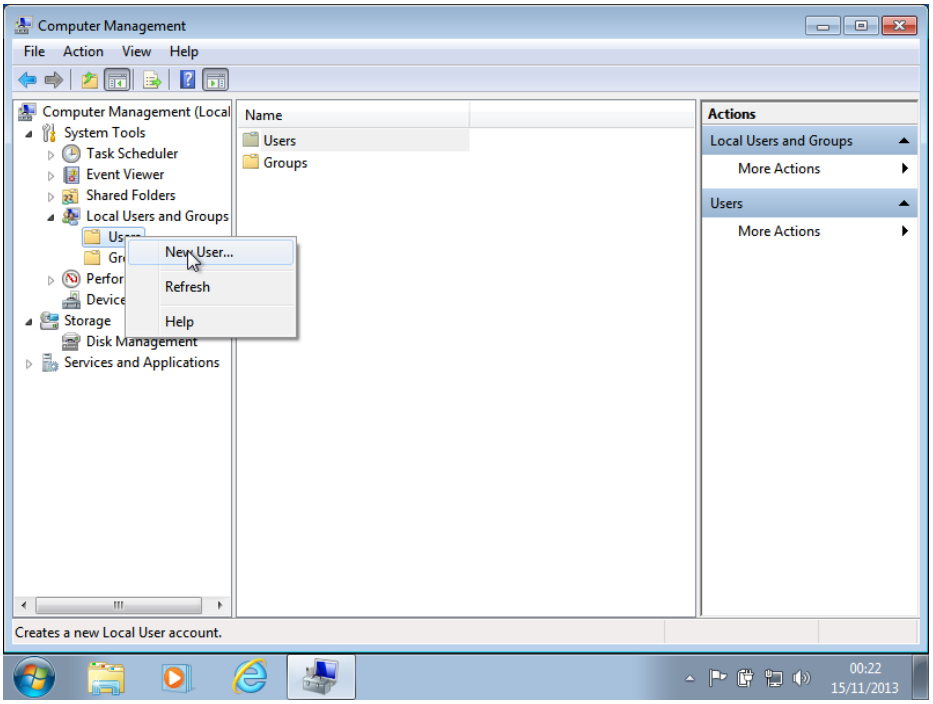
We will also set up an Account Lockout Policy. Select **Account Lockout Policy,** we will select the default settings here. **Account lockout duration** defines the amount of time a user will be locked out after exceeding the **Account lockout threshold**, which is the number of invalid logon attempts allowed. **The reset account lockout counter after** must be less than or equal to the value you entered in Account lockout duration.



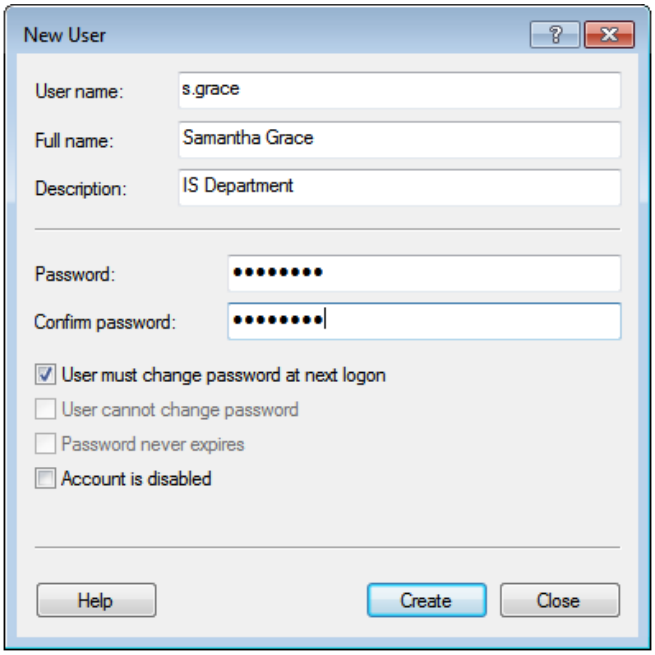
Now that we have set up the User Account Policy, we will set up the individual users. We will be using a naming convention of *firstinital.surname*. If you are setting up users in an organisation, firstly check to see if they have a naming convention in place. To set up a user press **Start**, right click **Computer a**nd select **Manage.** The following screen is displayed.



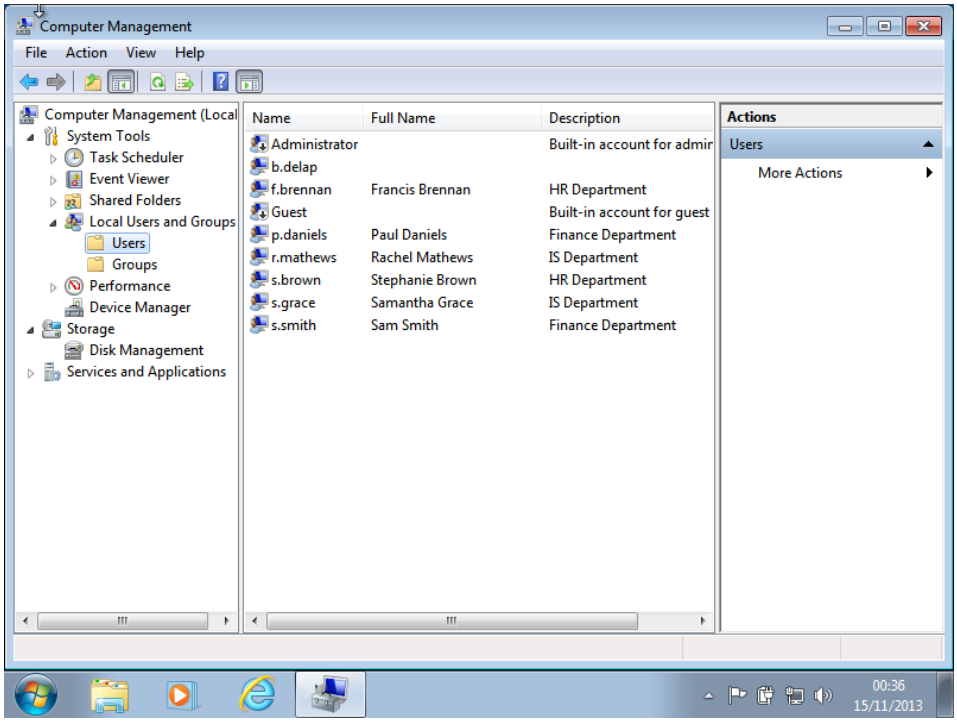
Select **Local Users and Groups,** then highlight **User** and right click.. Select **New User.**



We will create the first user Samantha Grace, her User name is s.grace (i.e. *firstinitial.surname)* as per our naming convention. We will give her a strong password, but it is essential to tick the box "User must change password at next logon" as passwords given by administrators are known within a company and, therefore, there could easily be a security breach. Select **Create.**



We will create 5 other users in the same fashion. All users are listed on the screen below.

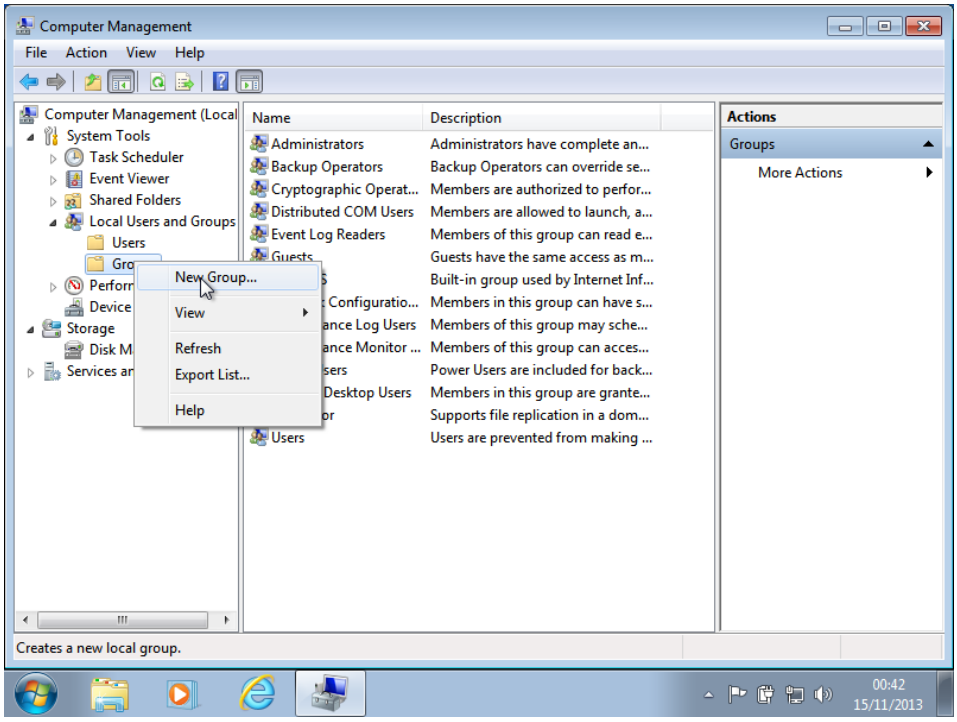


Groups are used to group users of a particular type together. They are essential for file security as groups of users can be assigned the same permissions.

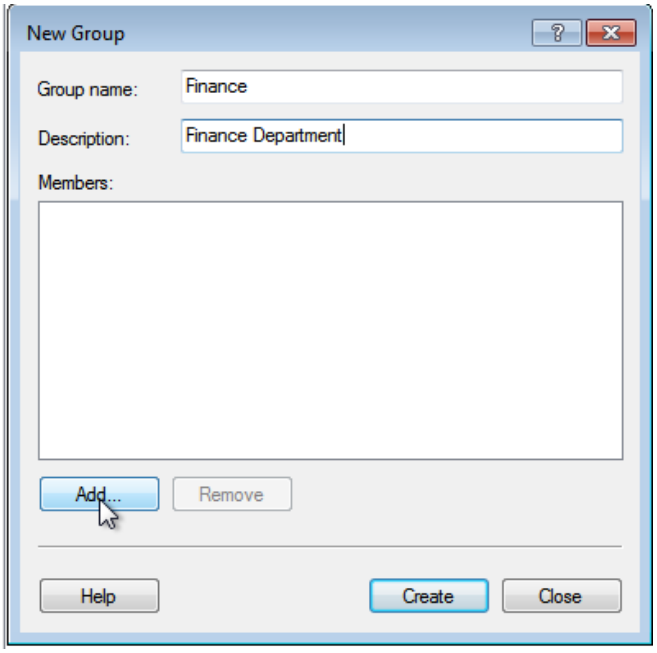
A group is a collection of user accounts that can define the permission of its members. A single account can be a member of multiple groups. Groups are an efficient way of managing multiple users, especially when you are dealing with a whole network of accounts. They are an efficient way for an Administrator to manage authorisation as she/he can assign a certain level of access for a file or folder to a group instead of to just a single user account. Therefore, if a new user joins a department, the administrator can just set that user up in that department's group and he/she will have access to that group's files/folders.

Windows 7 is automatically installed with a variety of groups. The most important groups that we are concerned with at the moment are the **User's** group and the **Administrator's** group. There are also other groups such as Backup Operators, Event Log Readers. The person that installs **Windows 7** is automatically added to the **Administrator's** group. An Administrator has the highest permission rights and is allowed to make very important changes to the computer. It is therefore advisable to set yourself up with a normal **User** account as well which should be used at all times other than when you are actually performing **Administrator** tasks.

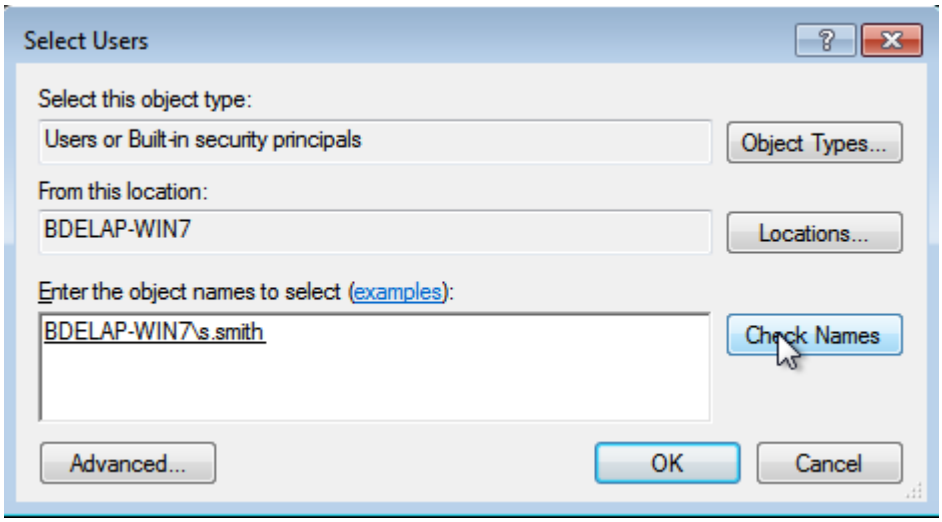
We wish to create custom **Groups.** Right click **Groups** and select **New Group.**



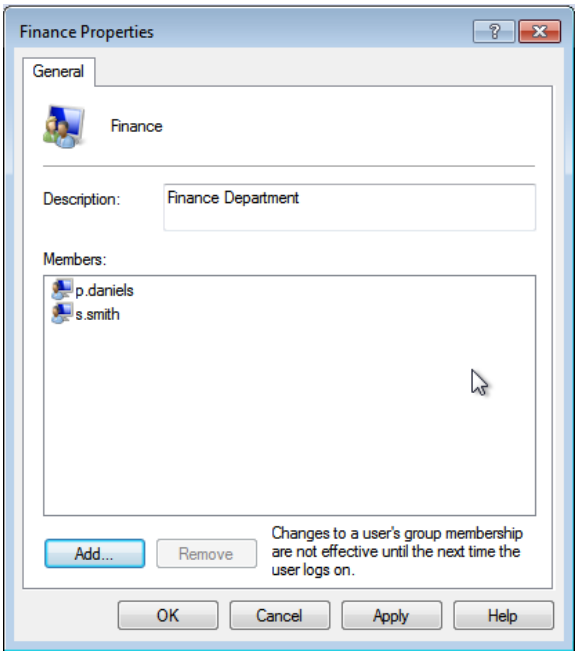
The screen below is displayed. Insert the Group name and a description, then select **Add.** This is where the members are added to a group.

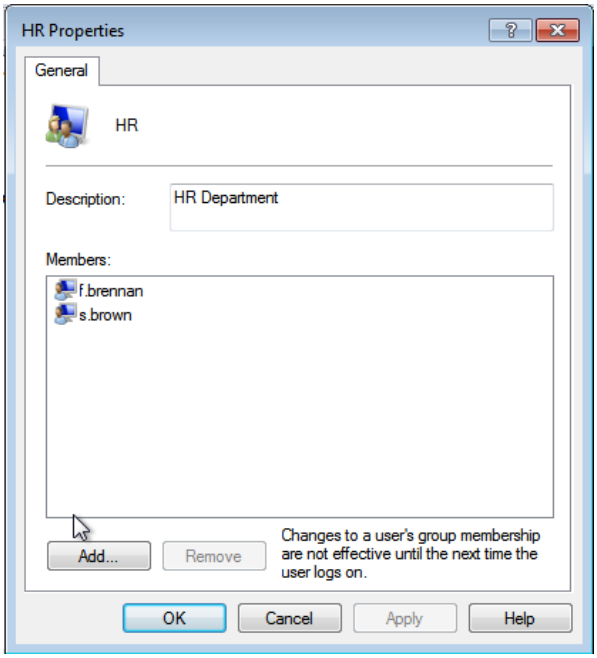


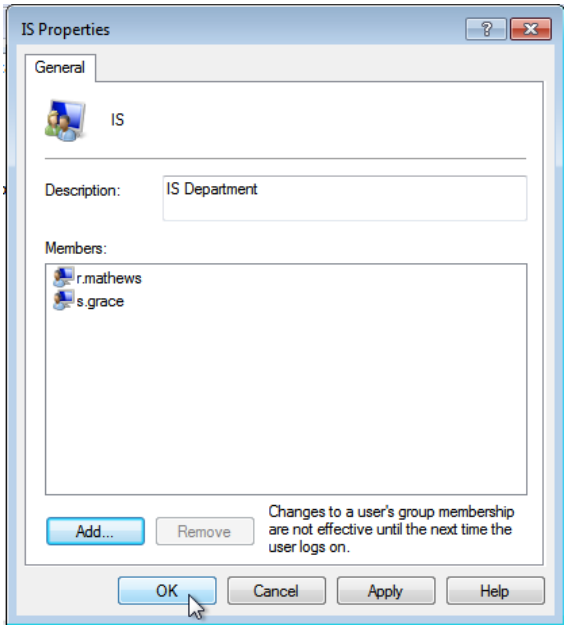
The screen below is displayed. Type the name of the user (e.g. s.smith), then press **Check Names**. Select **OK**. We will then add the other groups in the same fashion.

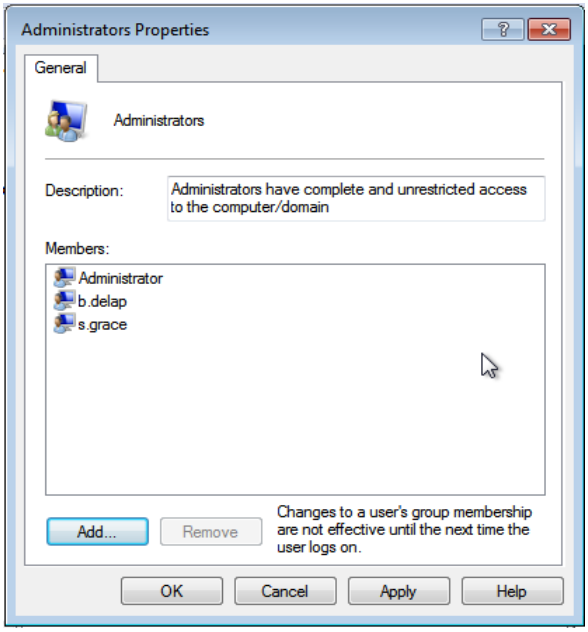


The following screens show the groups and their users.









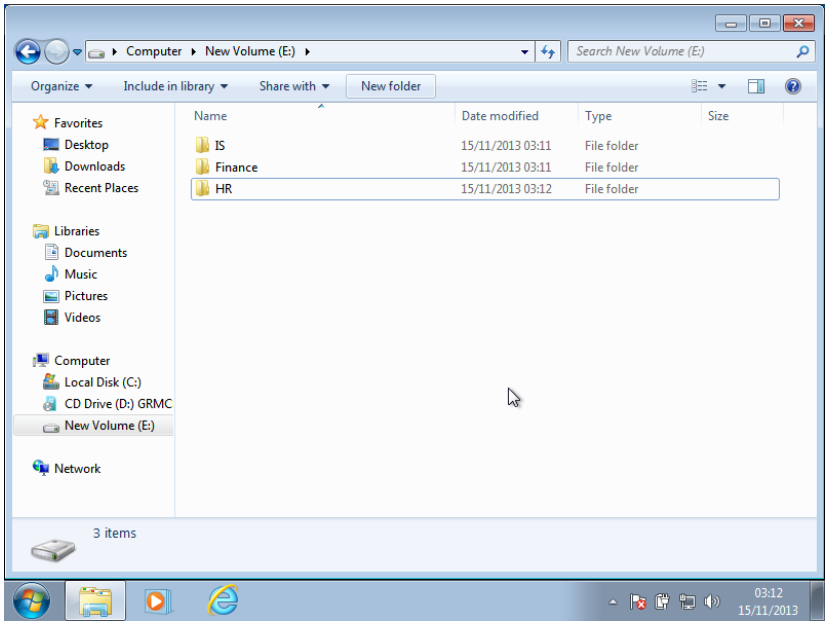
Second partition – create a folder structure to meet the following requirements:

Before carrying out any of the tasks below, you need to allocate space to the newly created disk partition (created on installation of Windows 7) and assign it a drive letter. See Appendix A – Allocating Disk Space.

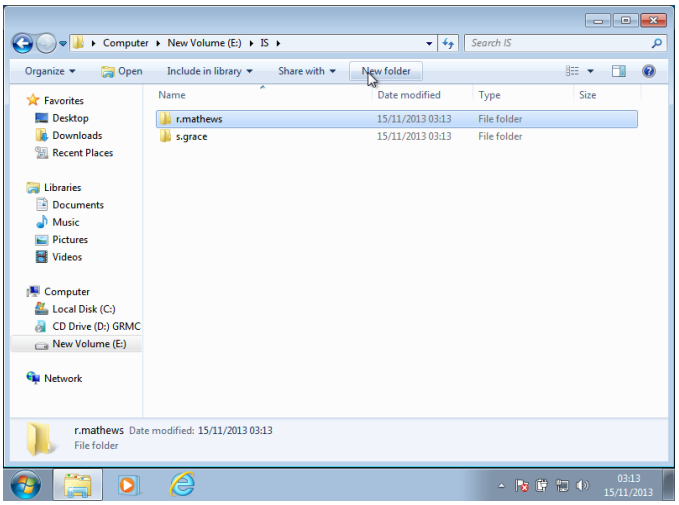
Each department should have its own folder with each user within the department having a private folder

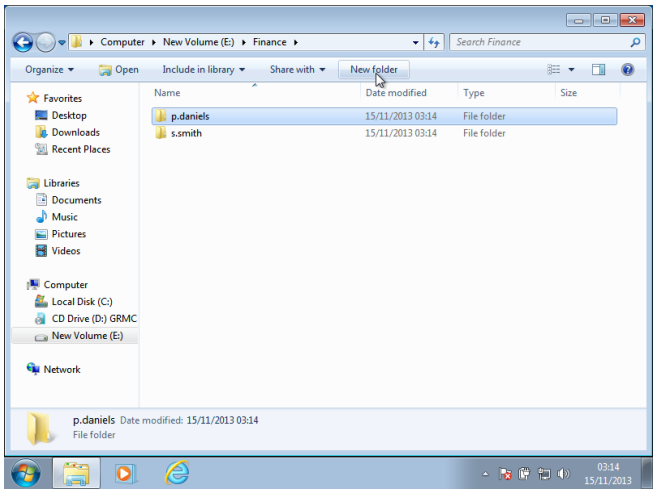
I will start by creating folders on the E: drive for the three departments: Finance, HR and IS.

From the **Start** menu, double click **Computer**, double click the **E: drive.** Select **new folder**, a new folder is created with the default name of "new folder". Overwrite this name with the desired name of your new folder. In my example I will create three folders – Finance, HR and IS.

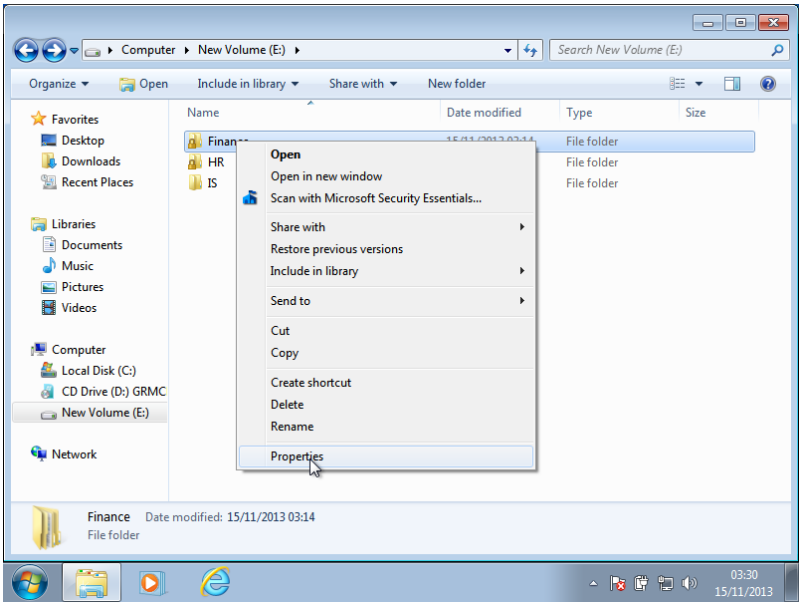


Within each folder, I will create sub-folders for each user.

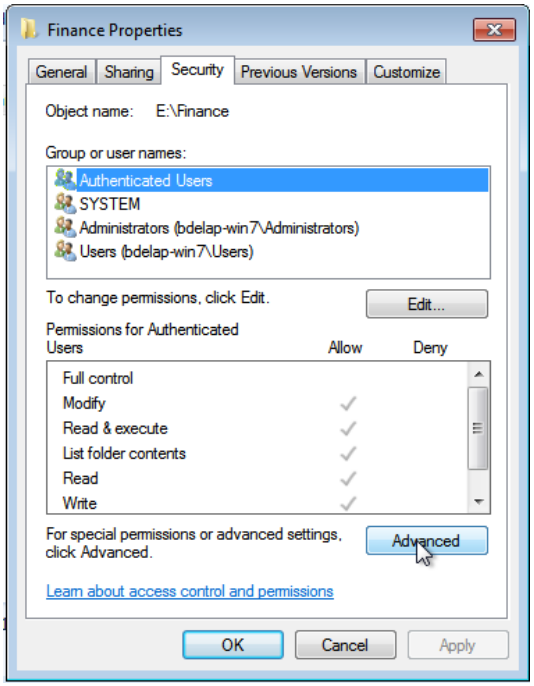


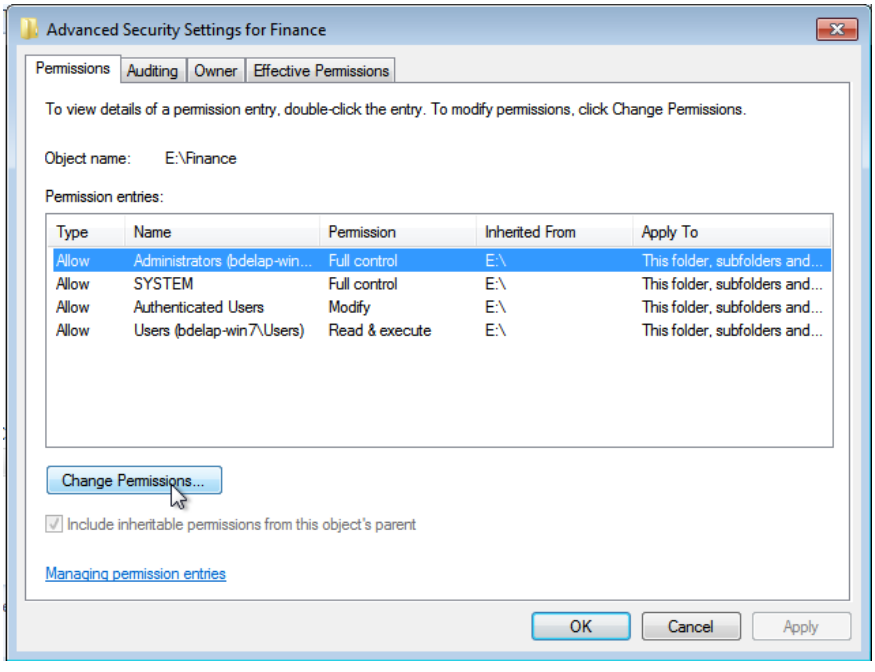


Passwords and user accounts provide **authentication**. After they have been set up we need to determine what the user can do with the available resources, this is called **authorisation.** In my example, I must restrict access to each folder to just Administrators and the appropriate Group. I will start with the **Finance** folder using the NTFS file security. Right click the folder and select **Properties.**

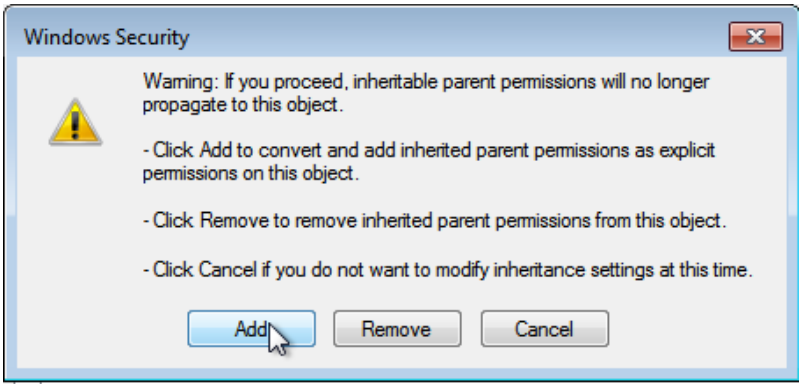


Select the **Security** tab. Here we see a list of the users who currently have access to this folder. These users have been given access through inheritance i.e. a folder inherits the permissions of its parent folder. Press **Advanced.** Select **Change Permissions**. The first thing we want to do is stop inheritance permissions, this is called an IRF (Inherited Rights Filter). We apply this filter by unticking the box "Include inheritable permissions from this object's parent".

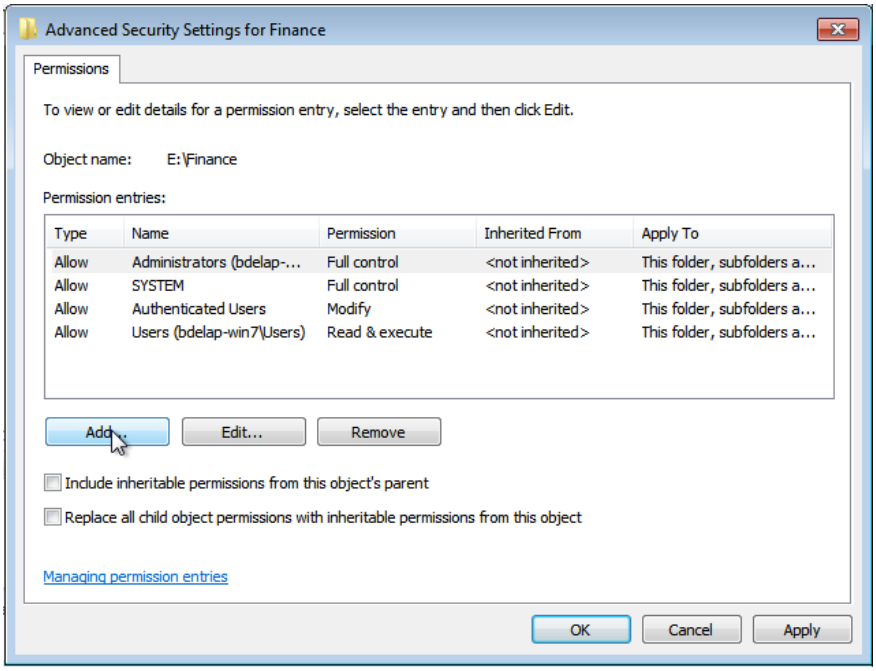




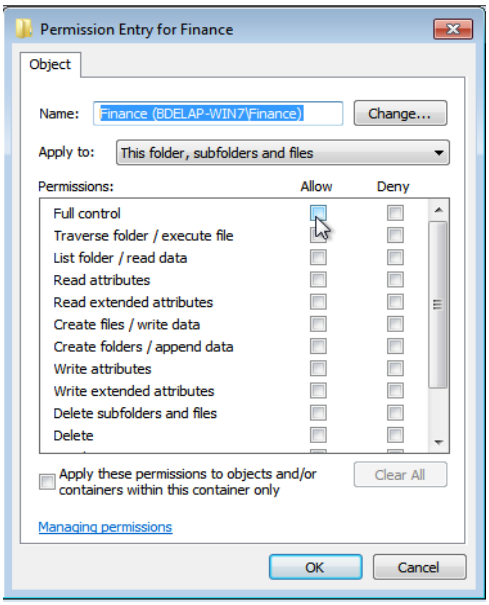
A **Windows Security** popup is displayed asking us if we wish to Add, Remove or Cancel. It is very important that we do **not** select Remove at this stage as by doing so we could actually remove permissions from ourselves and therefore would not be able to complete the task. The only time you would choose Remove is if you have already added the groups to whom you wish to grant permission. Select **Add.**



You will notice that the same users and groups are still listed but now they are listed as <not inherited>.

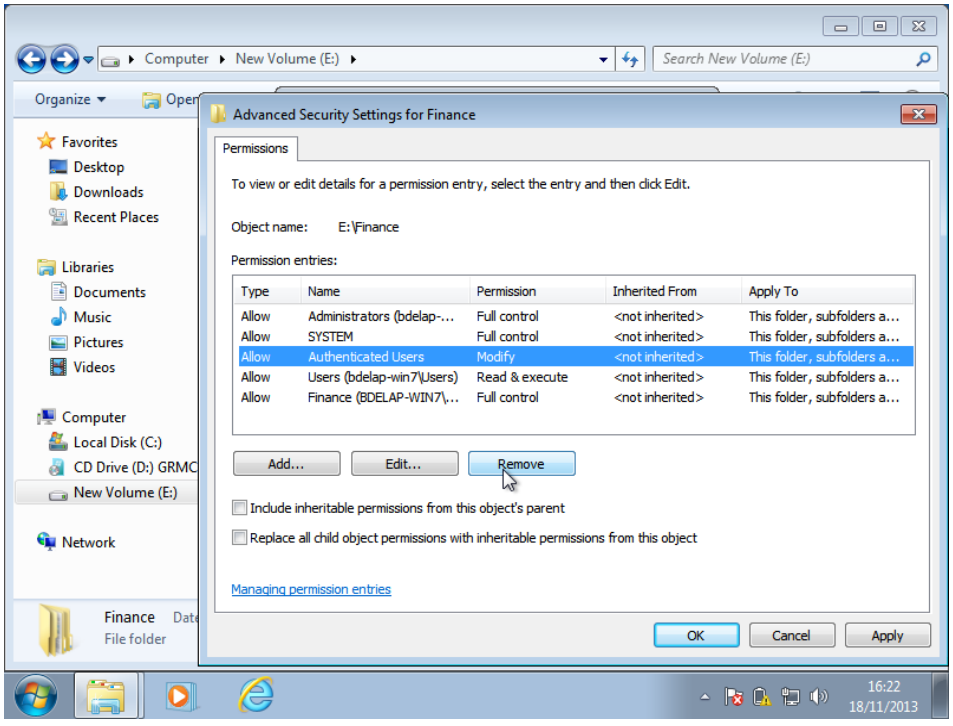


I will firstly **Add** the Finance group. This is known as an **Explicit** assignment as I explicitly allow access to this group. In the next screen type the name of the group and press **Check Names.** Press **Apply.** Press **OK.**



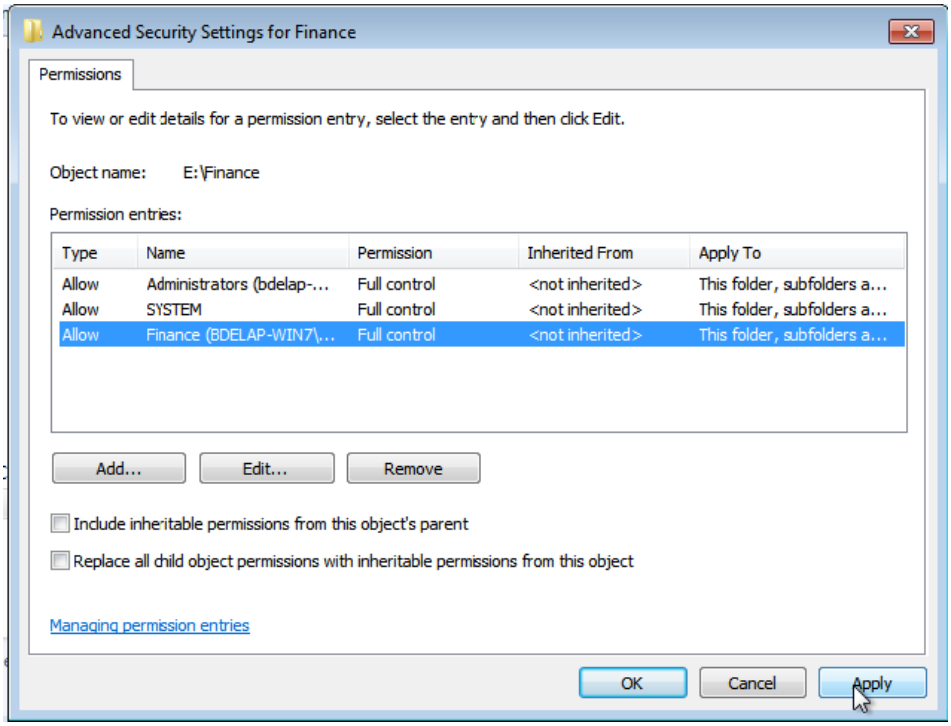
There are many types of permissions which are self explanatory. I will tick the first box **Full control** which will give the Finance group full control over the folder. Press **OK**. A tick will be placed in all the "Allow" boxes. Press **OK.** We are returned to the Advanced Settings screen (above)

I will now remove the groups to whom I do not wish to give access. Highlight the group and press **Remove.** This is known as **implicit** denial as they are denied by their absence on the permissions list.



I will leave the Administrators group as we want this group to have access to the folder. I will also leave the SYSTEM group as this group needs to be here for system processes such as backup. Press **Apply.** The only groups that have access to this folder are the users listed below. I have **explicitly** added these users to permissions. All other users are **implicitly** denied access to this folder.

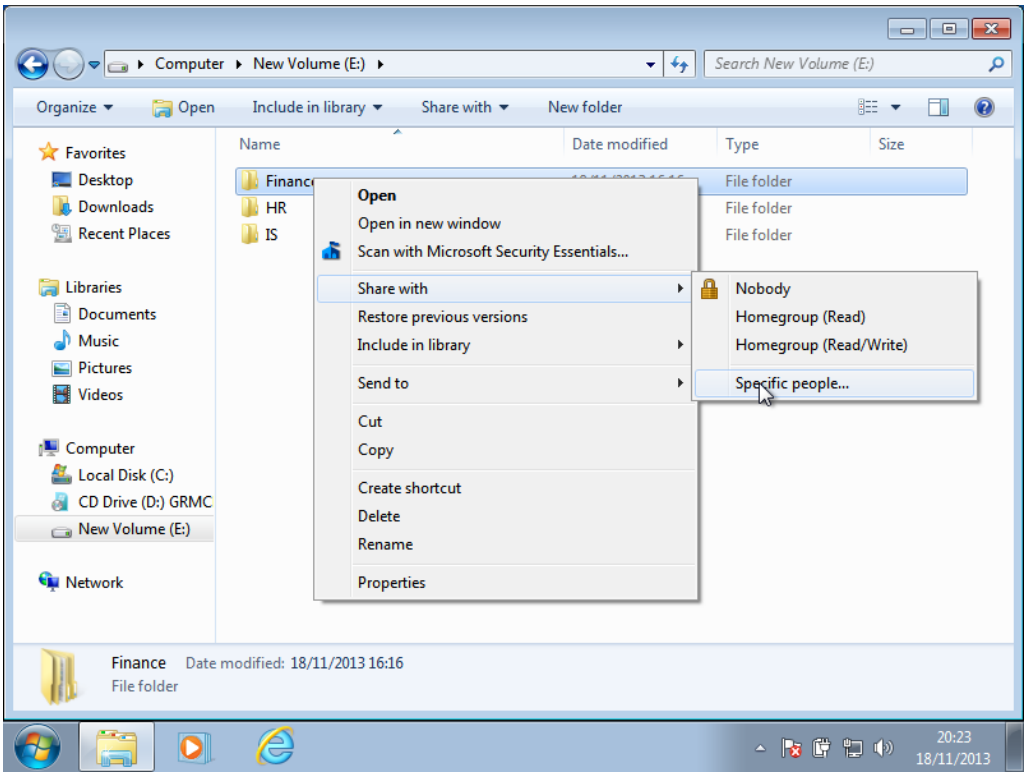
I also did exactly the same for the other two folders – IS and HR.



As users can belong to many groups, there are times where they may have different permissions. These permissions are combined. The golden rule of security is that **Deny Permission** overrides a **Grant Permissions.** If you are unsure of a user's or group's permissions on a particular file/folder, right click the folder name, select **Properties,** select the **Security** tab, select **Advanced,** select **Effective Permissions,** press **Select** to enter the user/group name, press **Check Names,** press **OK.** A list of that user's/group's permissions is then listed.

If your computer is going to be used on a network, you will also need to **share** your folders so that the various groups will have access to them. Share permissions only apply to networks. Even if a **share** permission is given to a user on a network, they will not be allowed access that file/folder unless they have permission with the NTFS file security system, so it is essential to use NTFS permissions. **Share** permissions are disregarded if the user is actually using your machine or using Remote Desktop to access your machine. **Share** permissions are given by default to the users/groups that have already been given NTFS permissions. To add a user/group with **Share** permissions, do the following:

From the **Start** menu, double click on **Computer,** select the drive where your files/folders are located. Highlight the file/folder that you wish to **Share.** Right click and select **Share with**, then select **Specific people.**



In the next screen, select a user from the dropbox ,or if you want to share with a group, type the group name in the box and select **Add.** The user/group will appear on the list of people with **Share** permission. They will be given **Read** permission by default. If you wish to change this, highlight **read** and select **read/write** or **remove.** Press the **Share** button. You are then given the option to email or copy and paste links to the folder. When you are ready press **Done.** You are then returned to the folder screen.

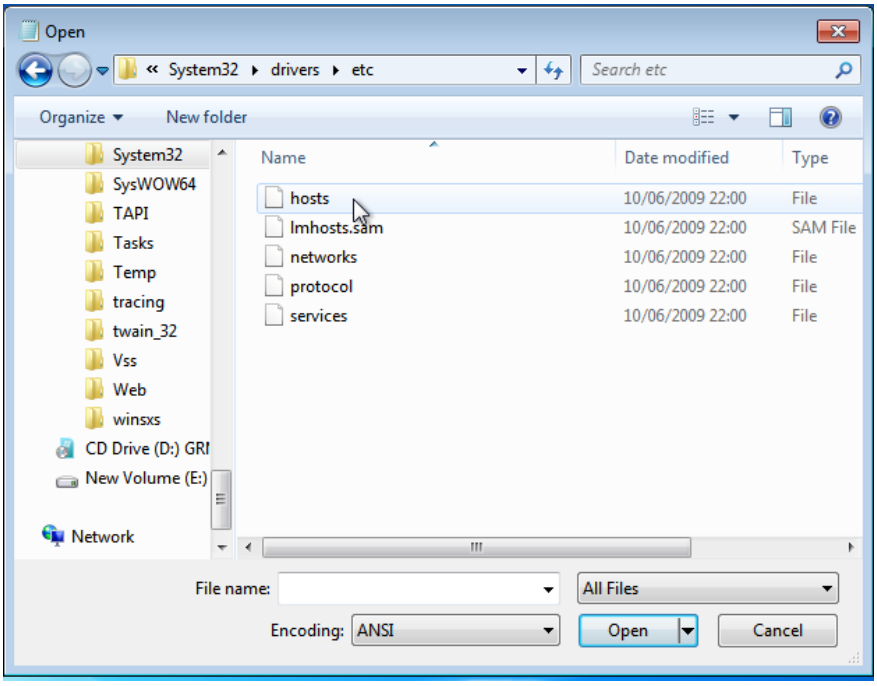
Block Access to Websites

In accordance with best practice, it is often company policy to block access to social media sites. While it is possible to block certain websites using firewall software or other programs, you can also block websites by editing the Windows host file.

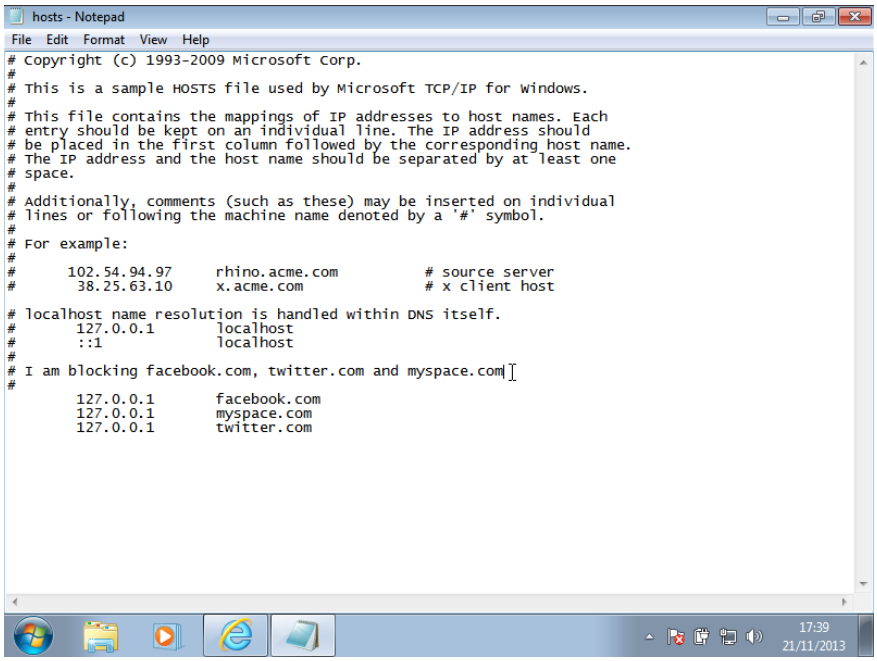
According to Wikipedia http://en.wikipedia.org/wiki/Hosts_(file) a host file is defined as follows:

> *The host file is a computer file used by an operating system to map hostnames to IP addresses. The hosts file is a plain text file, and is conventionally named hosts.*
>
> *The hosts file is one of several system facilities that assists in addressing network nodes in a computer network. It is a common part of an operating system's Internet Protocol (IP) implementation, and serves the function of translating human-friendly hostnames into numeric protocol addresses, called IP addresses that identify and locate a host in an IP network.*

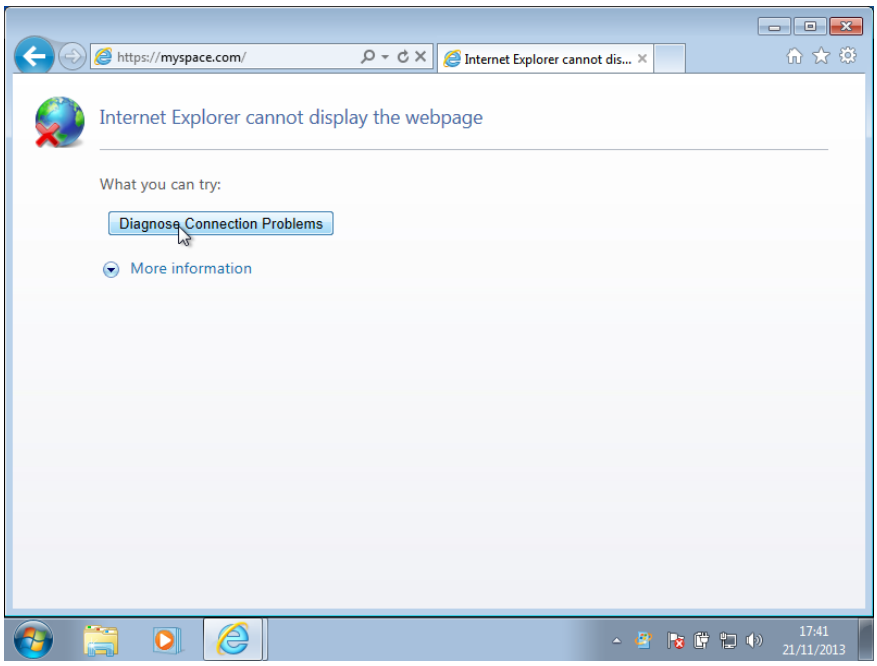
Select **Start** menu, chose **All Programs**, select **Accessories,** right click **Notepad,** select **Run as administrator.** You will be asked if you want to allow the program to make changes to your computer. Select **Yes.** In the **Notepad** screen, select **File, Open**. The host file is located in C:\Windows\System32\drivers\etc.



The address IP loopback address on the computer is 127.0.0.1. That means if I ping this address I am actually pinging my own machine. Using that loopback address, any unwanted domain name can be redirected back to the local machine. The next screenshot shows the changes I made to the host file. Press **File, Save** to save this file. You will need to restart the computer to implement these changes.



On logging back on to the computer, the following screen was displayed when I tried to access the blocked websites.

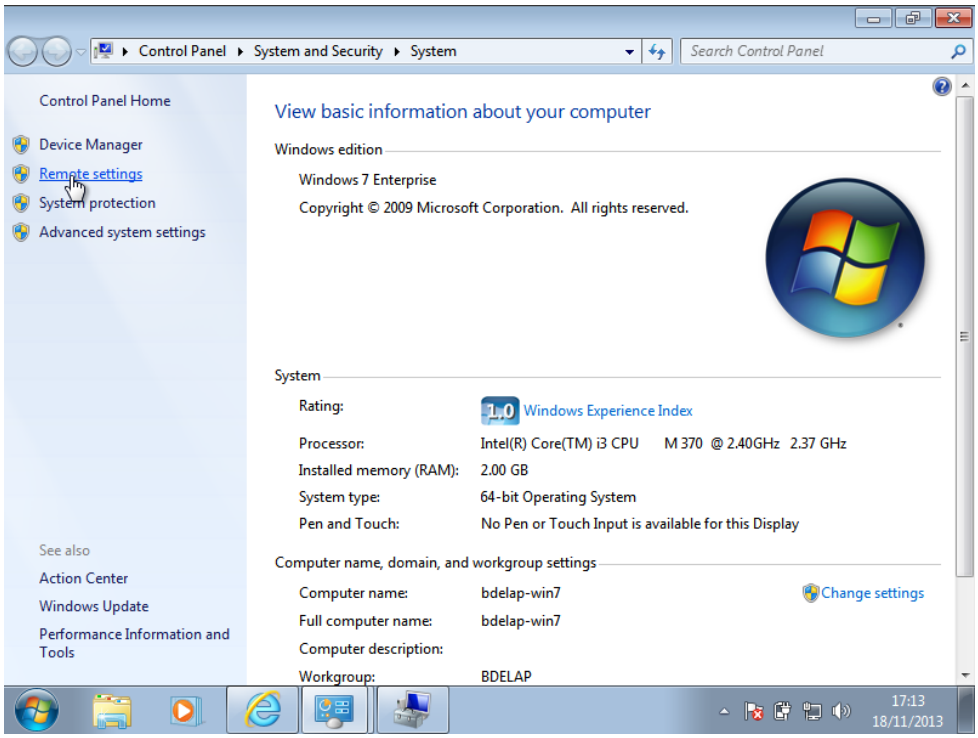


There was no problem accessing other sites.

A more ideal thing to do would be create a website at a specific IP address where this website would explain that the required website was blocked. The IP address of that website would then be used in the host file instead of the loopback IP address.

A4 Remote Connectivity

Remote connectivity is the ability to get access to your computer from a remote distance. If you or somebody in your company needs this kind of access, then you must set up **Remote Desktop** on your computer. To do this, from your **Start** menu, right click **Computer**, select **Properties.** Select **Remote settings.**



Select the **Remote** tab from the **System Properties** menu.

The top half of the screen deals with **Remote Assistance** which Microsoft describes as follows: http://windows.microsoft.com/en-ie/windows7/help-someone-with-a-computer-problem-using-windows-remote-assistance

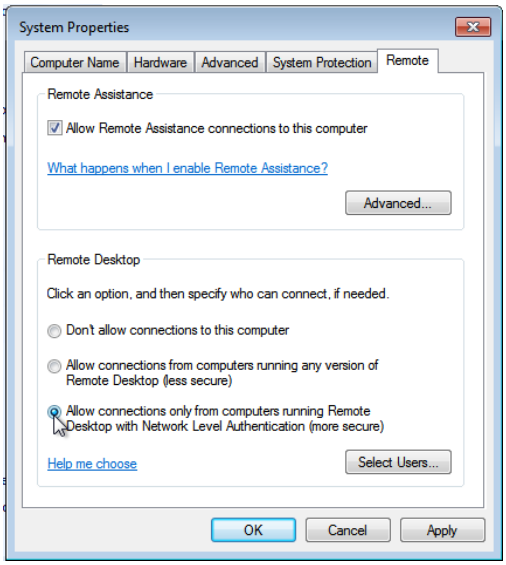
> *When you're having a computer problem, sometimes you might want help from someone else. You can use Windows Remote Assistance to invite someone to connect to your computer and help you, even if that person isn't nearby. Windows Remote Assistance creates an encrypted connection between the two computers over the Internet or the network that both computers are connected to.*

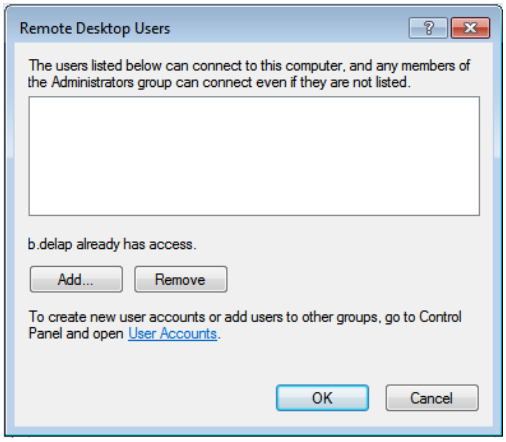
You give the other person a password so that he or she can connect. After connecting, the other person can view your computer screen and chat with you about what you both see. Your helper can use his or her mouse and keyboard to control your computer and show you how to fix a problem. You can also help someone else the same way. This is used by many Technical Support firms to support software

If you would like to be able to use Remote Assistance, Tick the box "Allow Remote Assistance connections to this computer".

Select one of the three buttons for **Remote Desktop.** The top button "Don't allow connections to this computer" will not allow anyone to access your computer. The second option allows users to connect who may not be running the same version of Remote Desktop. This is not as secure as the third option which only allows remote connections from users running the same version of Remote Desktop with Network Level Authentications.

Choose your option, then press **Select Users.** In the **Remote Desktop Users** screen you can add the users that you wish to give remote access. (You do this by pressing **Add,** on the next screen, enter the user's name and press **Check Names**, then pressing **OK).** The Administrators group do not need to be listed, therefore we will not add any names here. Press **OK.** On returning to the System Properties screen, press **Apply** and then **OK**

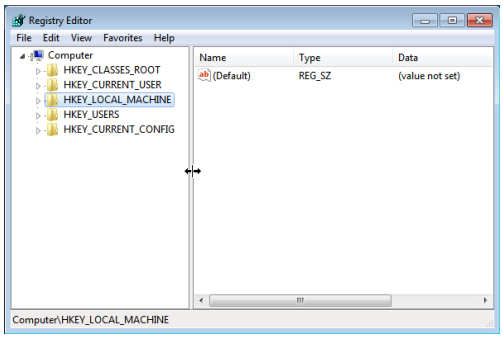




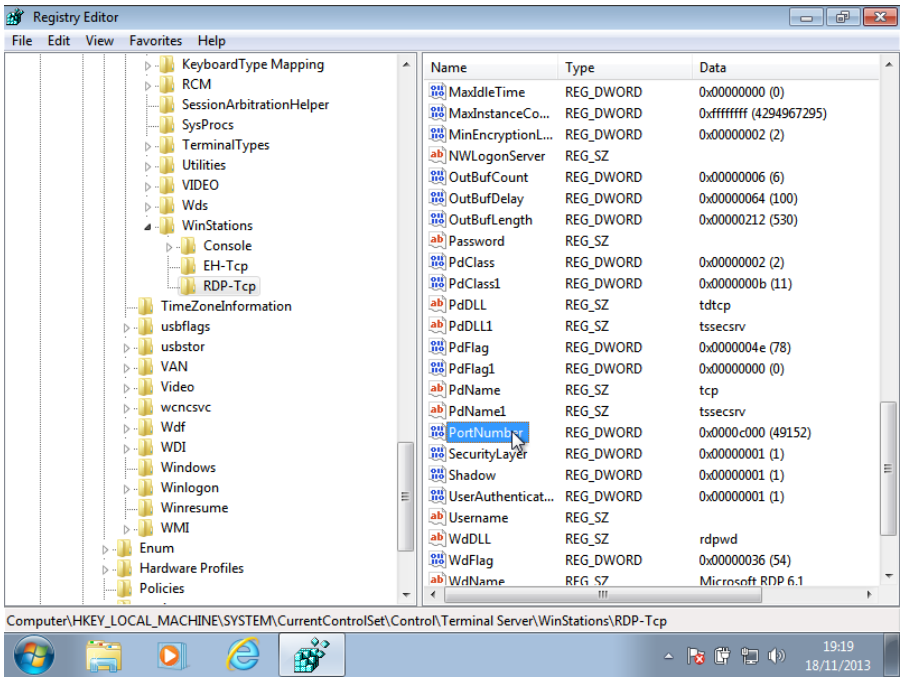
The default port for **Remote Desktop** is 3389. As a result, many hackers and unauthorised users will try to connect to this port if they wish to attack or infect your computer. We will therefore change the port for **Remote Desktop.** To do this, we need to edit the Windows registry.

The Windows registry is a database that houses the configuration settings for all of the software and hardware used on your computer. By altering these settings, you can alter the way your computer programs behave. Be very careful about changing any items in the registry. You should back up the registry before proceeding. If you wish to make a backup copy of your registry, see A8 – System Registry.

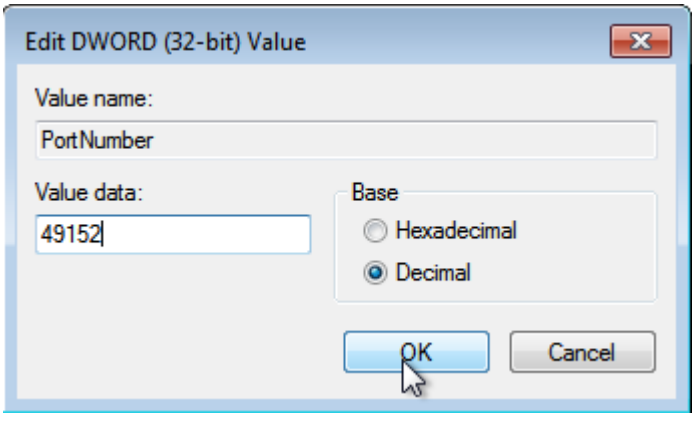
From the **Start** menu, type **regedit** in the "Search program and files" field. This will then list the "regedit" which you should double click. You are then asked if you wish the program to make changes to your computer. Select **Yes.** You are brought in to the registry editor screen.



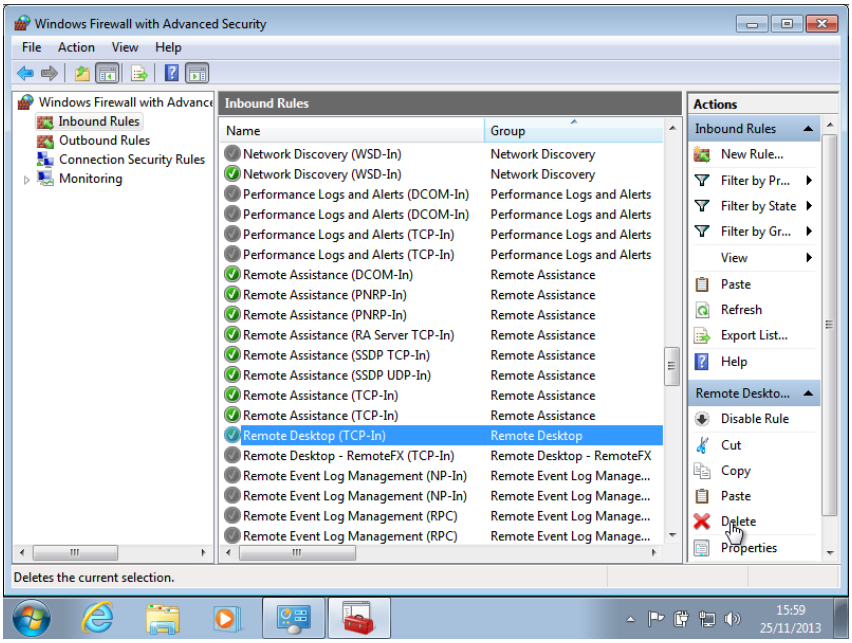
Expand the options by clicking each option as follows: HKEY_LOCAL_MACHINE; SYSTEM; Current Control Set; Control; TerminalServer; WinStations; RDP_TCP; PortNumber. Right click **Port Number** and select **Modify.**



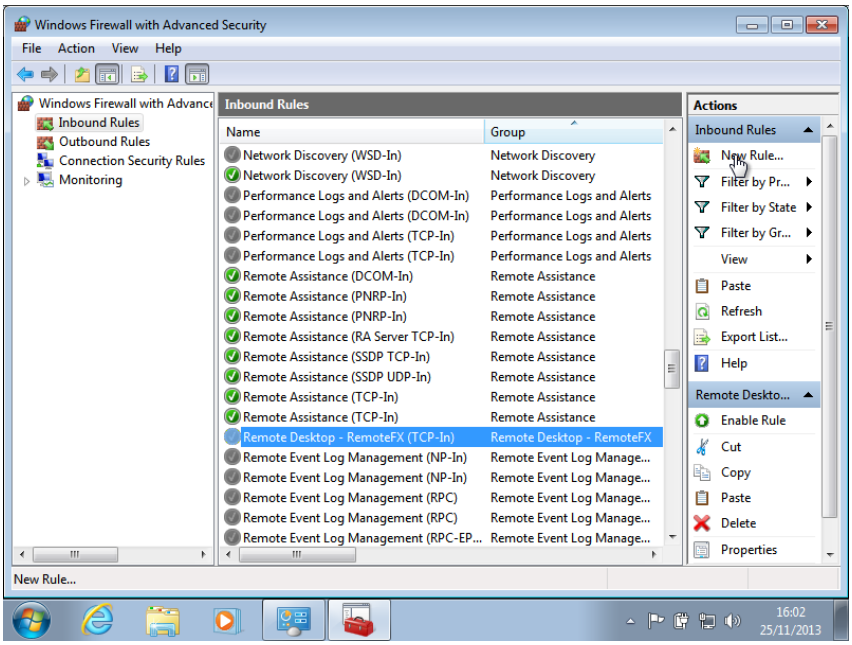
Port numbers 49152 to 65535 are dynamic and private ports that can be used by applications but cannot be registered by vendors. We will use port 49152. Select the **decimal** option and press **OK**. If a remote user wishes to access our computer we must firstly give them our external IP address and the port number which we have assigned to **Remote Desktop**. See Appendix F – Finding your external IP address.



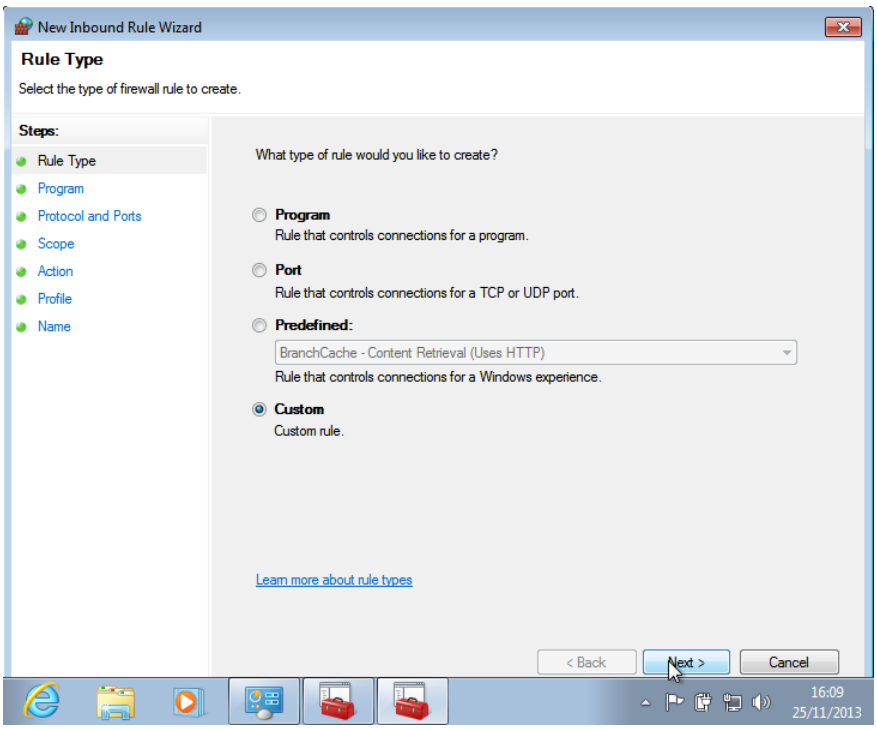
After changing the port number, we must now update our firewall settings to update the Remote Desktop port. To do this, from the **Start** menu, select **Control Panel,** select **System and Security,** select **Windows Firewall,** select **Advanced Settings,** select **Inbound Rules.** A list of rules is displayed. Scroll down to **Remote Desktop (TCP-In).**



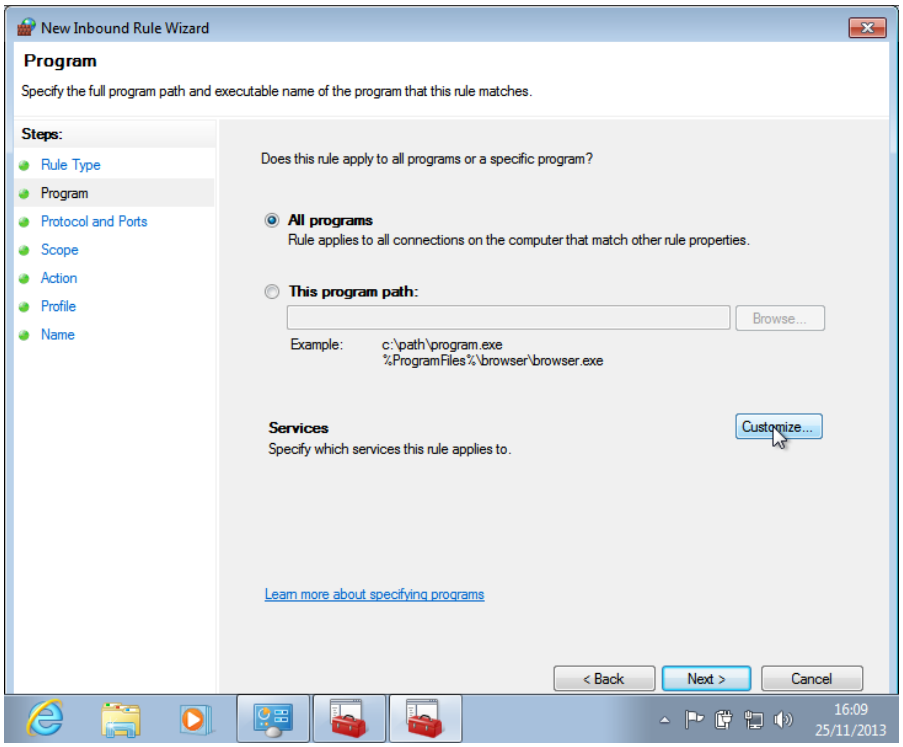
You are not allowed to change the port number in this rule. Therefore, we must delete the rule and recreate it in order to enter the new port number for Remote Desktop. Highlight this rule and press **Copy.** Then press **Delete** to delete this rule.



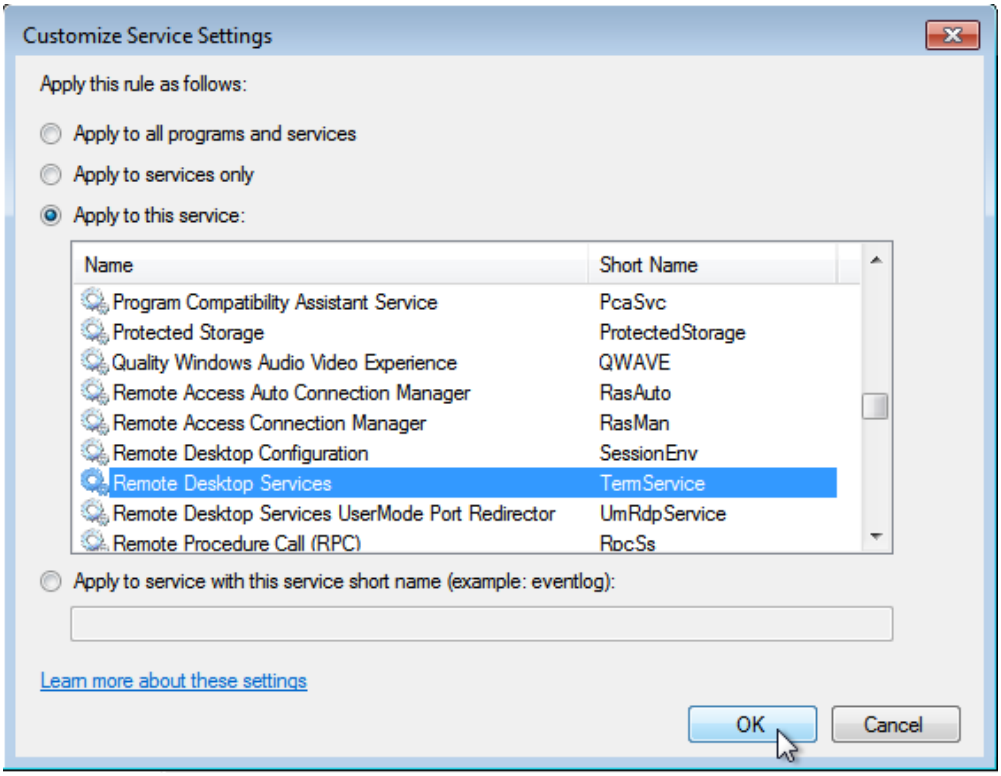
You will see that the rule is no longer on the list. Select **New Rule.**



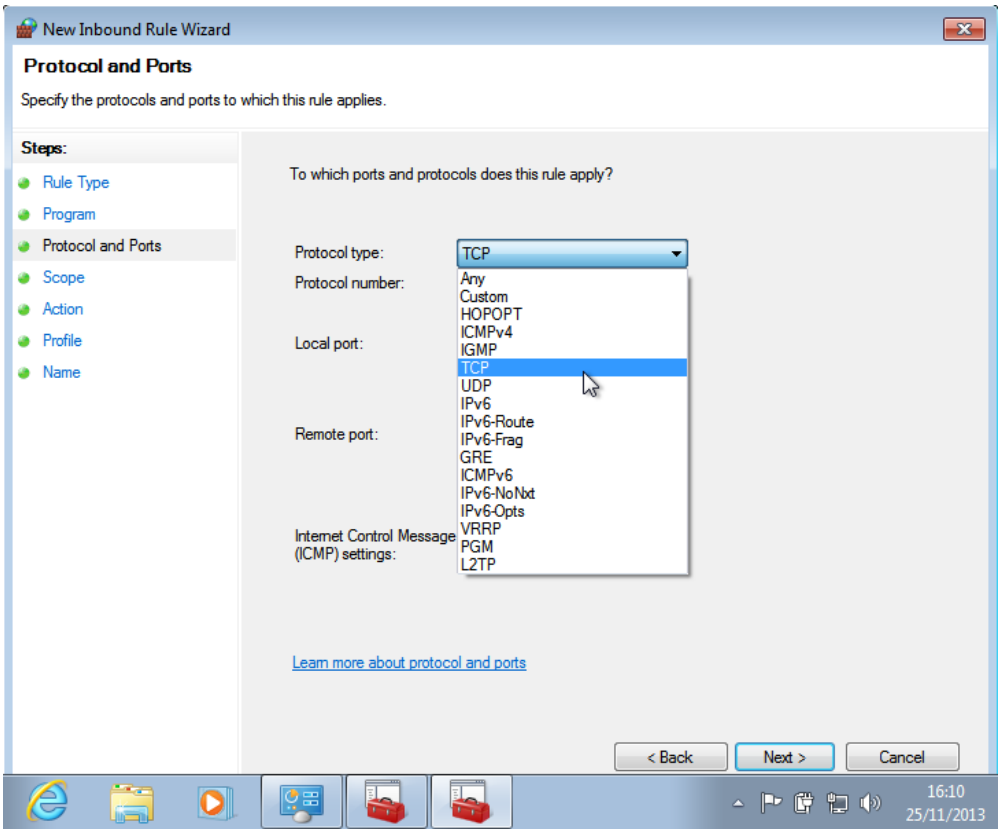
The **New Inbound Rule Wizard** screen is displayed. Select **Custom** and then press **Next.** Select **All programs** and press the **Customize** button.



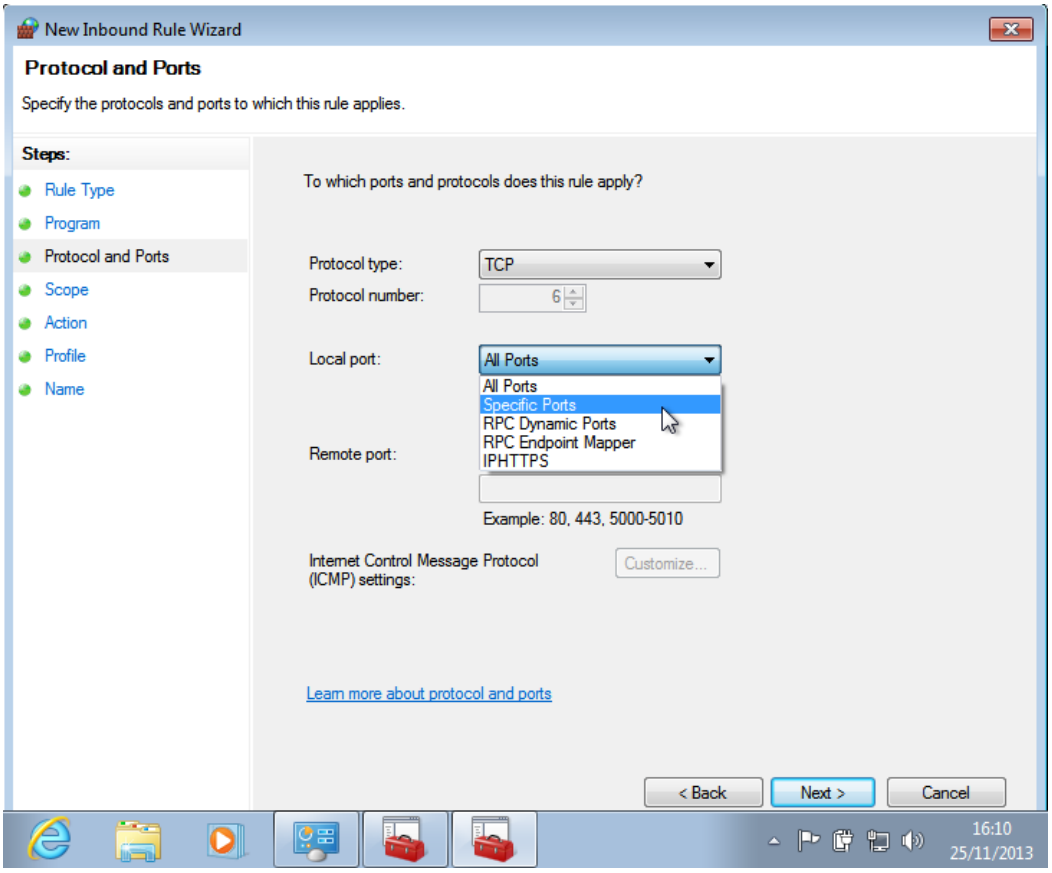
The **Customize Service Settings** screen is displayed. Scroll down to **Remote Desktop Services** and press **OK.**



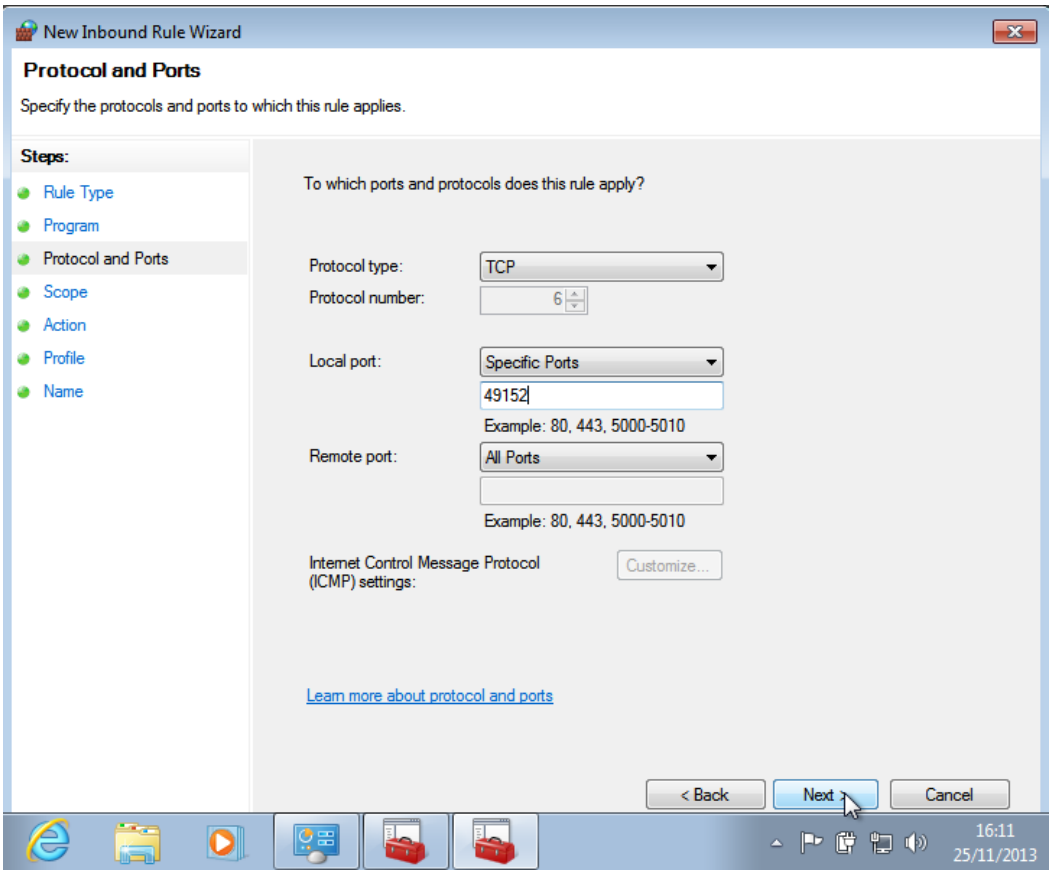
The **Protocol and Ports** screen is displayed. Select TCP from the drop down menu.



For local port select **Specific Ports.**



Type in the new port number **49152** and press **Next.**

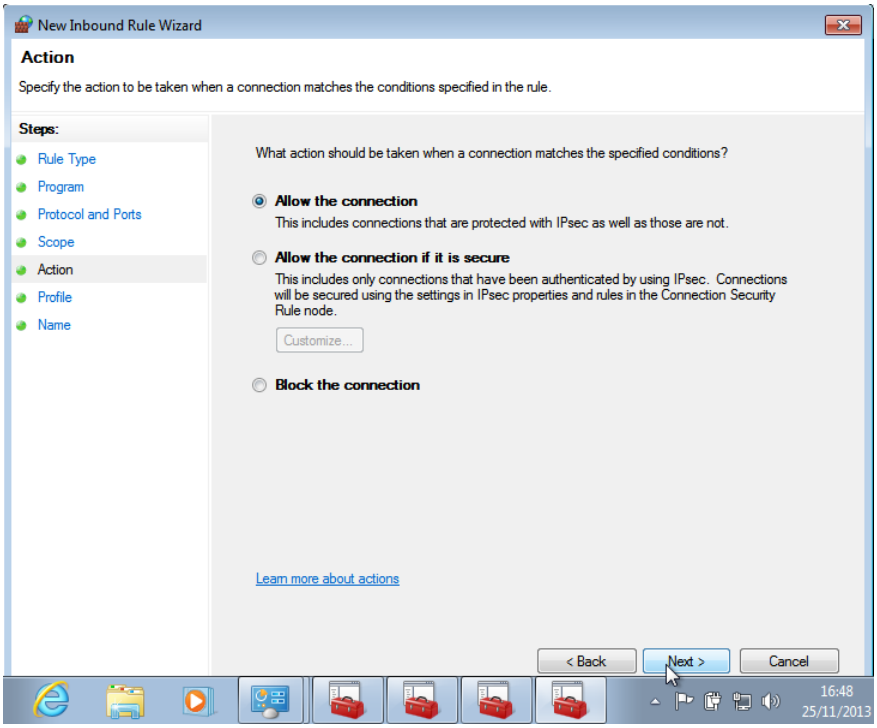


The next screen concerns the scope of the rule. Keep the defaults **Any IP Address** for both of the following questions :

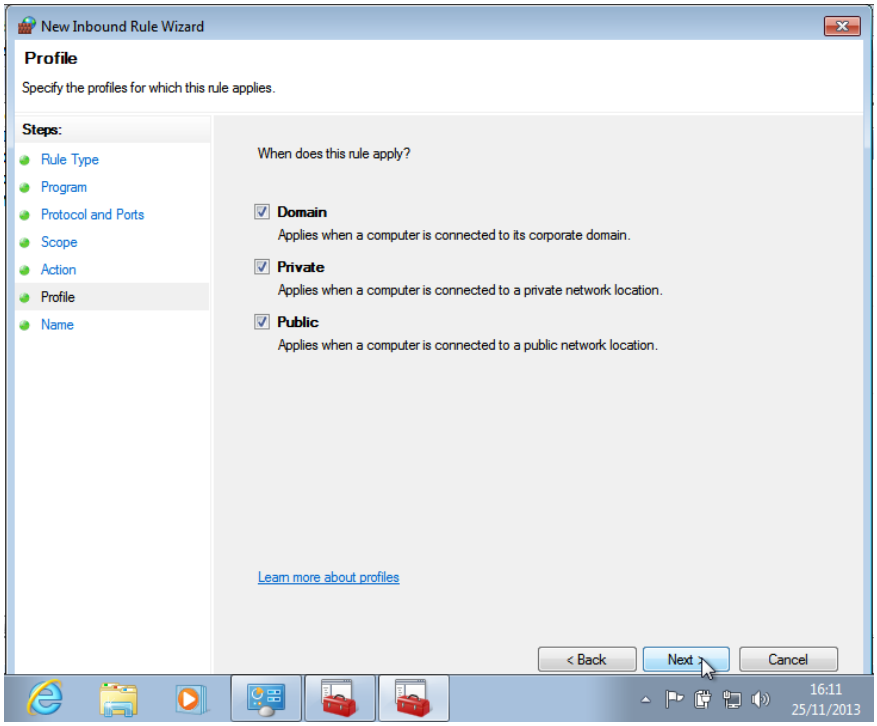
Which local IP address does this rule apply to?

Which remote IP address does this rule apply to?

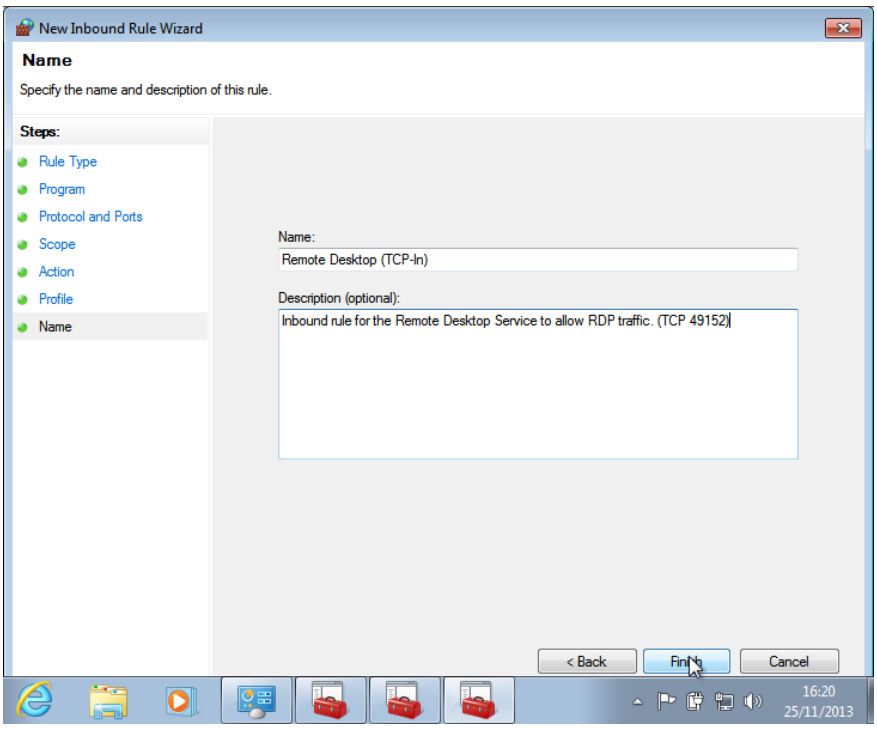
Press **Next.** The **Action** screen is displayed. Select **Allow the connection** and press **Next**



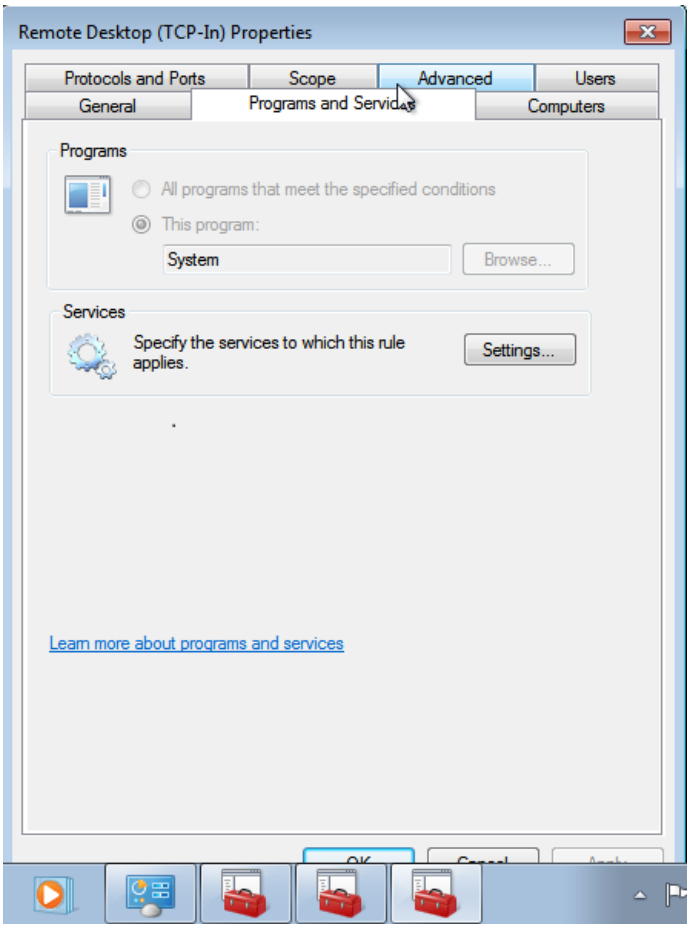
Tick all the boxes in the **Profile** screen and press **Next.**



Give the new rule a name and description and press **Finish.**



The **Customize Service Settings** screen is displayed again. The new rule will appear at the top of the list. Double click the new rule and select the **Programs and Services** tab. Select the **This Program** button and type in **System** to retain the settings of the original **Remote Desktop (TCP-In)** rule.

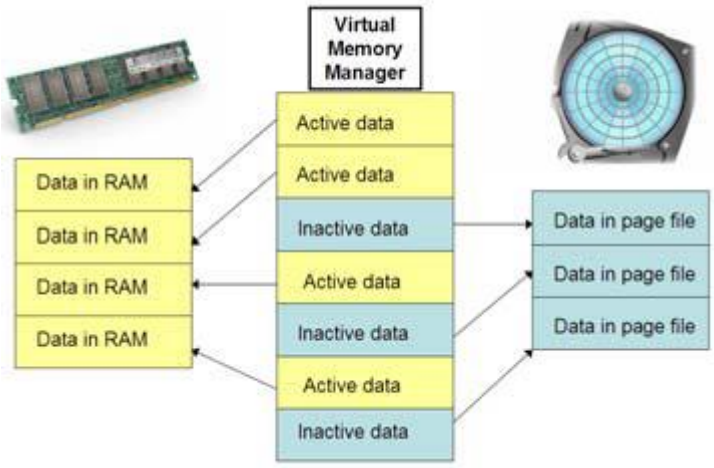


A5 Performance

Use swap file to improve performance

If your computer lacks the RAM to run a program or process, it uses virtual memory to assist it in this process.

It does this by combining your RAM with a file on your hard disk called a swap file (also known as a page file) called *pagefile.sys* in Windows. The inactive items on your computer are moved to the swap file, this is why you sometimes notice a slight delay when you maximise a minimised window or click on an application in a different window. The following diagram illustrates how Virtual Memory Manager works. Diagram taken from http://www.tombrett.ie/courses/msc-conversion/6%20Memory.pdf



The size of the swap file can be altered in Windows, where we can enter a minimum size value and a maximum size value, but we have to be careful as changing that size may increase or decrease performance. It is recommended that the virtual memory should be 1.5 times the number of actual RAM in your system. The swap file can be altered as follows:

Increasing the size of the swap file can lead to an increase in performance. However, sometimes it can lead to a decrease in performance as reading and writing to disk (i.e. the swap file) is much slower than dealing directly with RAM. This depends on the amount of physical RAM on your system.

Windows can be set **not to use virtual memory at all.** This can also increase performance as Windows is forced to always use RAM , and therefore there is no reading or writing to and from a swap file. However, by doing this we are limiting the number of applications that can run at one time as there may not be enough RAM. As a result applications may start crashing and displaying memory error messages.

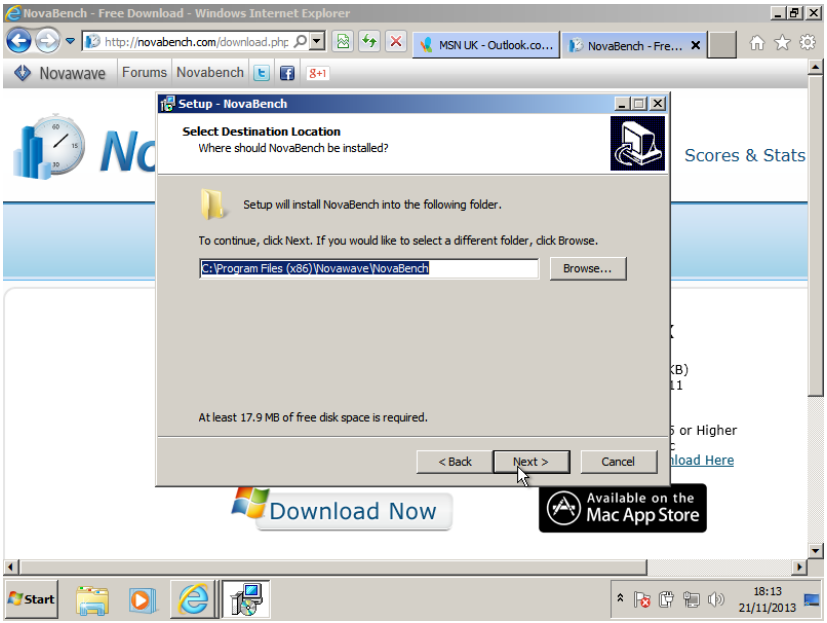
Setting the minimum and maximum swap file size to the same value. This increases performance as you don't have to deal with fragmentation when Windows increases the size of the swap file.

Moving the swap file to another drive or partition If the partition is on the same drive, there will be no performance improvement. If however you move the swap file to a separate drive and there's not much other contention for that drive, then performance will improve as writing and reading can take place at the same time. The best performance can be achieved by moving the swap file to a **solid state drive**. A solid state drive contains no mechanical parts allowing data transfer to and from storage media to take place at a much higher speed.

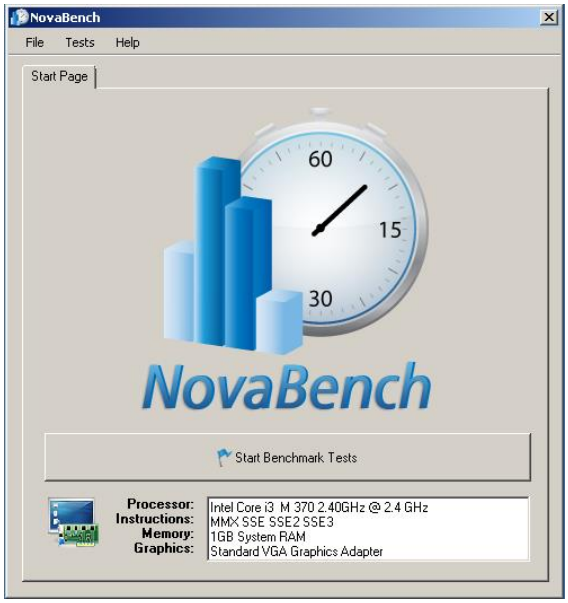
I will attempt to improve performance by increasing the size of the swap file and setting the minimum and maximum size of the swap file to the same value. But before doing this I want to download a benchmarking tool where I can measure performance before and after altering the swap file. I have decided to download Nova Benchmarking tool as it has been recommended by colleagues. It is also free of charge. To download, open Internet Explorer and go to Nova's home page www.novabench.com Select **Download Now.**

You are then asked if you want a Windows or Mac OS version, Select **Download Now** on the Windows icon. You are asked if you want to run or save **Novabench3.exe**, select **Run.** You may be informed that the publisher Novabench cannot be verified. You are asked if you are sure you wish to run this program. Click **Run.** You will then get a warning message from Windows asking if you want changes to be made to your computer. Click **Yes.** You are given a choice to accept or not accept the license agreement. Read through the terms and conditions. If you are happy to accept the terms and conditions, select **I accept the agreement** and press **Next.**

You are shown the default directory on your computer where Novabench will be installed. If you wish to change this, click **Browse** and select the drive and directory where you wish it to be installed. When ready, press **Next.**

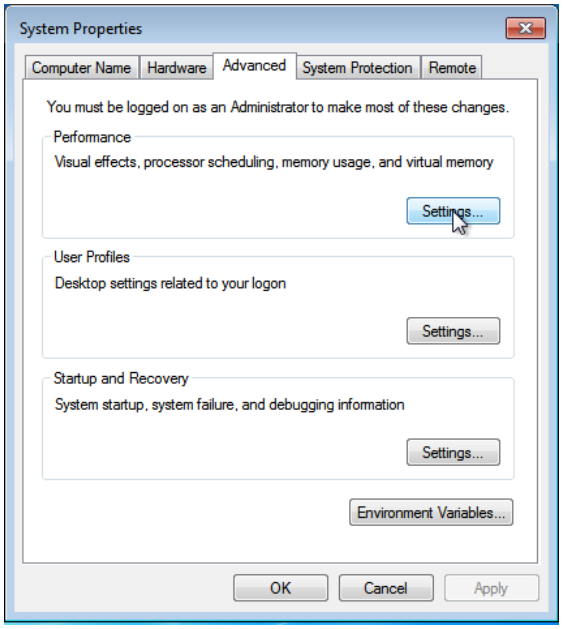


The default start menu folder is displayed with the default name **NovaBench.** If you wish to change this folder select **Browse** and enter the default start menu folder that you require. When you are ready, press **Next.** You are then shown the directories and folders where **NovaBench** will be installed. If you are happy with these directories and folders, click **Install.** A progress screen is displayed indicating the progress of the installation which takes approximately four minutes. A screen is then displayed saying **Completing the NovaBench Setup Wizard.** Press **Finish.** I will now check the current performance of my system before making the swap file change. The results are displayed on the next page alongside the results after altering the swap file.

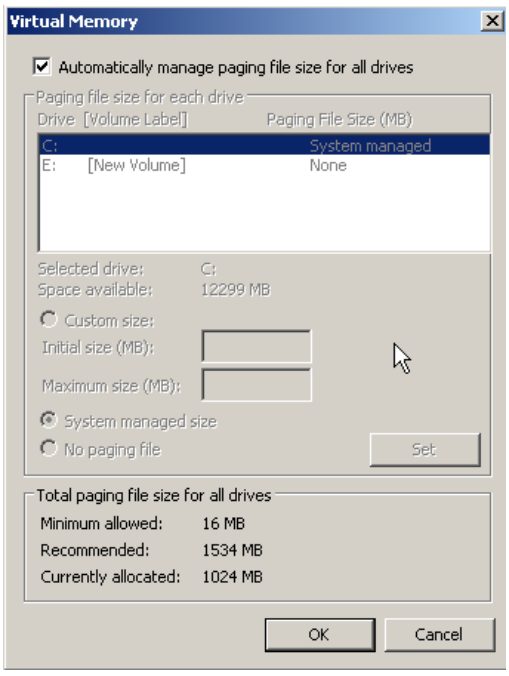


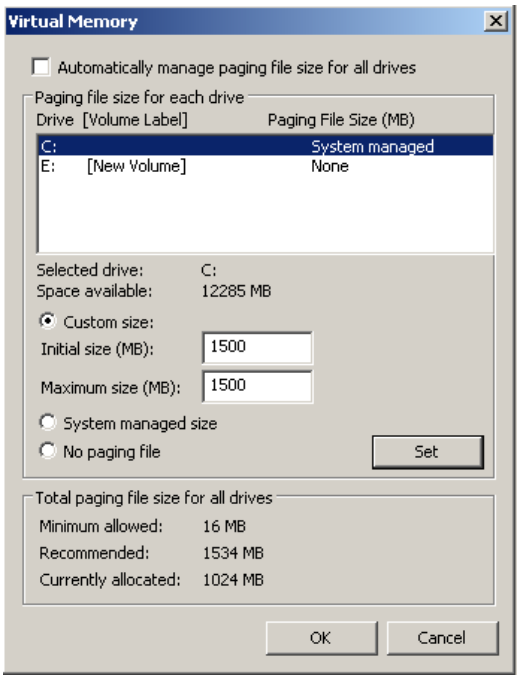
To make the change to the swap file from the **Start** menu type **Advanced System Settings.** Double click **View Advanced System Settings.**

The **Advanced** tab of the System Properties screen is displayed. Select **Settings** in the Performance section.



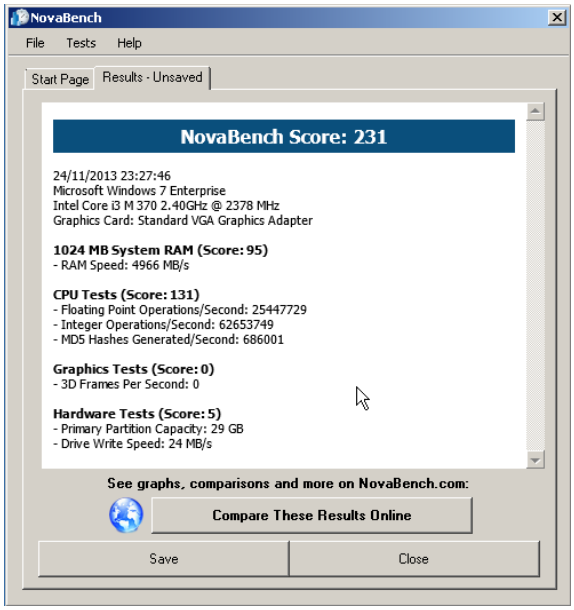
Select the **Advanced** tab of the **Performance Options** screen. On the virtual memory section, select **Change.** The **Virtual Menu** screen is displayed (below left). Firstly untick the tickbox **Automatically manage paging file size for all drives.** By doing this you are now allowed to change values on this screen. Select the button **Custom Size.** Because I have RAM of 1024 MB and the recommended swap file size is 1.5 times RAM, I will enter 1500 MB in to both the Initial size and the Maximum size (both increasing the size of the swap file and setting the minimum and maximum size of the wap file to the save value).



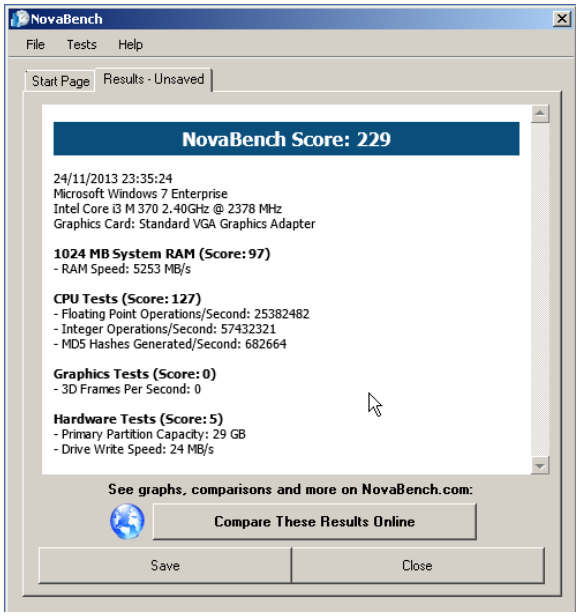


Press **Set.** Then press **OK,** you are returned to the advanced tab of the performance options screen. Press **Apply,** press **OK,** you are returned to the Systems Properties screen, press **OK.** You are informed that you must restart your computer to implement changes made. Press **Restart computer.**

The second test must now be done to compare the performance results. You can see from the results below that there is a slight performance improvement from a RAM speed of 4966 MB/s to 5253 MB/s



Before swap file increase



After swap file increase

A6 Email Accounts

The two main email protocols are POP3 and IMAP.

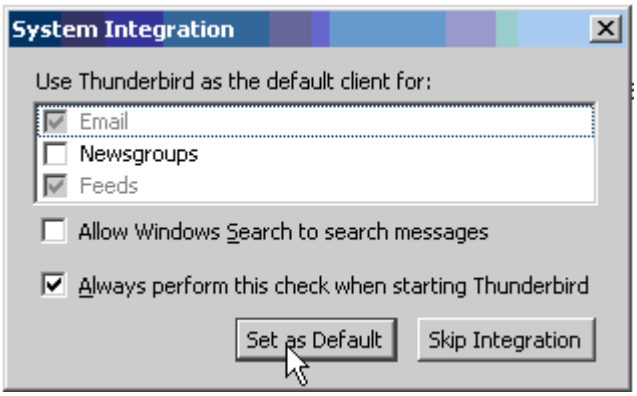
POP3 was originally called POP (Post Office Protocol). It dates back to when bandwidth was low and was designed to download email for offline reading. After downloading, the emails would then be deleted from the remote server. Since emails are deleted on the remote server they are tied to the machine on which they are downloaded and cannot be accessed via webmail or any email client on a different device. An email client (application to handle email) needs to be installed on a device in order to use POP3 e.g. Thunderbird.

IMAP (Internet Message Active Protocol). This protocol actually stores an email message on a remote email server until it is deleted by a user. The user logs in to that server either using a browser or a using an email client (such as Thunderbird). Because the messages are stored remotely, users can use many devices or clients to view the same message. IMAP has become very popular as people now use many devices to access their email e.g. smart phone, tablet, PC. Because IMAP stores messages remotely, you have a limited mailbox size depending on the settings provided by the email service. To overcome this you can use an email client such as Thunderbird to store a local copy of emails and delete them from the remote server.

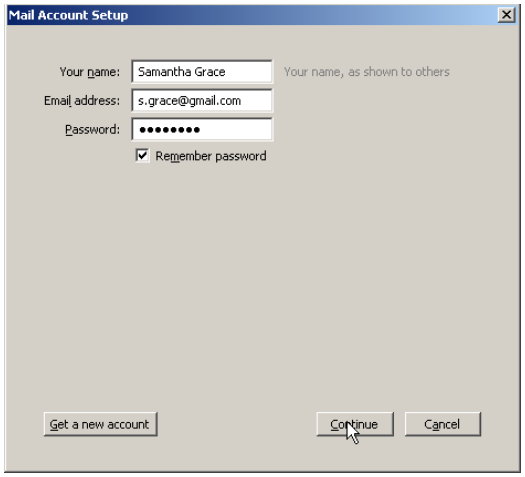
SMTP (Simple Mail Transfer Protocol). This is an outgoing mail service that handles the sending of email messages to the internet. An SMTP only handles the outgoing messages and is used in conjunction with the incoming mail servers POP3 and IMAP.

On reviewing the various email clients available to download free, I have decided on Thunderbird. To download Thunderbird open the website: www.mozilla.org/en-gb/thunderbird Press the **Thunderbird Free Download** button. You are then given the choice to run or save the program file, select **Run.** You are asked if you want to allow the following program to make changes to your computer, select **Yes.** You are then welcomed to the Mozilla Thunderbird Setup Wizard. Press **Next.** Choose **Standard** installation and press **Next.** The default installation directory is displayed. If you are happy with this directory press **Install**. The installation will take approximately 60 seconds. A screen is displayed informing you that it is Completing the

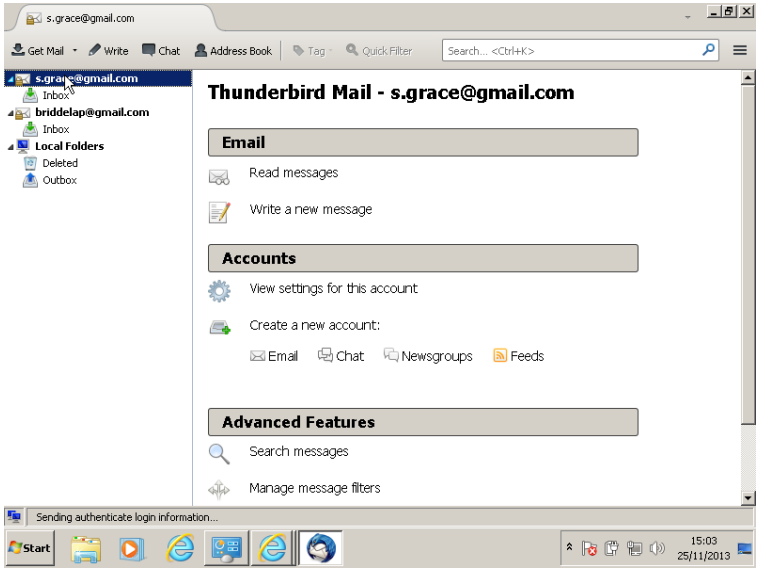
Mozilla Thunderbird Setup Wizard, press **Finish.** Thunderbird automatically opens in the Accounts screen where you can choose to setup Thunderbird as the default client for email and feeds. Select **Set as Default.**



The Mail Account Setup screen is displayed. Enter your name, email address and password and press **Continue.** I will set up the user Samantha Grace with an email address of s.grace@gmail.com The Mail Account Setup screen is then updated with the type of protocol, which is IMAP and the domain name for the email service provider (in this case gmail.com). Press **Done**



The account for Samanta Grace is displayed.



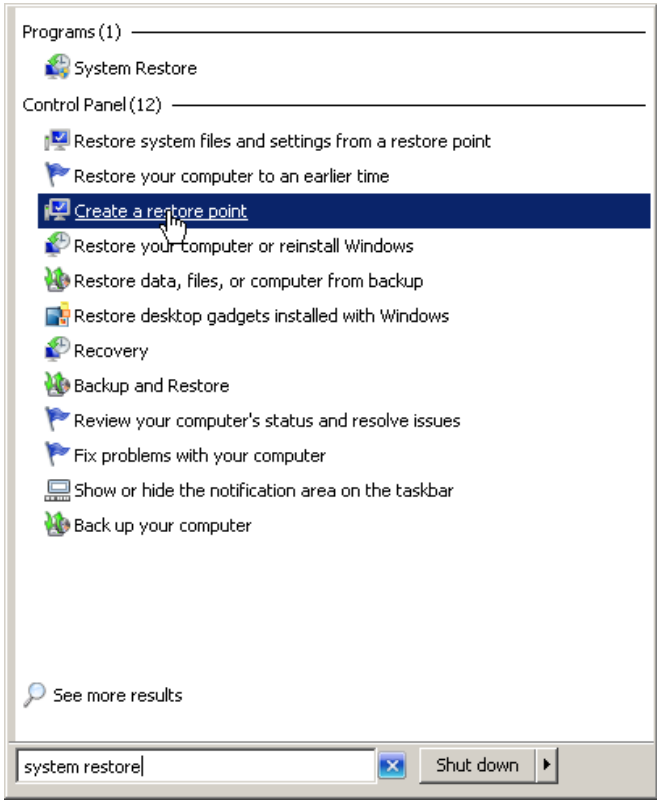
A7 System Restore Setup and Testing

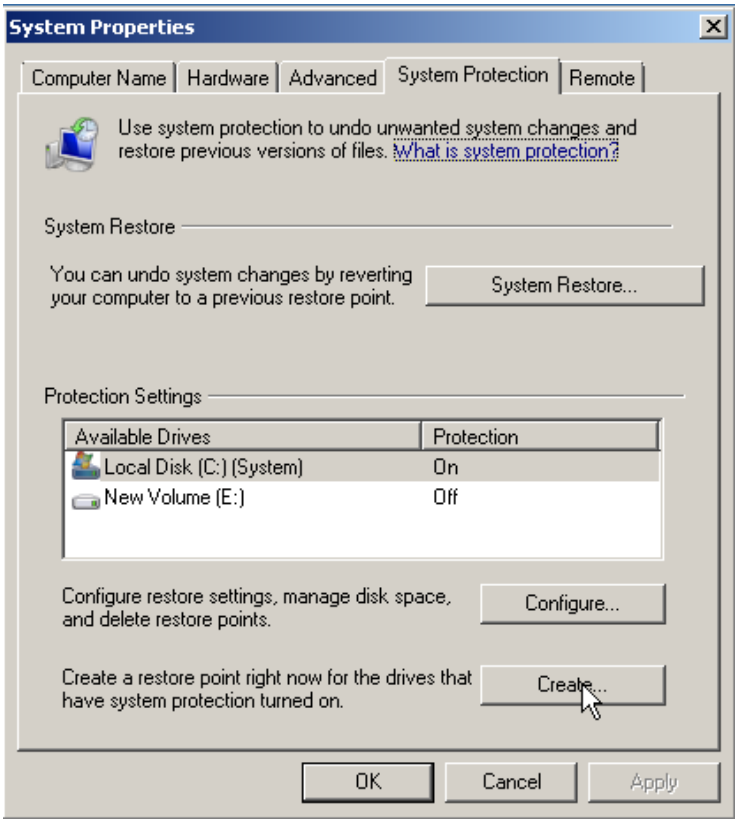
System Restore is a feature in Windows that allows you to restore your system's files to an earlier point in time. It's a way to undo system changes without affecting your data. Changing Windows settings or installing a new application or driver can sometimes have an unexpected affect on your computer. In this situation, System Restore will return your system to behave as it did before that installation. Windows automatically creates System Restore points every week and before the installation of a program or device driver. You can also create System Restore points manually. It is advised that a manual System Restore Point should be created before changing any Windows settings or files.

When a user restores a PC to an earlier restore point, Windows automatically creates a new restore point for the current system settings before actually restoring to that earlier restore point.

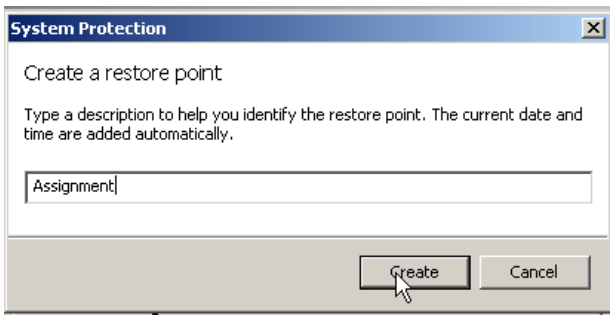
System Restore does not restore data so you need to have a proper backup plan in place in case data files such as documents, spreadsheets, photos are lost or corrupted.

To demonstrate System Restore, I will create a System Restore Point as follows. From **Start** menu, type "system restore" in the search programs field. Double click **Create a restore point**. The System Protection tab of the System Properties screen is opened. Highlight the **C:** drive and press **Create.**





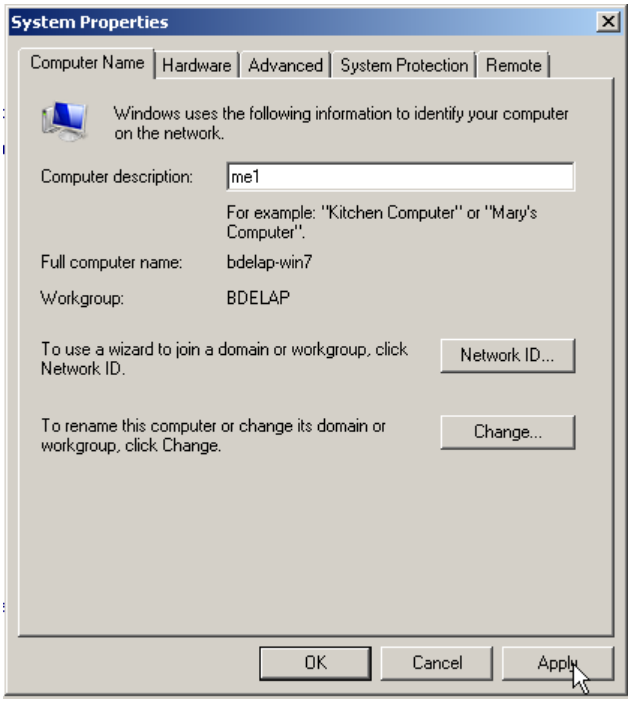
Type a name (this should be meaningful so that you will recognise it if you wish to restore at a time in the future). Press **Create.**



It will take approximately 60 seconds to create the restore point. A message is displayed informing you the restore point was created successfully. Press **Close.** You are then returned to the System Properties screen.

I will now make the following changes:

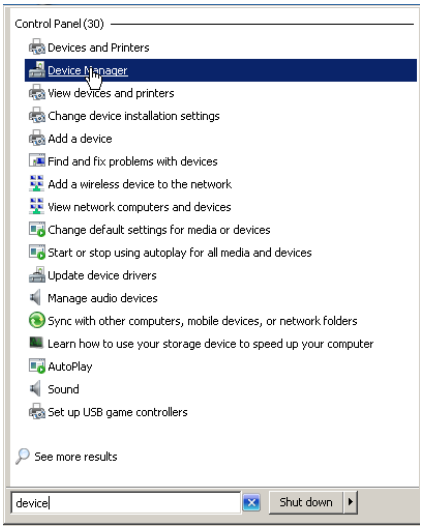
1. Change the name of the machine to "me1". In the System Properties screen, select the **Computer Name** tab. Type "me1" in the Computer Description and press **Apply.** Press **OK.**



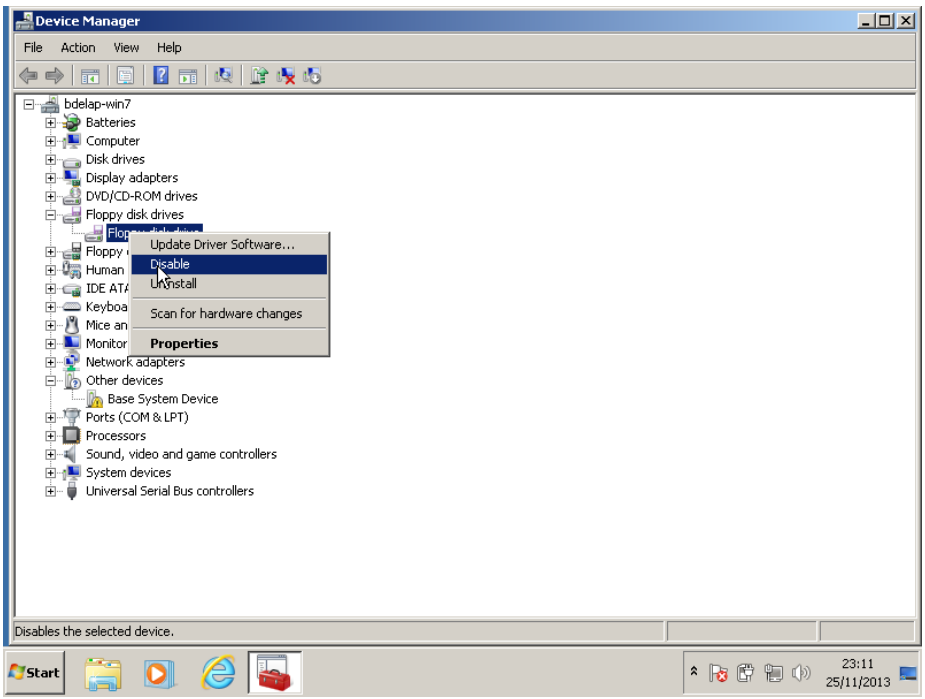
2. From the **Start** menu, select **Computer,** select **Desktop** which will take you in to the Desktop folder. Create two new folders called **folder1** and **folder2.** Double click **folder1** and create a text file called **notes** (To create a text file, right click within the empty folder, select **New**, select **Text Document**. A new file is then created with a default name of 'New Text Document'. Overtype the default name with **notes** to change the name of the new document). Double click on the document **notes**, this will open

Notepad. Type your name. Select **File** then **Exit.** You are then given the option to Save, Not Save or Cancel. Choose **Save.**

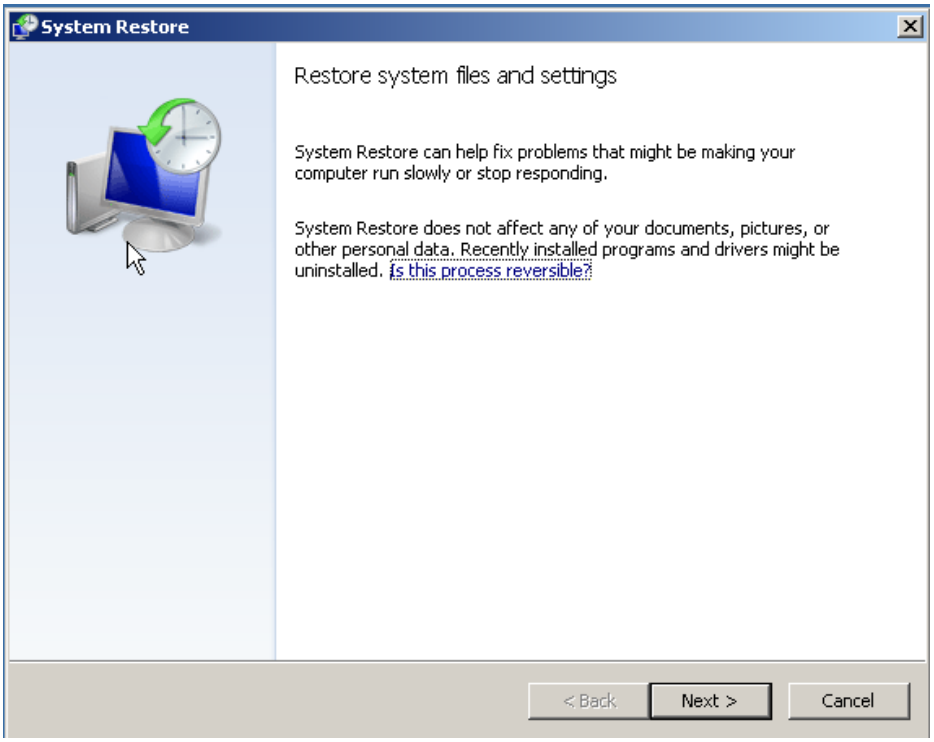
3. Disable the floppy diskette within the machine. From the **Start** menu, type **device manager** in the search program and files field. Double click **Device Manager**



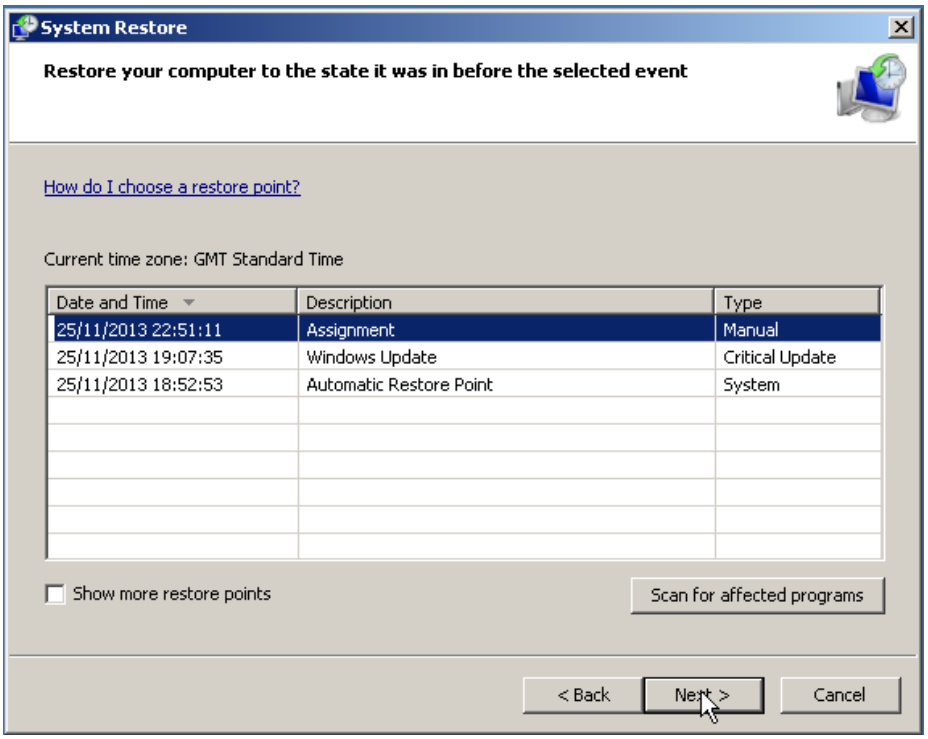
All hardware devices in your computer are listed. Double click on **Floppy disk drives** to expand. Then right click on **Floppy disk drive** and click **Disable.** You are advised that disabling this device will cause it to stop functioning and you are asked if you really want to disable it. Select **Yes.**



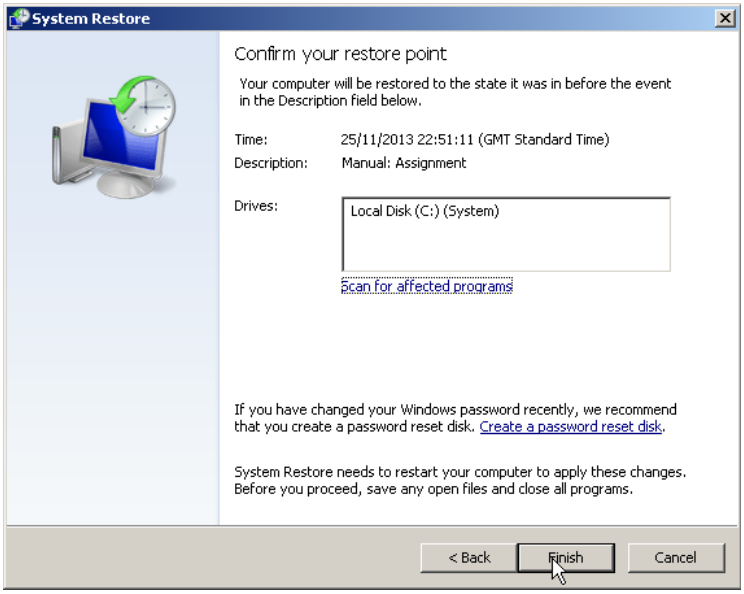
I will now restore my computer to the restore point created called **Assignment.** From **Start** menu, type "system restore" in the search programs field. Double click **System Restore.** The System Restore screen is displayed. Press **Next.**



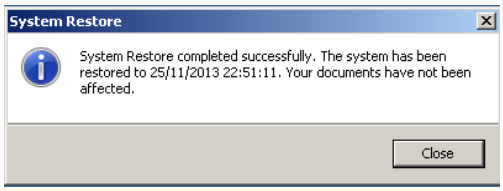
A list of the available restore points is displayed. Highlight the required restore point and press **Next.**



This screen is then displayed confirming your restore point. Press **Finish.**

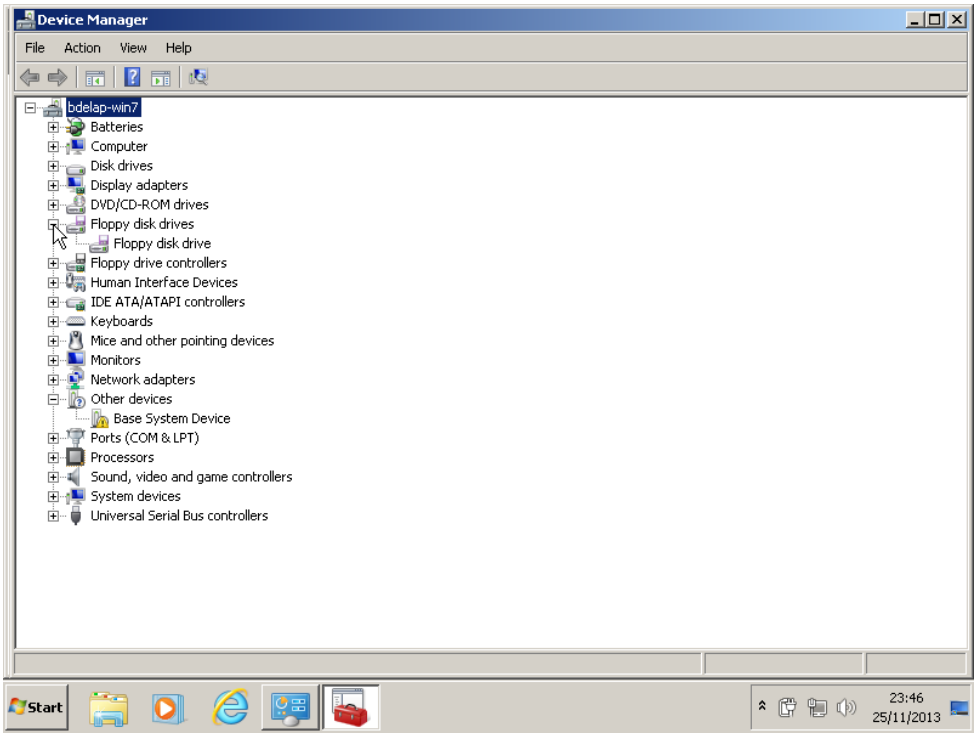


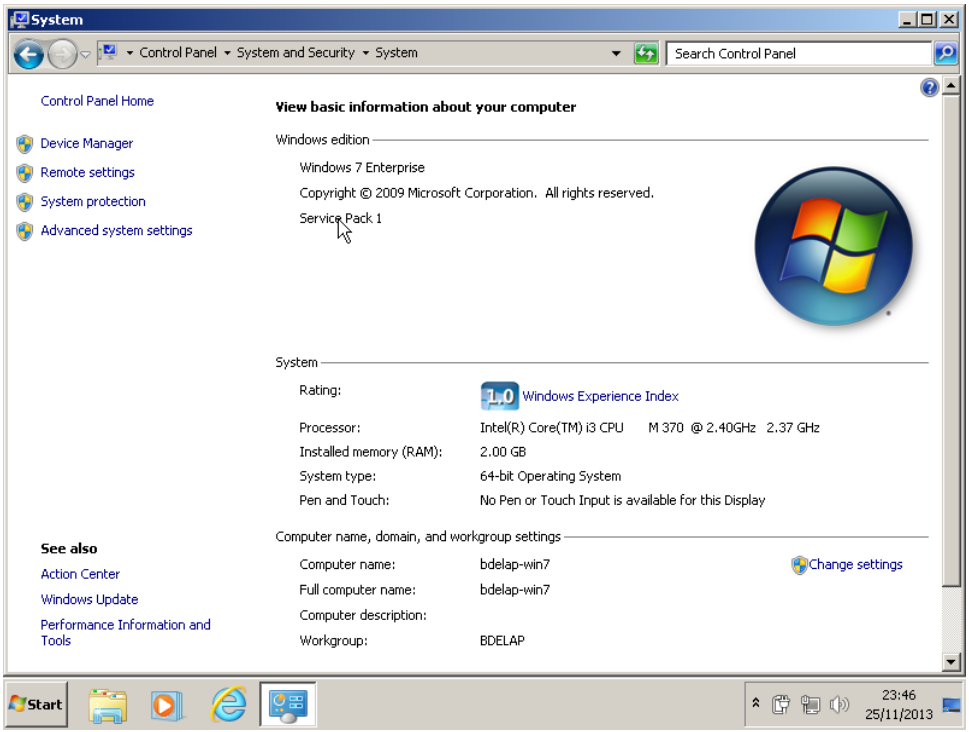
A box is displayed warning you that System Restore cannot be interrupted and asking you if you wish to continue. Press **Yes.** It takes approximately 5 minutes to restore. Windows is restarted automatically. When Windows restarts a message is displayed as follows:



On re-entering the system we can see immediately that **folder1** and **folder2** remain unchanged. The text file **notes** with my name inside is still the same. This is to be expected as System Restore does not affect data files, only system files.

The floppy diskette drive is now enabled and the system name has reverted back to bdelap-win7. Again this result was expected as changes to Device Manager and Computer Name are held in Windows system files and these files have been restored to the earlier restore point.

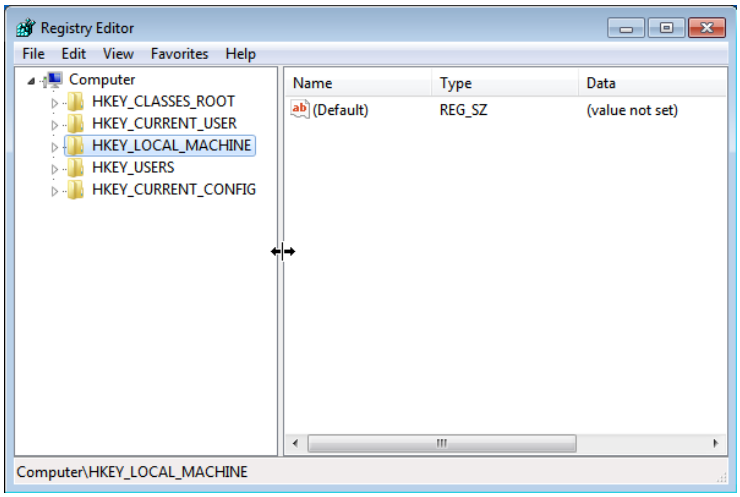




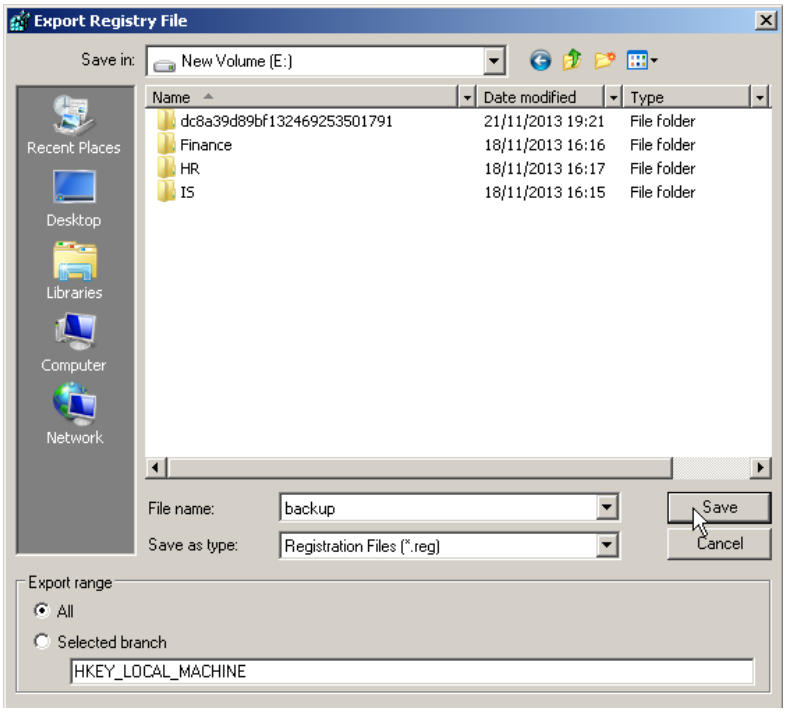
A8 System registry

Backup the registry

From the **Start** menu, type **regedit** in the "Search program and files" field. This will list "regedit" which you should double click. You are asked if you wish the program to make changes to your computer. Select **Yes.** You are then brought in to the registry editor screen.



Select **File** and then **Export.** You are presented with the **Export Registry File** screen.



Select the drive and directory where you wish to save the file. (In our example on the E drive (partition) with the name of backup) Select the **All** toggle in the **Export range** and press **Save.**

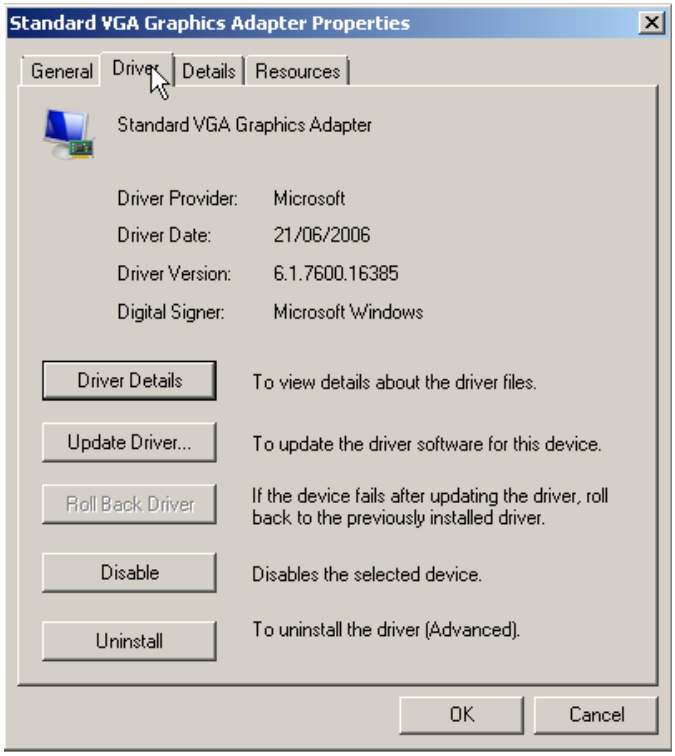
If you need to restore the registry, see **Appendix E – Restoring the Registry**

A9 Driver Compatability

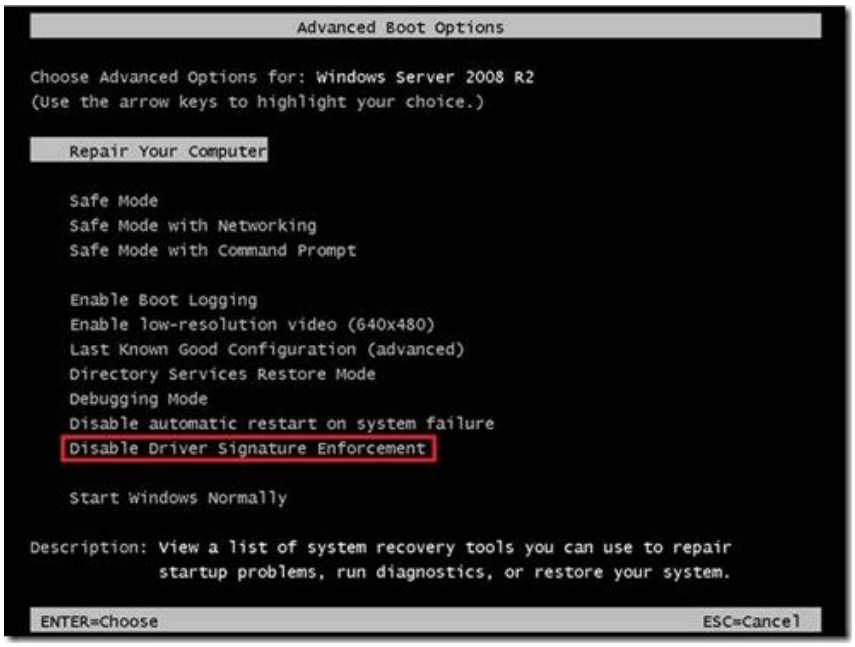
Microsoft's definition of a signed driver is as follows: http://windows.microsoft.com/en-us/windows-vista/what-is-a-signed-driver

> *A signed driver is a device driver that includes a digital signature. A digital signature is an electronic security mark that can indicate the publisher of the software, as well as whether someone has changed the original contents of the driver package. If a driver has been signed by a publisher that has verified its identity with a certification authority, you can be confident that the driver actually comes from that publisher and hasn't been altered.*

If we look at the properties of any of our drivers we will see that they have a signature.



In order to maintain the stability of the operating system environment in the future it is required that I prevent any unsigned drivers from being installed. Windows 7 does not by default allow you to install unsigned drivers. If you need to install an unsigned driver, you have to press the <F8> key when starting your computer and select the option **Disable Driver Signature Enforcement.**

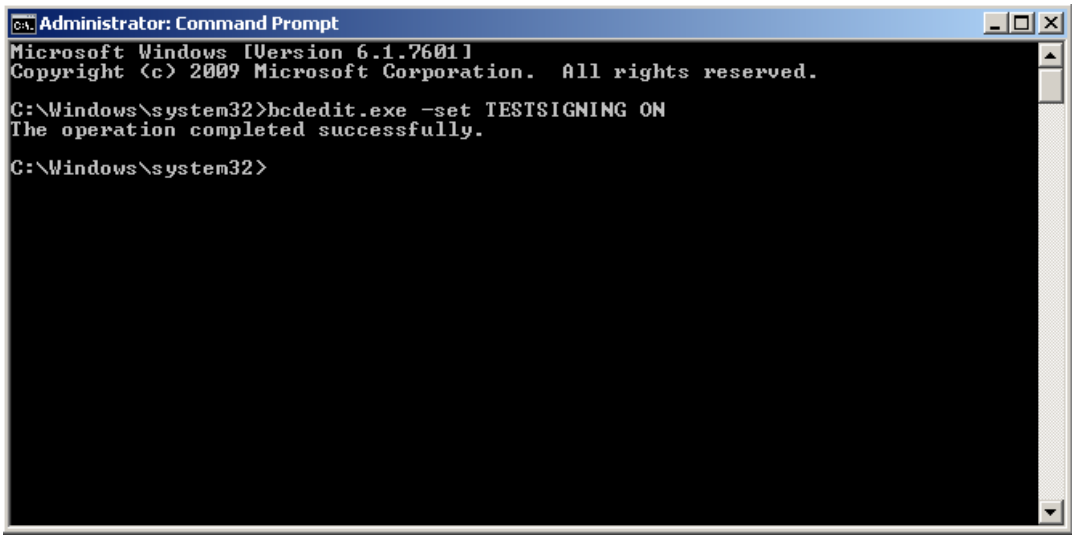


Screen shot from http://blogs.technet.com/b/askcore/archive/2012/04/15/troubleshooting-boot-issues-due-to-missing-driver-signature-x64.aspx

In previous versions of Windows, in order to enforce this rule, BCDEdit was required to enable Driver Signature Enforcement. BCDEdit is the primary tool for editing the boot configuration of Windows 7.

You must enter the BCDEdit command from the command prompt as an administrator. Select **All Programs** from the main screen. Choose **Accessories,** right click the **Command Prompt** icon and select **Run as Administrator.** This will take you to the command prompt. Type the following command:

Bcdedit.exe -set TESTSIGNING ON

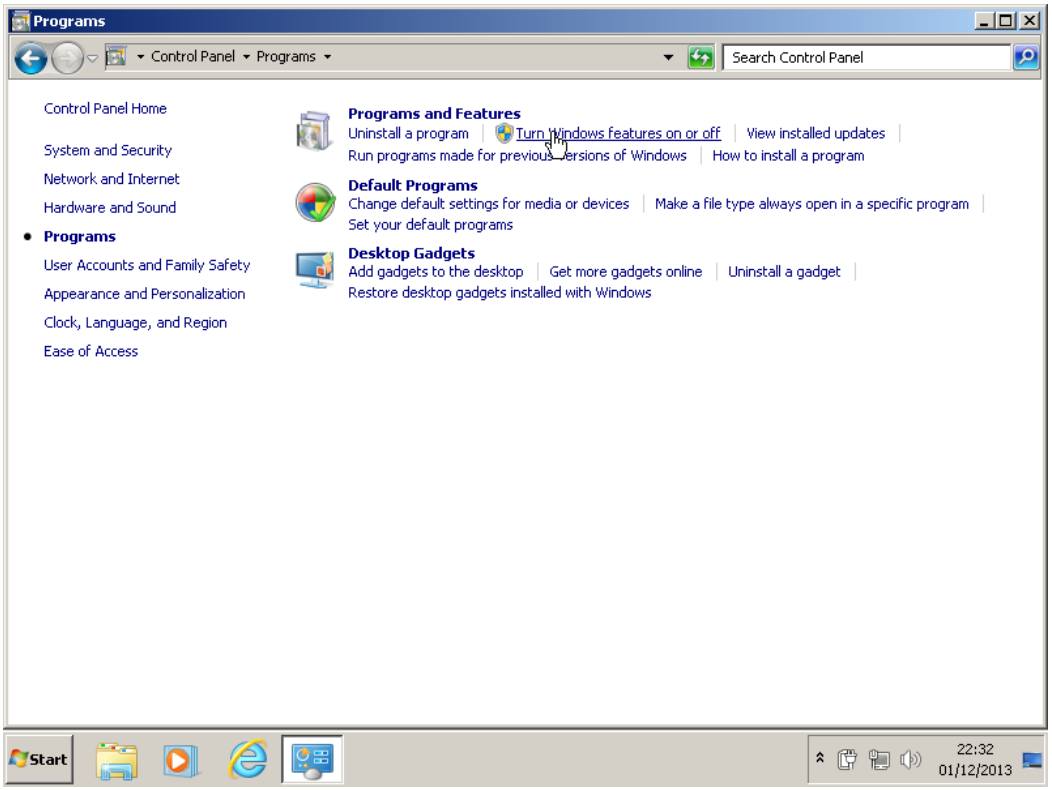


Close the **Command Prompt** window to return to the main screen.

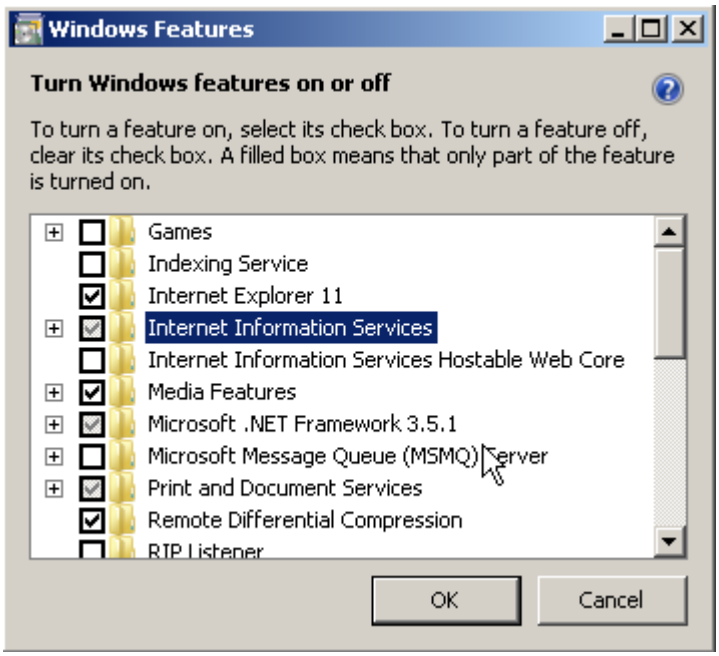
B1 Install web servers and Linux

Install Microsoft Web Server

In order to install Microsoft's Web Server, select **Control Panel** an then select **Programs**. Click **Turn Windows features on or off.**

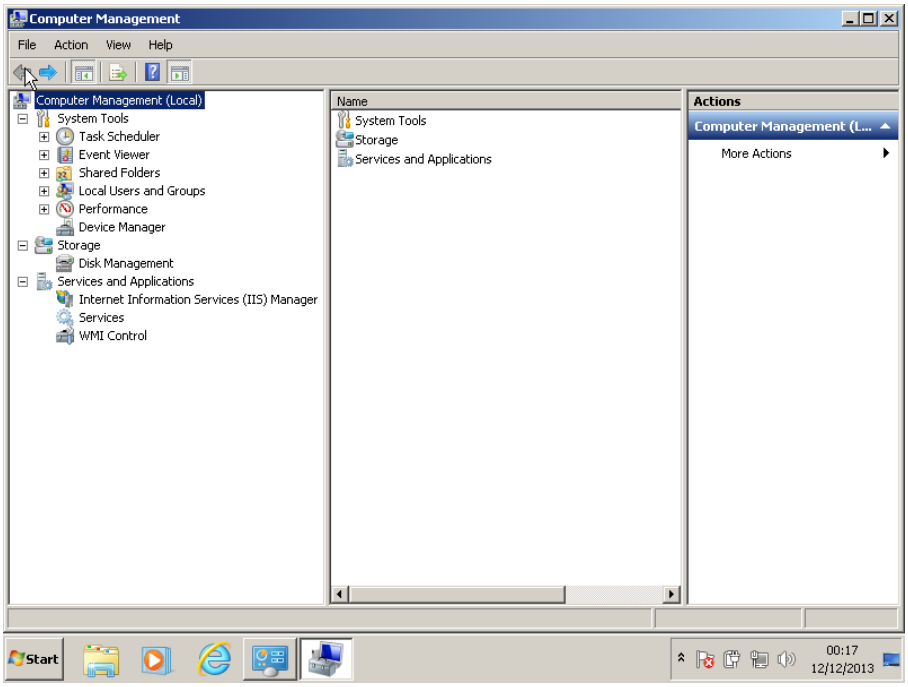


The next screen list the features that can be turned on or off. Tick **Internet Information Services** and press **OK.**

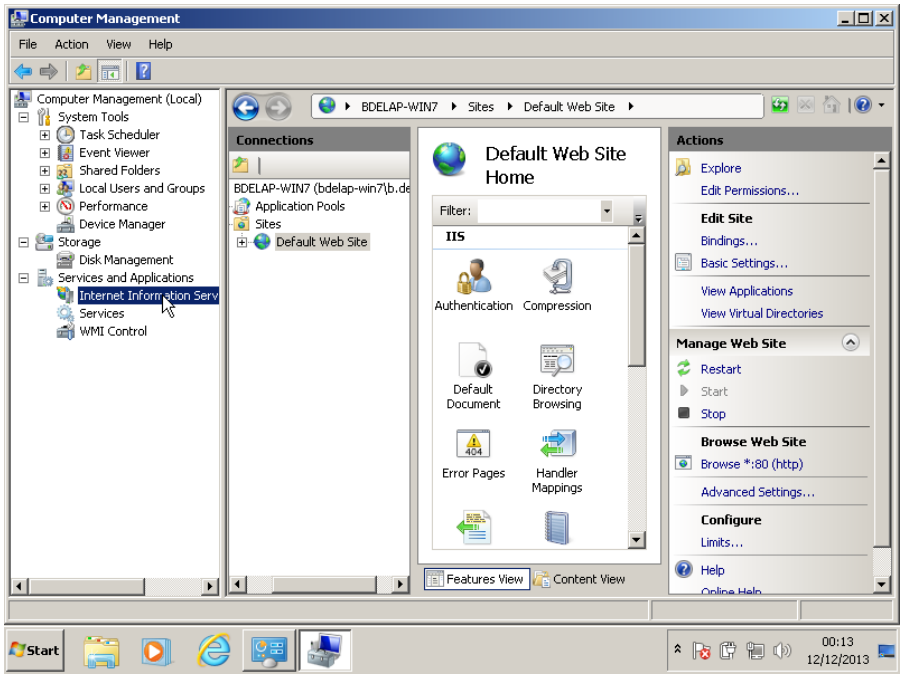


A dialog box is displayed asking you to wait while Windows makes changes to features. This will take approximately 30 seconds.

To ensure that IIS is running, right click **Computer** from the main menu. Select **Manage.** Click the new icon that has appeared under **Services and Applications** called **Internet Information Services (IIS) Manager.**

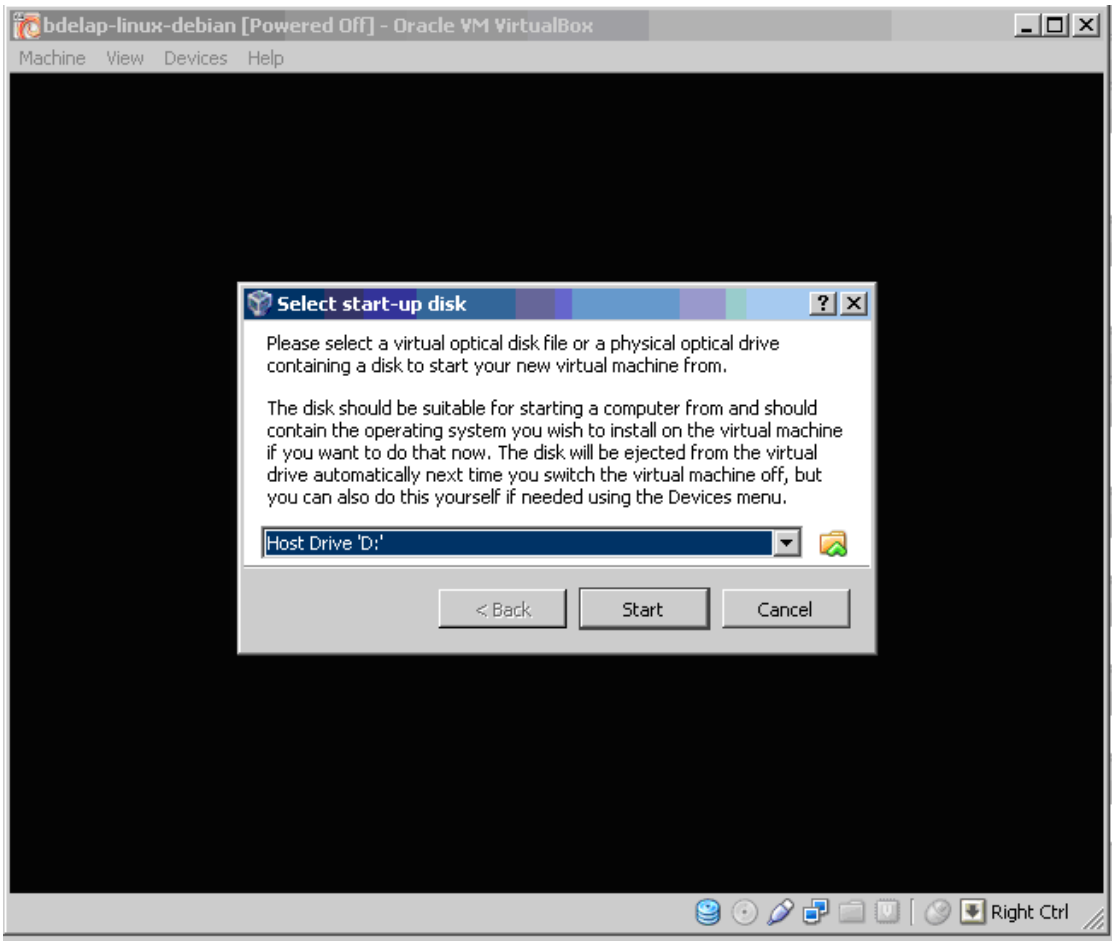


The following screen shows that the Web Server has been started as the **Start** option is greyed out.



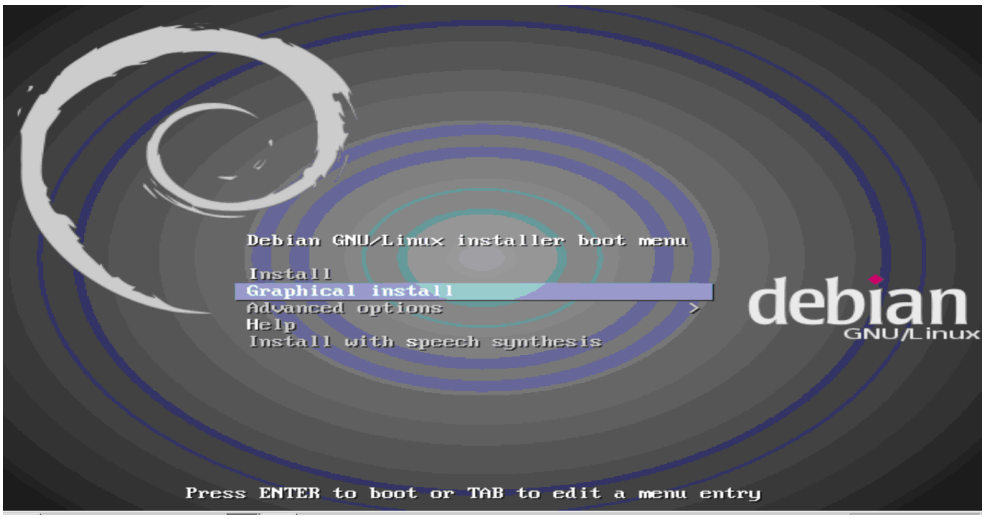
Install Debian Linux

When you power on your machine, you are presented with the screen below. If you have a CD with the operating system, then press the **Start** key. However, we are installing from a drive on our host machine, so we will select the folder icon with the green arrow on the bottom right hand corner.



Find the folder where your .iso file is located and select that .iso file. In this case the file is called **debian-7.1.0-amd64-netinst.iso.** Press **Continue.** You are presented with a screen showing your .iso file. Press **Start** to install.

You are presented with the Linux Debian install screen. Unless you are very familiar with Unix and its commands and are comfortable performing operations from the command prompt, it is advisable to select the second option **Graphical Install.** Highlight **Graphical Install** and press **Enter.**



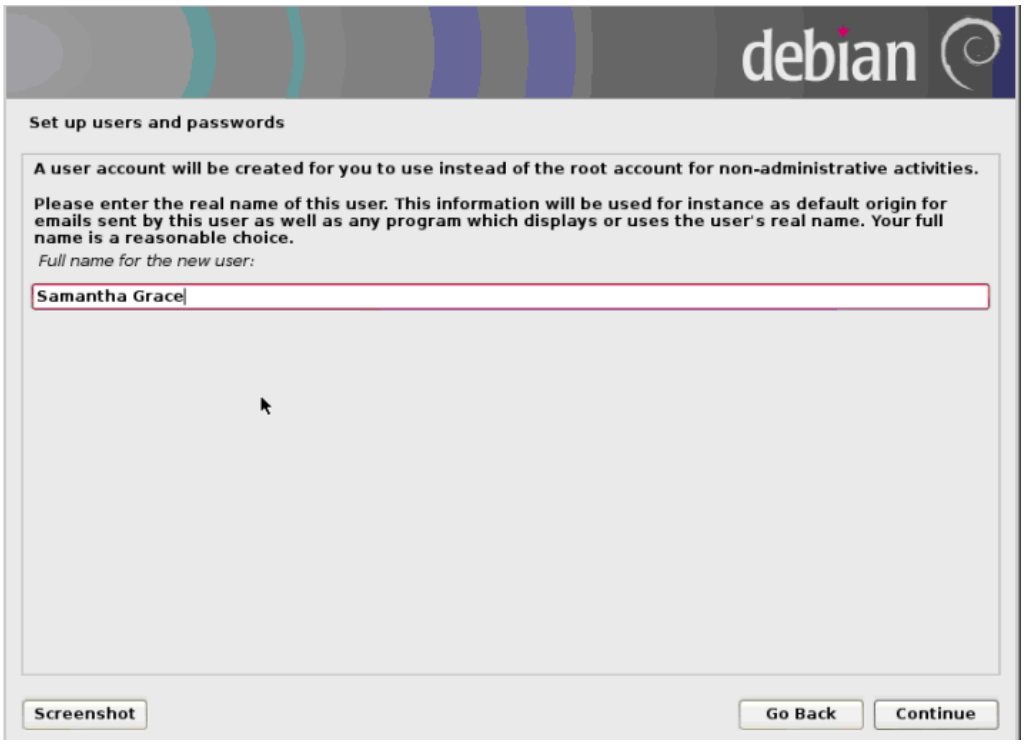
The next three screens are used to select language and country. Highlight your language and press **Continue.** Highlight your country and press **Continue.** If you have selected English, you will be given choice of British English or US English. Highlight your selection and press **Continue.**

You will have to wait approximately one minute while the system automatically installs. Then you are presented with a screen for configuring the network. The first thing you must do is give the machine a host name using just a single word. If you work for an organisation, you should speak to the Administrator before entering this name, as they may already have a naming convention in place. If you are a home user, call this machine by a name that will identify this computer to you e.g. **KitchenComputer** or a person's name eg **John.** In some cases for security reasons you may not want the computer to be identifiable, in this situation give the host a non meaningful name. We will give our machine a host name of **bdelap-linux-debian.**

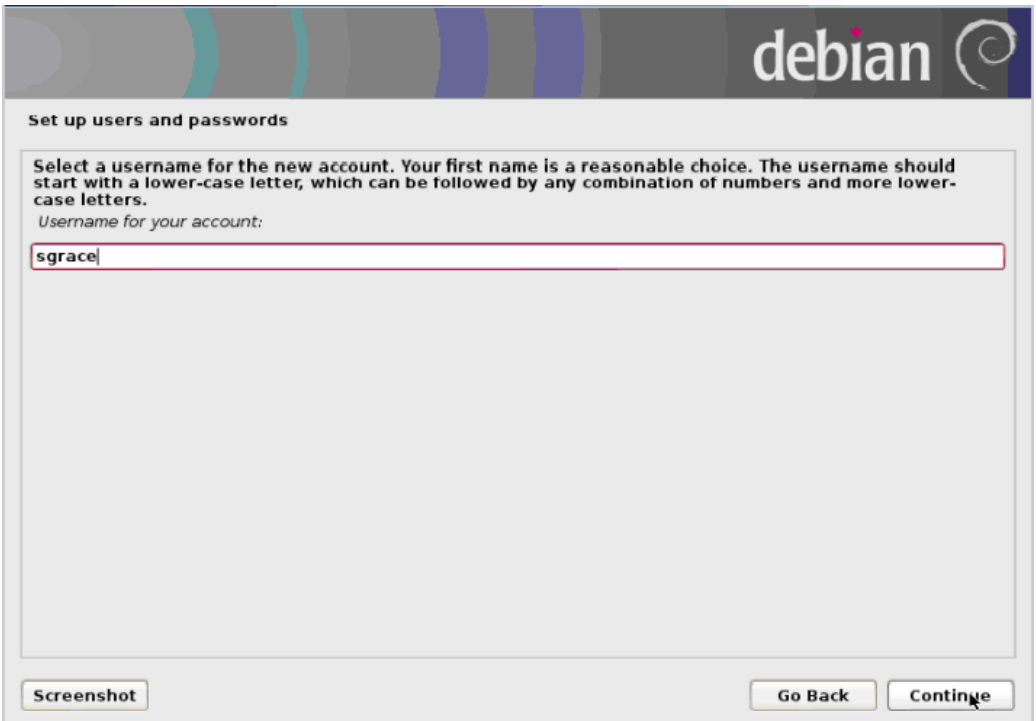
The next screen prompts for a domain name. We will leave this blank for the moment and press **Continue.**

The next screen prompts for a password for the user "Root". In Linux the "Root" user account is the most privileged account on the system. A lot of damage can be done by the "Root" user, therefore, it is very important to enter a strong password here. If you leave the password field blank, the "Root" account is disabled and the system's initial user will be given the power to become "Root" using the "sudo" command from the command prompt. It is important to use a strong password here, one that uses a combination of capital letters, small letters, numbers and punctuation and one that is not a word in a dictionary. After you have entered the password and confirmed it, press **Continue.**

The next screen asks for your real name so that you can be set up a "non root" user. This is done because you should only log in as "root" when you wish to carry out administrative activities. Enter your first name and surname here. For instance, the name entered here will be used as a default name when sending emails or any program that displays or prints the user's full name. Enter your name and press **Continue**



The next screen prompts for a user name. Again if you belong to an organisation, you will need to check if they have a user name convention in place. We will use first initial and surname. Press **Continue** after you have entered the username. Our naming convention is normally <initial>.<surname>. Debian does not allow full stops to be used in user names.



You then need to enter a password and confirmation of that password and press **Continue.**

The next screen is concerning disk partitioning. Choose the default option "Guided – use entire disk" as the Installer will guide you through disk set up. If you wish to partition your disk, you should select the "Manual" option here. Press **Continue.**

Your disk will be highlighted and you are informed that all data will be erased if you continue. Press **Continue.**

The next section is where you actually partition your disk. In our situation, we are not going to partition our disk so we will select the default option. You are given two other options as follows:

1. Separate /home partition – The home directory is where all users' files and documents are stored, sometimes it is a good idea to keep this separate as it makes it easy to wipe out and reinstall Linux without losing any of your data.
2. Separate /home /usr /var and /tmp partitions. There is no need really to create separate logical drives for /usr and /var. If you are a developer, perhaps a separate drive for /tmp files as if your test programs go in to infinite loops, they could end up bringing down the entire system.

Make your selection and press **Continue.**

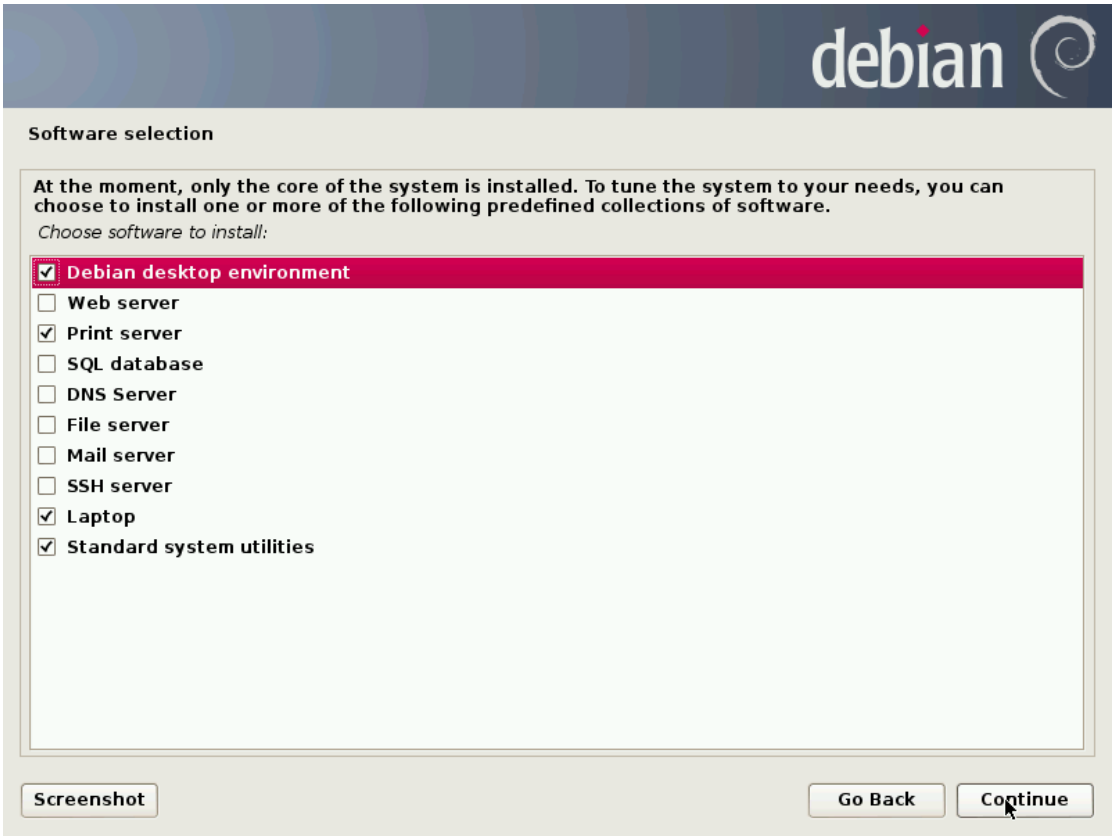
Even though we chose not to partition our drive, Linux automatically creates a partition for the swap file. The swap file is used for virtual memory and speed of access to the swap file can be increased if stored on a separate drive. There will be an even greater increase in speed if that separate drive is a solid state drive.

Press **Continue.** You are then given the choice to write the changes to disk. Choose **Yes** and press **Continue.**

The system will start installing the base system. A red countdown bar will indicate its progress. This stage of the installation takes approximately 2-3 minutes. When ready, you are asked to enter your country. The goal is to find a mirror of the Debian archive that is close to you on the network. Highlight your country and press **Continue**. You are given a choice of sites, and the installer recommends choosing ftp.<your country code>.debian.org. It is worth researching the various sites, perhaps by googling them and looking at what other users are saying, as apparently, they can vary quite a lot. Also, sometimes it may be better to select from a country other than your own if the sites in your own country do not get good reviews. Highlight your choice and press **Continue.**

If you use a proxy server, enter its name in the next screen, otherwise leave it blank and press **Continue.** The system will take approximately four minutes to configure. A red countdown bar will indicate its progress. During this process, you are asked if you want an automatic script to run every week where statistics are sent to the distribution developers. This information influences such decisions as to which

packages should go on the first distribution CD. Select **Yes** or **No** and press **Continue.** The next screen presents you with a checkbox menu where you can decide what software packages you want installed. Select your software by placing ticks in the boxes next to the software required and press **Continue.**



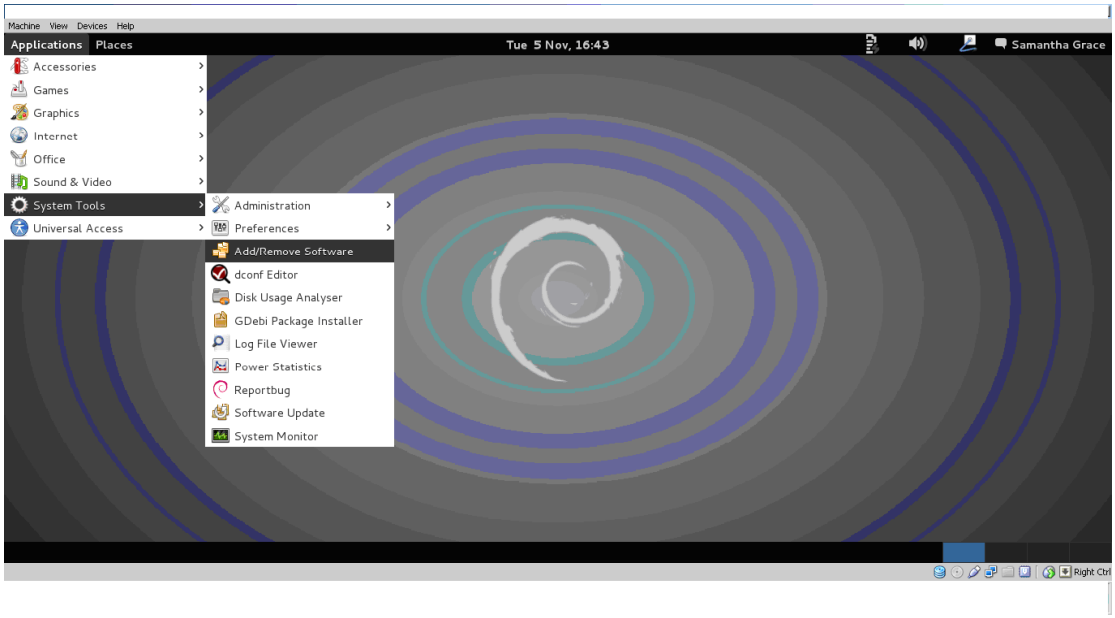
Depending on the number of software packages ticked, the system should take 15-30 minutes to complete the installation. A red countdown bar will indicate its progress and the number of minutes remaining.

Before finishing the installation, you are prompted to confirm that it is okay to install the GRUB boot loader to the master boot record. (If you have another operating system on your computer, then the installer would have detected this and prompted you accordingly – in this case if you install the GRUB boot loader to the master boot record, the other system will be temporarily unbootable). Choose **Yes** and press **Continue**.

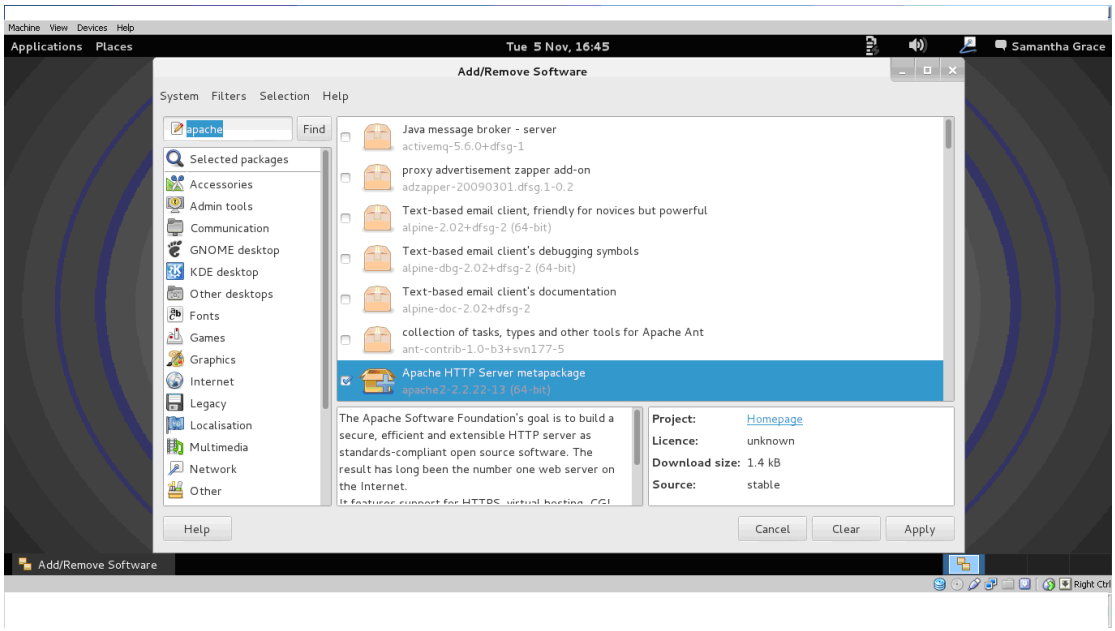
After a few seconds, the installation completes. If you installed from a disk, you need to remove that disk from the disk drive. If you press **Continue** the computer is automatically rebooted.

Installing the Apache Web Server

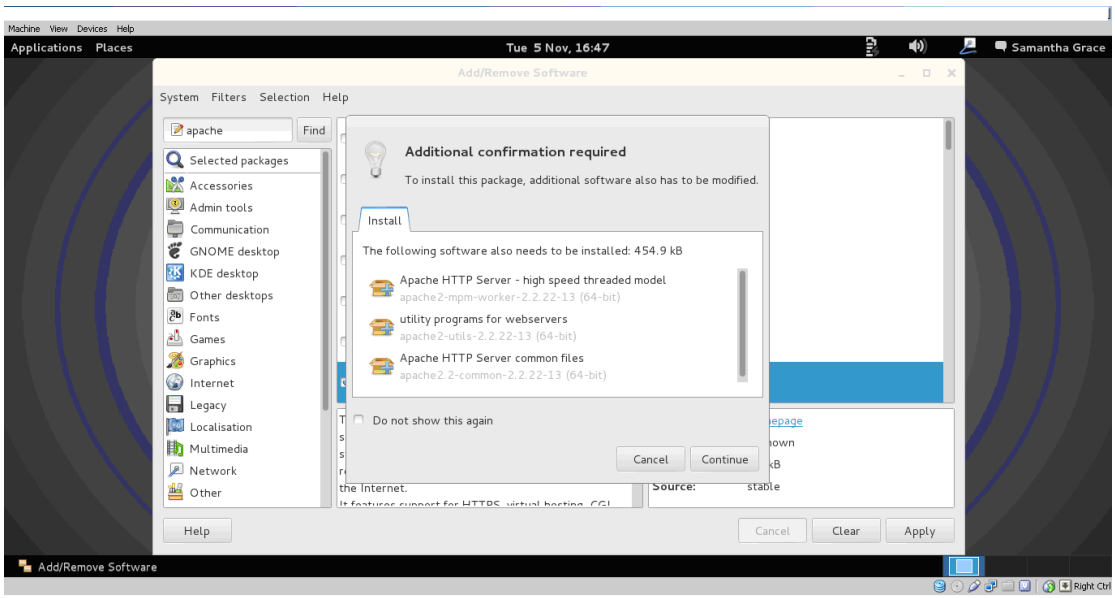
From the menu running along the top of the screen choose "Applications", then "System Tools". The system tools menu is displayed, choose "Add/Remove software"



The following screen is presented. Type "Apache" in to the Find box. The system shows Apache HTTP Server metapackage. Highlight this and press **Apply**



A list is displayed of additional software that must also be installed. Press **Continue.**

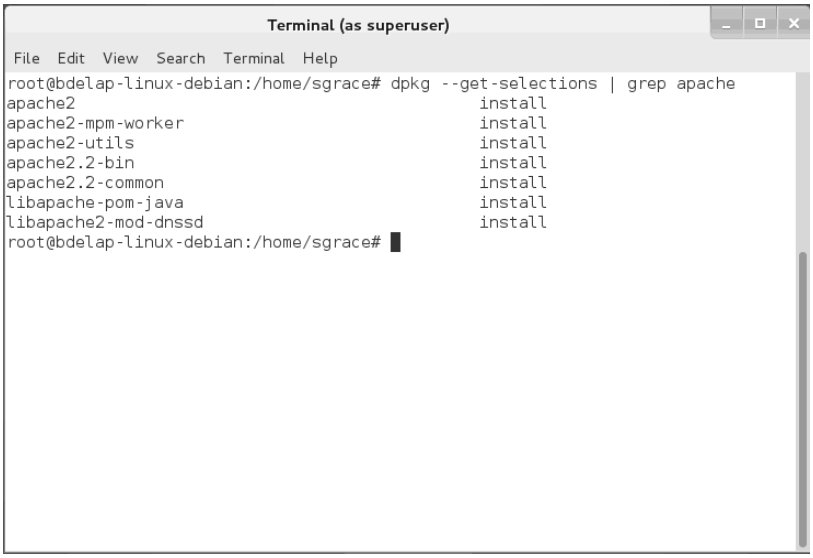


As this is an administrative activity, you are asked to enter the "root" password. Enter this password and press **Authenticate.** It will take about 2-3 minutes to install.

To check that Apache is installed and running, you can enter commands from the command prompt. To do this open the **Applications** menu, select **Accessories**. The Accessories menu is displayed, select **Root Terminal**. We must enter our "root" password. This takes us to the command prompt to our home directory. The following command determines if Apache is actually installed.

dpkg –get-selections | grep apache

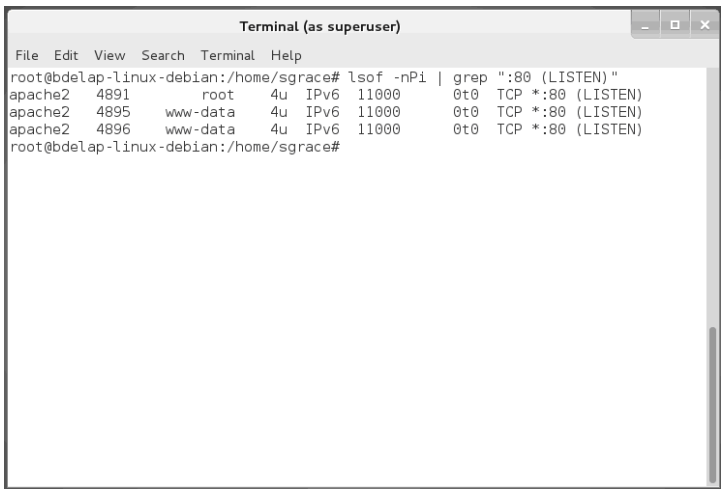
This finds anything installed containing the string 'apache'. If it is installed you should get a listing similar to the listing below:



To check if Apache is actually running, type in the following command, which finds any HTTP daemon on the default port (which is 80):

lsof –nPi | grep ":80 (LISTEN)"

If it is running you should get a listing similar to the listing below:



Choosing Apache or IIS

The main advantages of Apache are the following:

1. Lower costs as it is open source software.

2. If there are programmers in your organization they will be able to modify the code in Apache as the source code is freely available.

3. Enhanced Security. Apache was developed for a non-Microsoft environment (even though it does work with Windows). The majority of malicious programs have been written to take advantage of vulnerabilities in Windows. Apache has a reputation as being more secure than IIS.

The main advantage of Windows IIS:

1. IIS is supported by Microsoft who have a team dedicated to the support and development of IIS. Apache is supported only by the user community.

2. IIS supports the .NET framework.

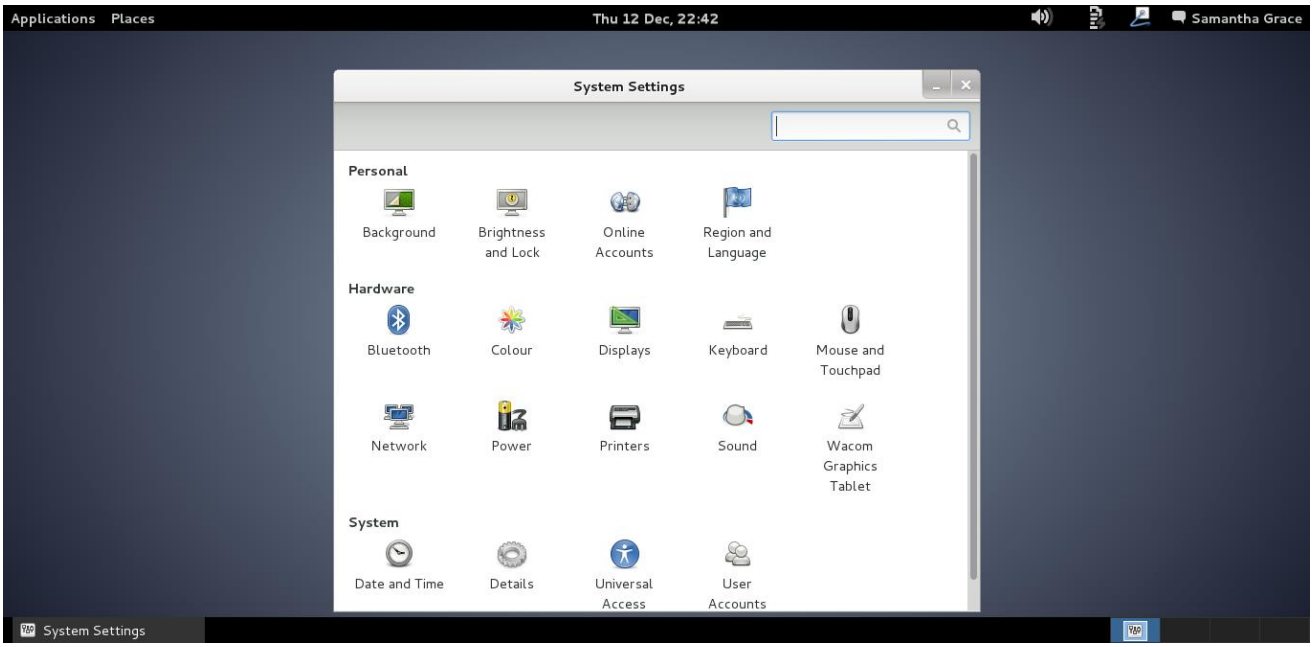
If cost is a major consideration the UNIX and Apache combination will work out much cheaper as there are no licensing costs. Apache also has the edge when it comes to security. However, if you are currently running a Microsoft environment and your staff are familiar with the .NET framework, there may be high training costs before they are ready to work with Linux and Apache.

B2 – Users, Groups and Security

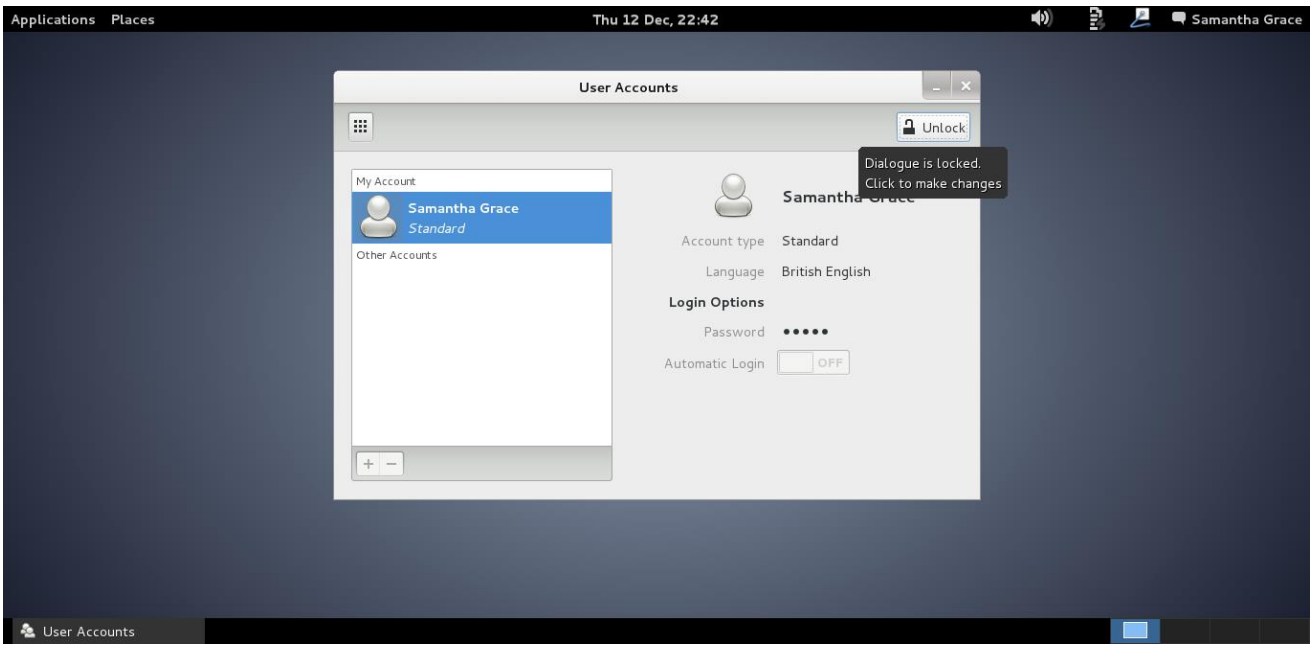
Create Users

On the main screen in Linux, double click the user name on the top right hand corner. A user menu is displayed, select **System Settings.**

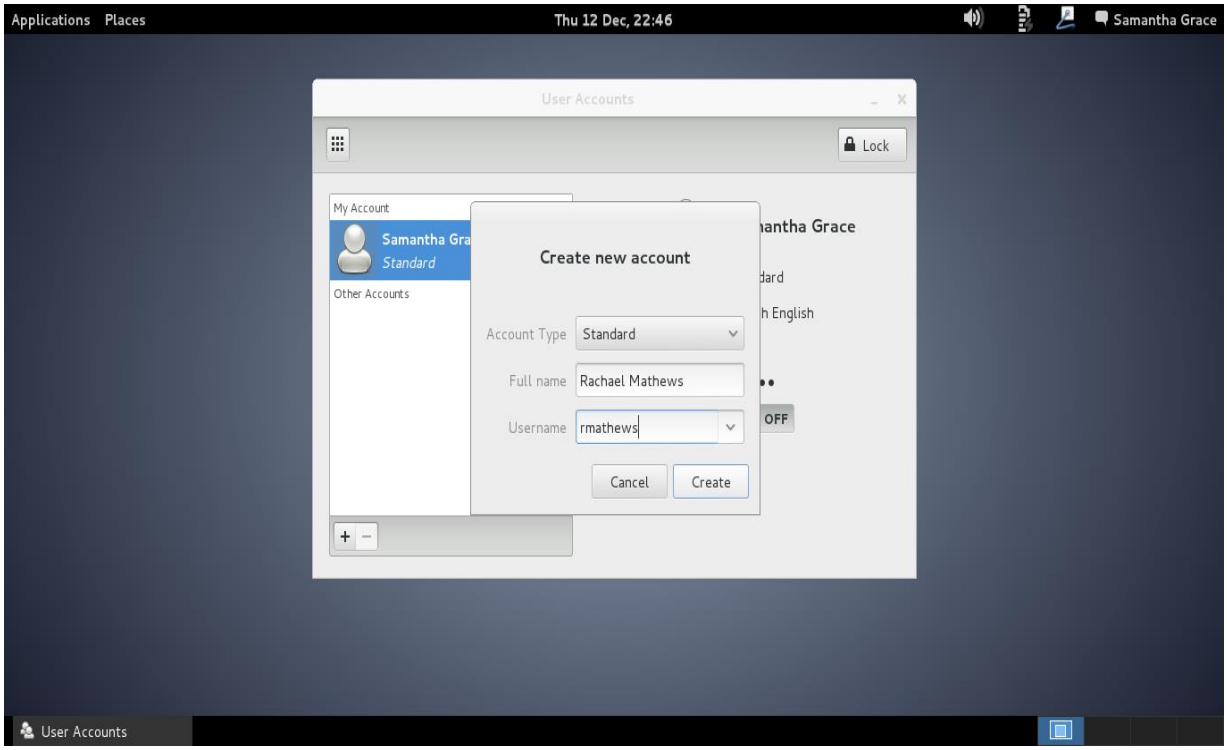
The **System Settings** menu is displayed. Select **User Accounts.**



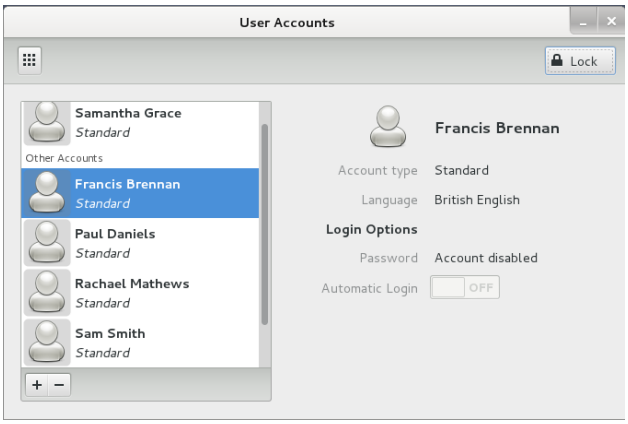
The **User Account** screen is displayed. At this stage the screen is locked, select **Unlock.**

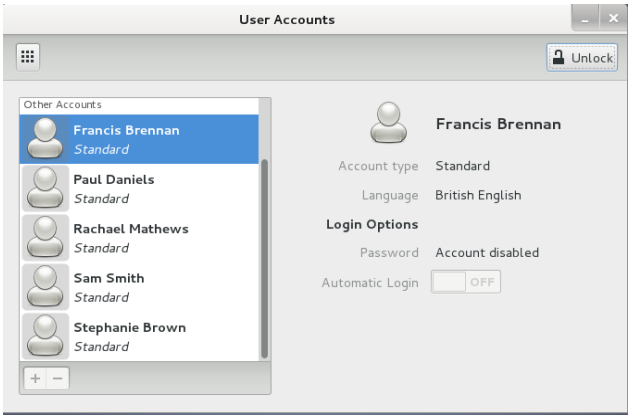


You are informed that authentication is required to change users. Enter the root password and press **Authenticate.** The + and – signs are now available. Press **+.** The **Crete new account** screen is displayed, enter the full name of the user and then the username. As mentioned earlier, if you work for an organisation you should check if they have a user name convention in place. We will add our first user Rachael Mathews with a username of rmathews. Press **Create.**



I created accounts for all users.

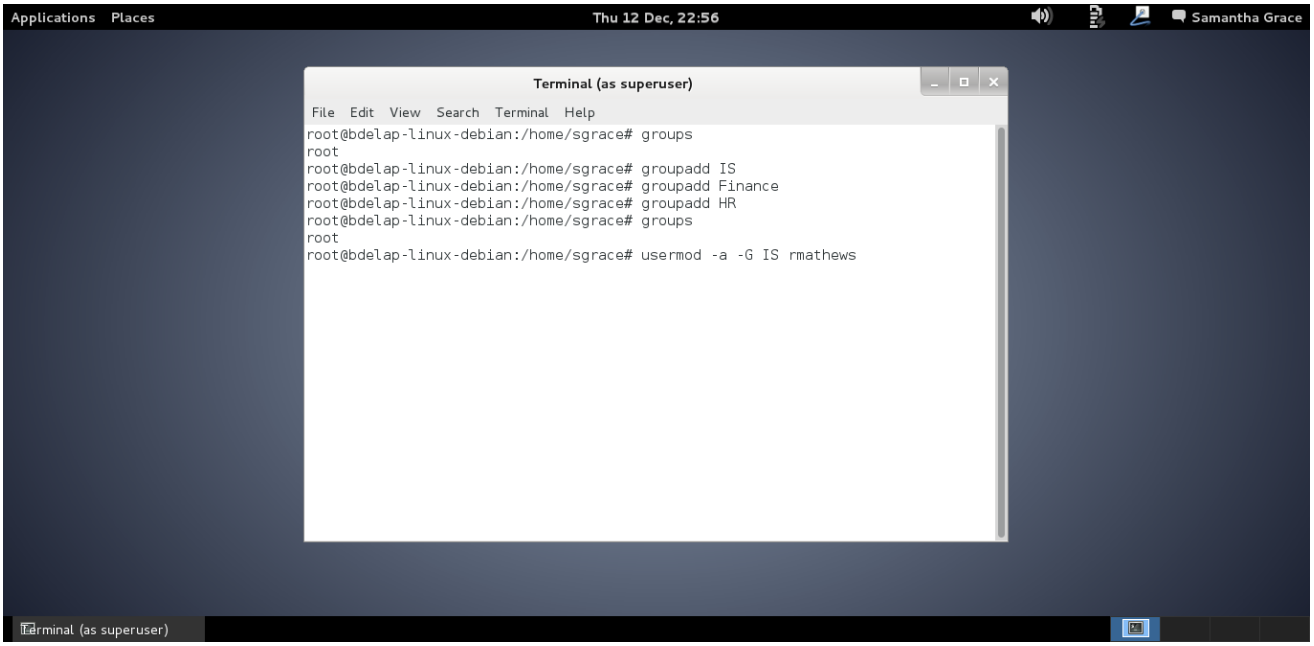




Groups cannot be added using the graphical interface. We must, therefore, use commands from the command prompt. Firstly select **Applications,** select **Accessories** and then double click the **Root Terminal** where you are taken to command prompt. The command to add a group is:

groupadd <groupname>

I added the three departments IS, Finance and HR.

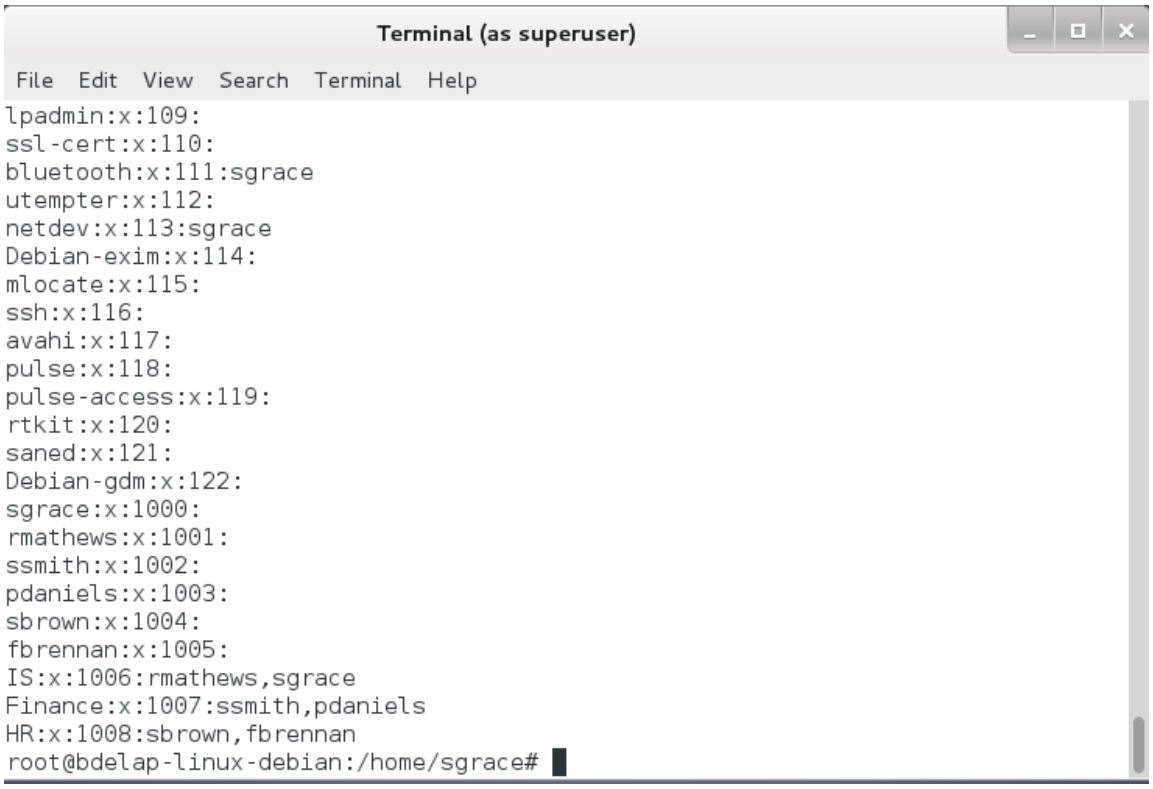


The following command is used to assign a user to a particular group.

usermod –a –G <groupname> <username>

I assigned all users to groups as instructed. The following command is used to display those groups.

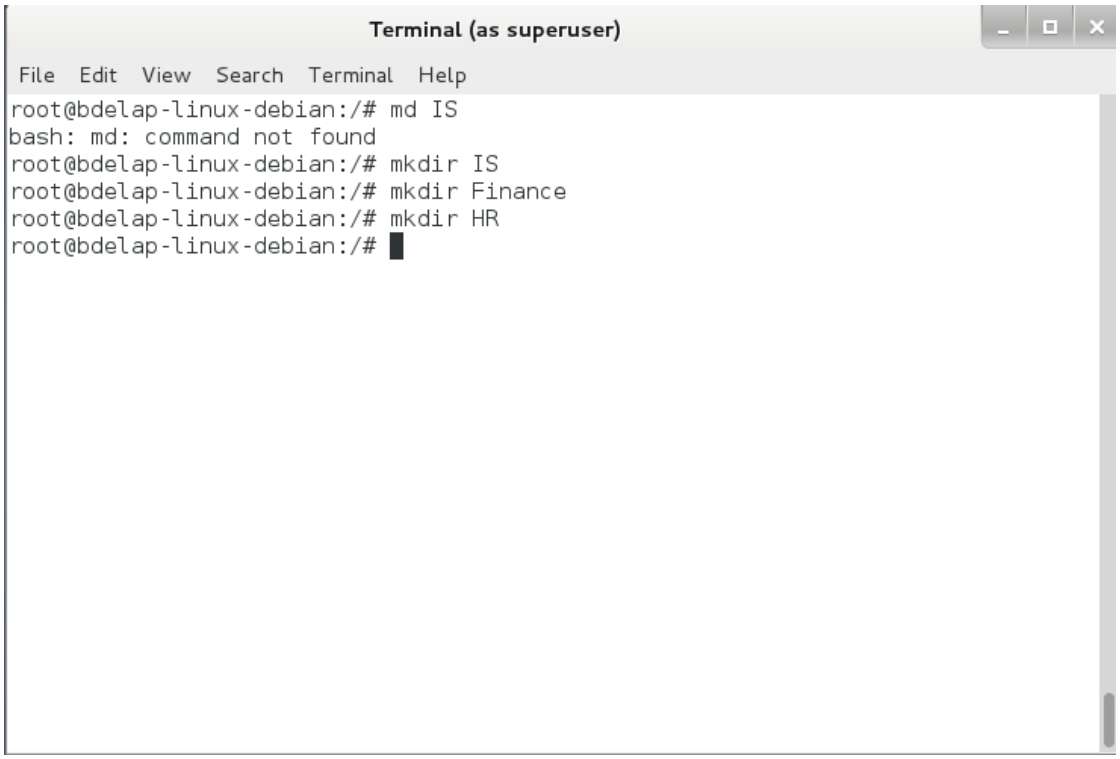
cat /etc/group



You can see the three groups listed at the bottom of the screen with their users.

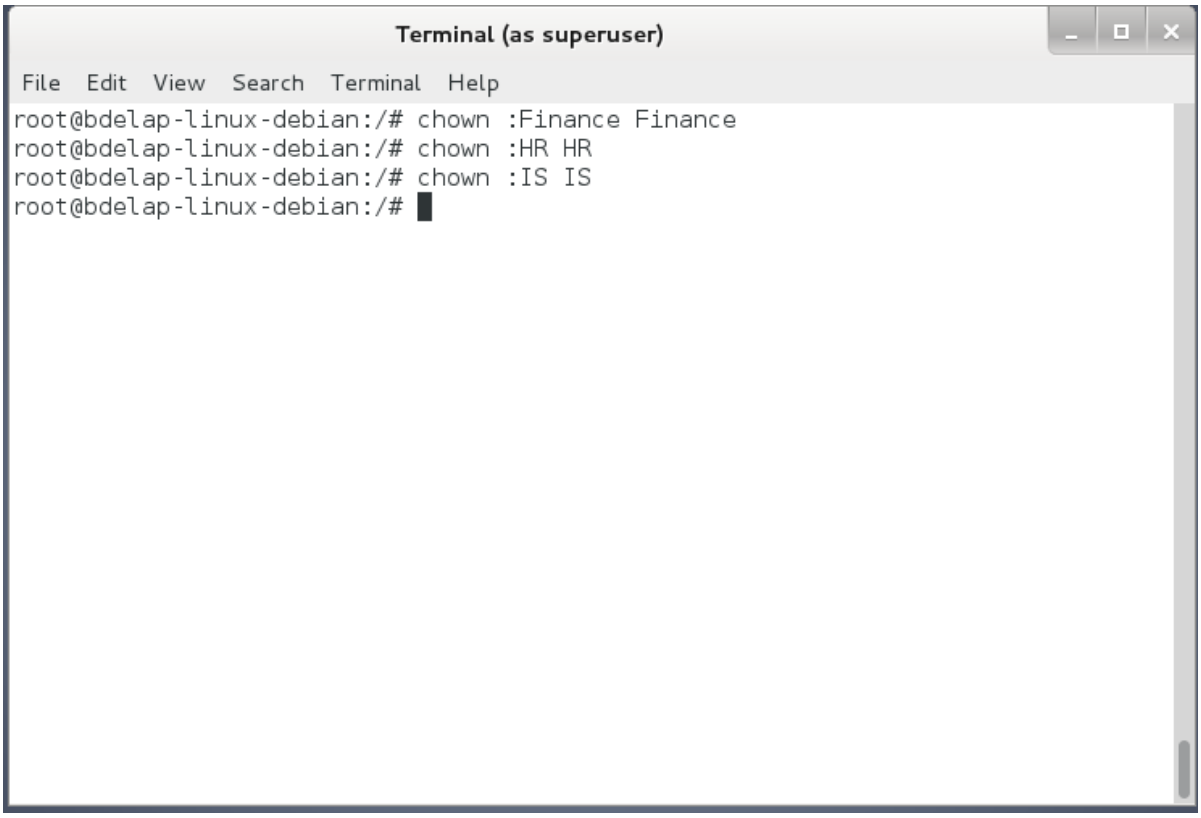
I must now create folders or directories for each group and give permissions to each group for their respective folders. The command to create directories is as follows:

mkdir <directory name>



The command to give a group ownership of a file is:

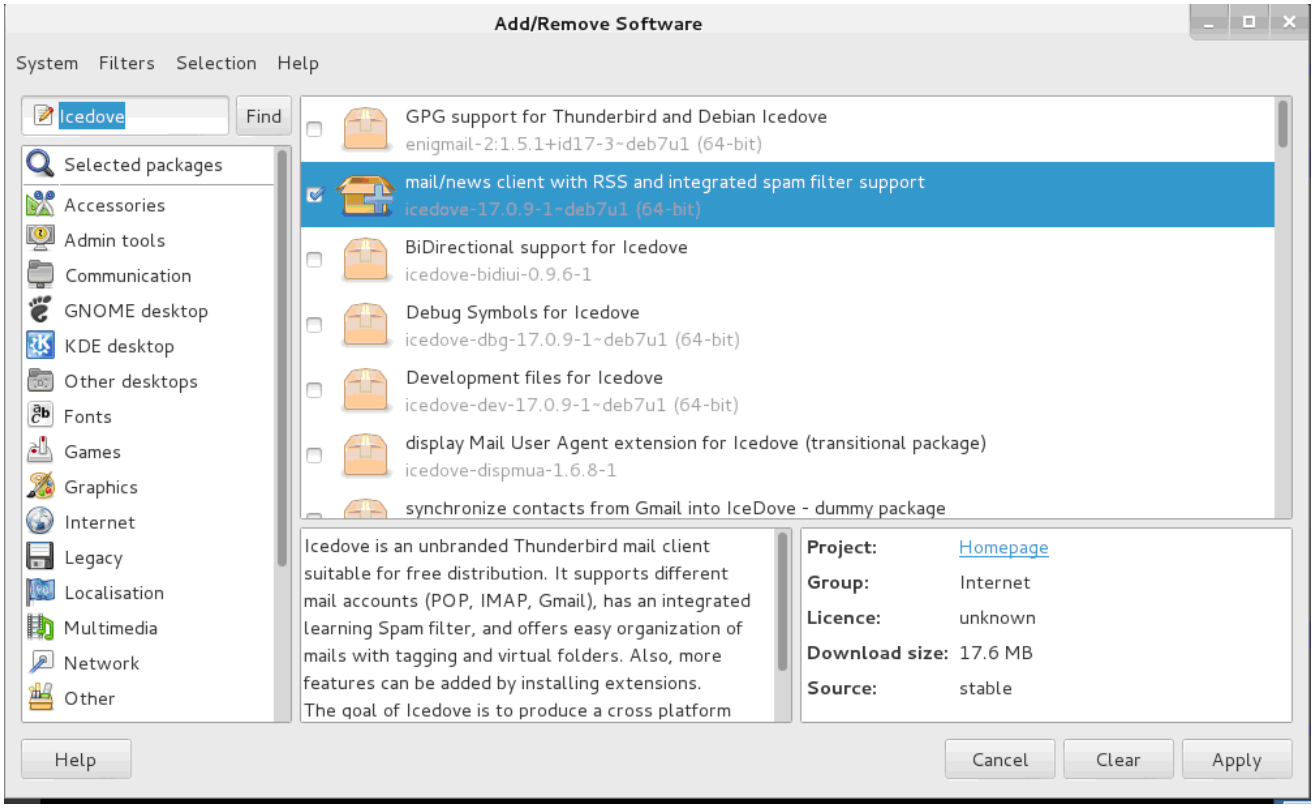
chown :<group name> <directory name>



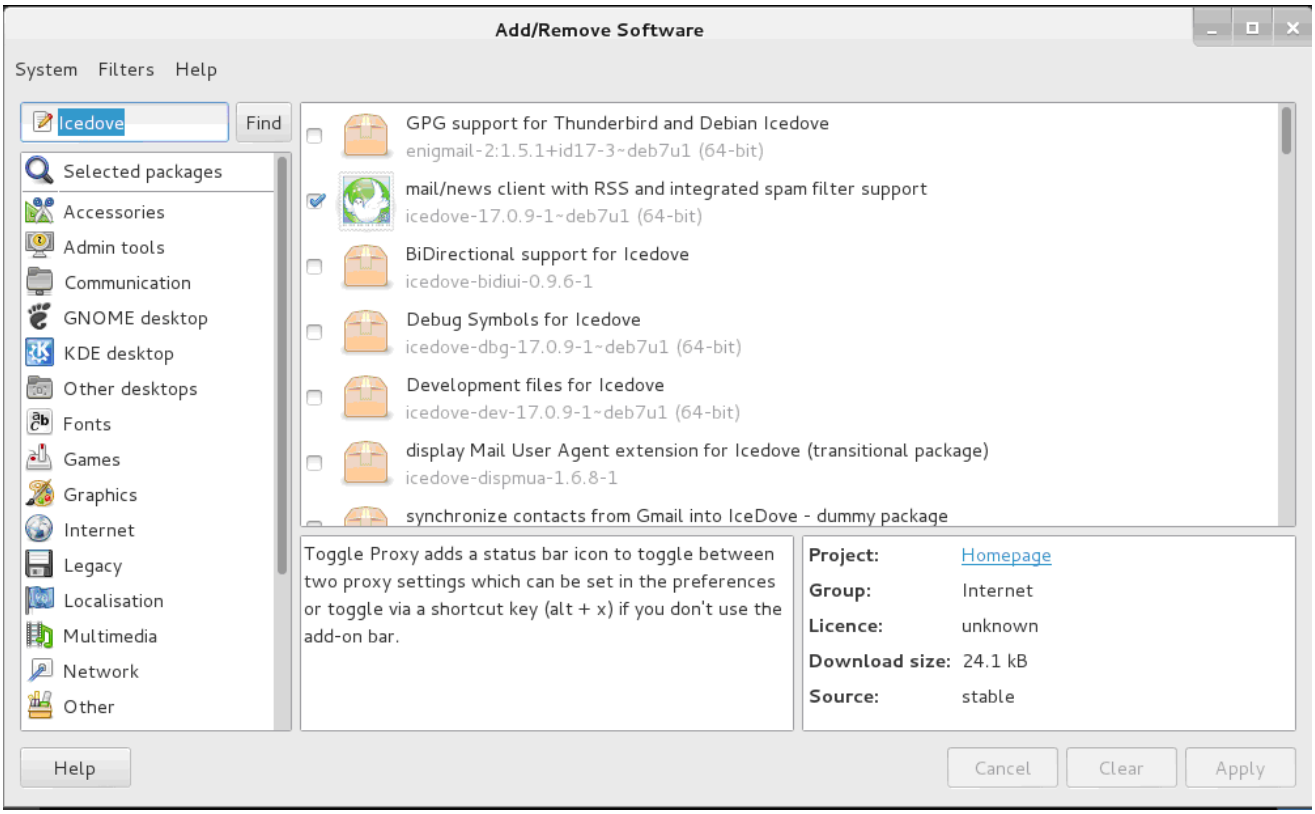
B3 Installing open source products:

Email (Thunderbird)

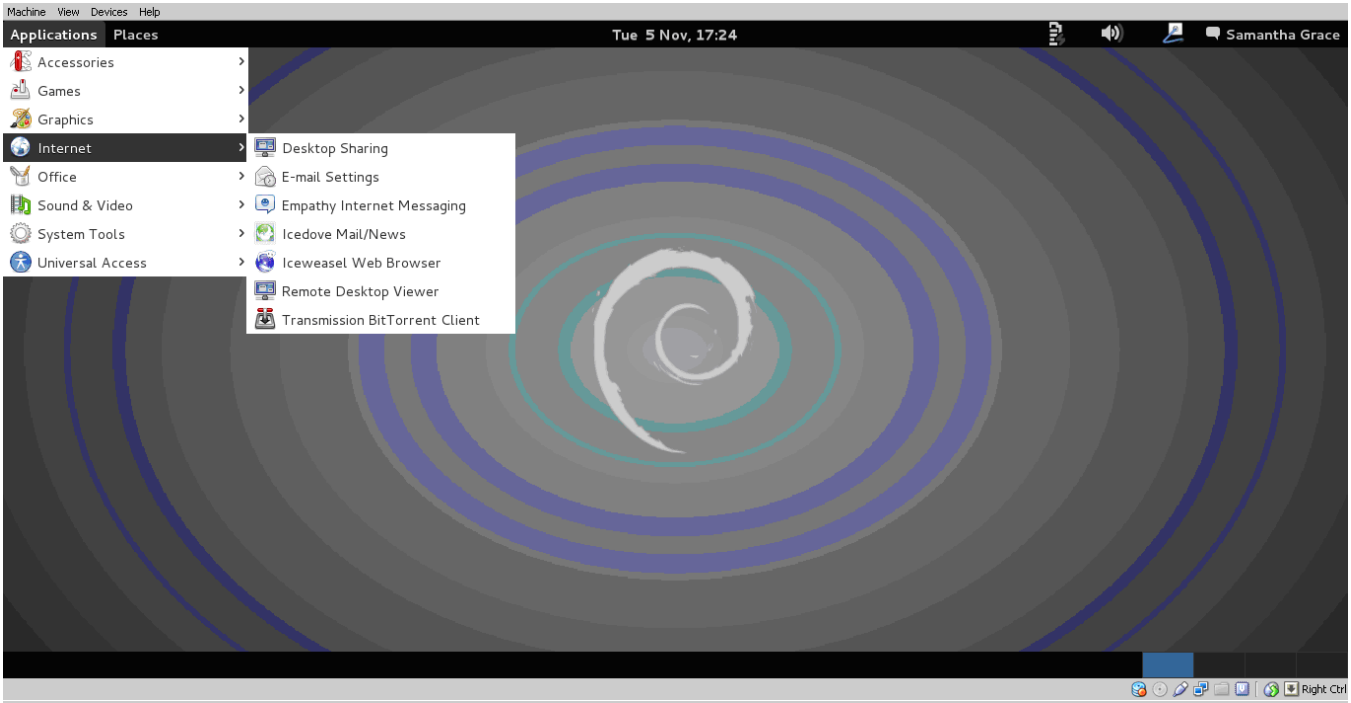
Open **Applications** menu, select **System Tools.** System Tools menu is then displayed, select **Add/Remove Software**. The Add/Remove Software screen is displayed, type "Thunderbird" into Find box. The only item that is displayed relating to Thunderbird is GPG Support for Thunderbird and Debian Icedove. On carrying out searches in Google, I now know that Thunderbird is called Icedove on a Debian installation. I will change my search to "Icedove". The following screen is displayed:



Highlight "mail/news client with RSS and integrated SPAM filter support" and press **Apply.** Because this is an administrative activity, I am prompted to enter the "root" password. Press **Authenticate.** It takes 2-3 minutes to complete installation. Once it is installed, the folder icon from the highlighted item above changes to a "white dove" icon.



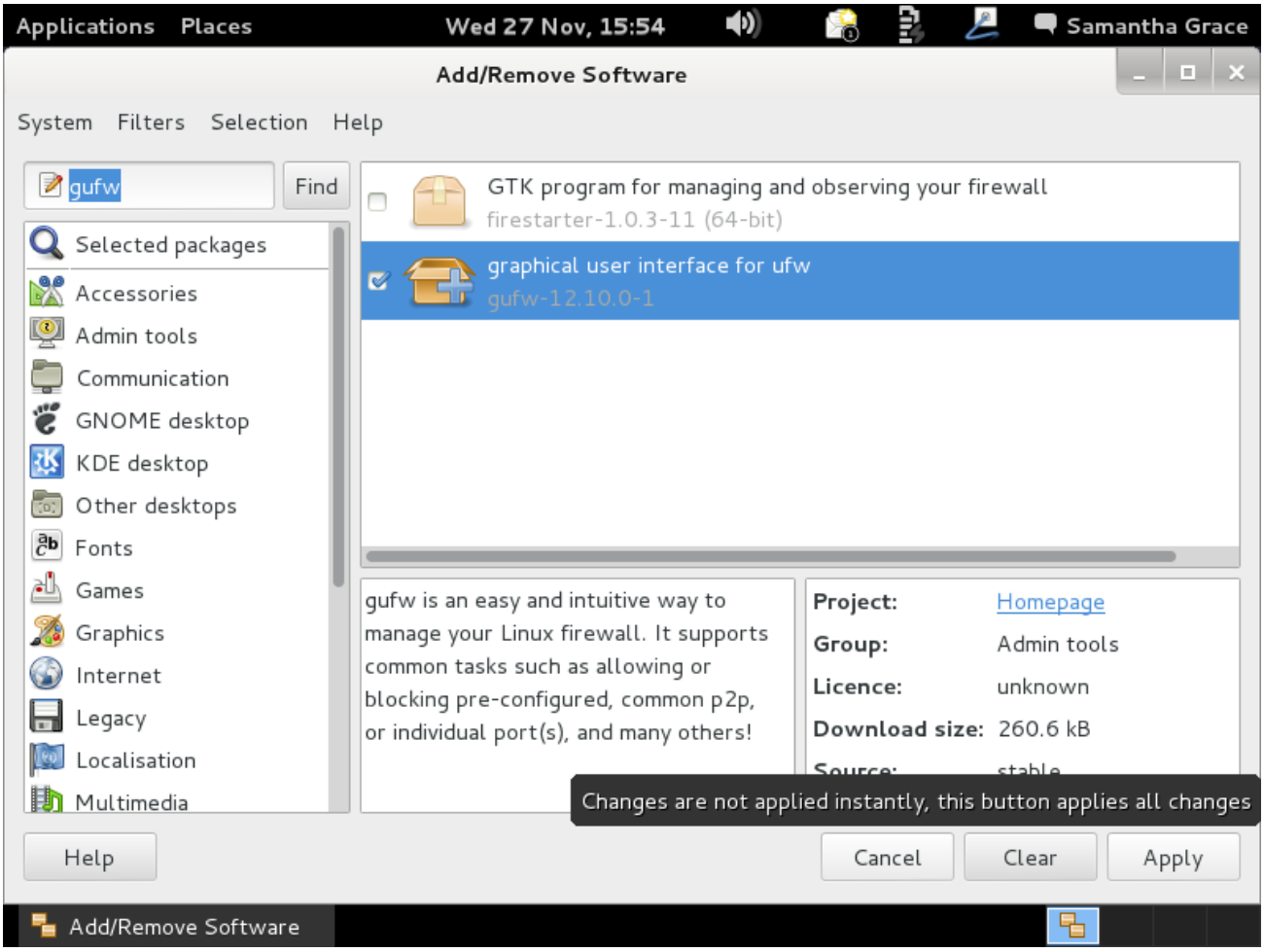
It is also listed on the **Internet** menu. Open **Applications** menu, select **Internet**, the Internet menu is now displayed, which now includes **Icedove.**



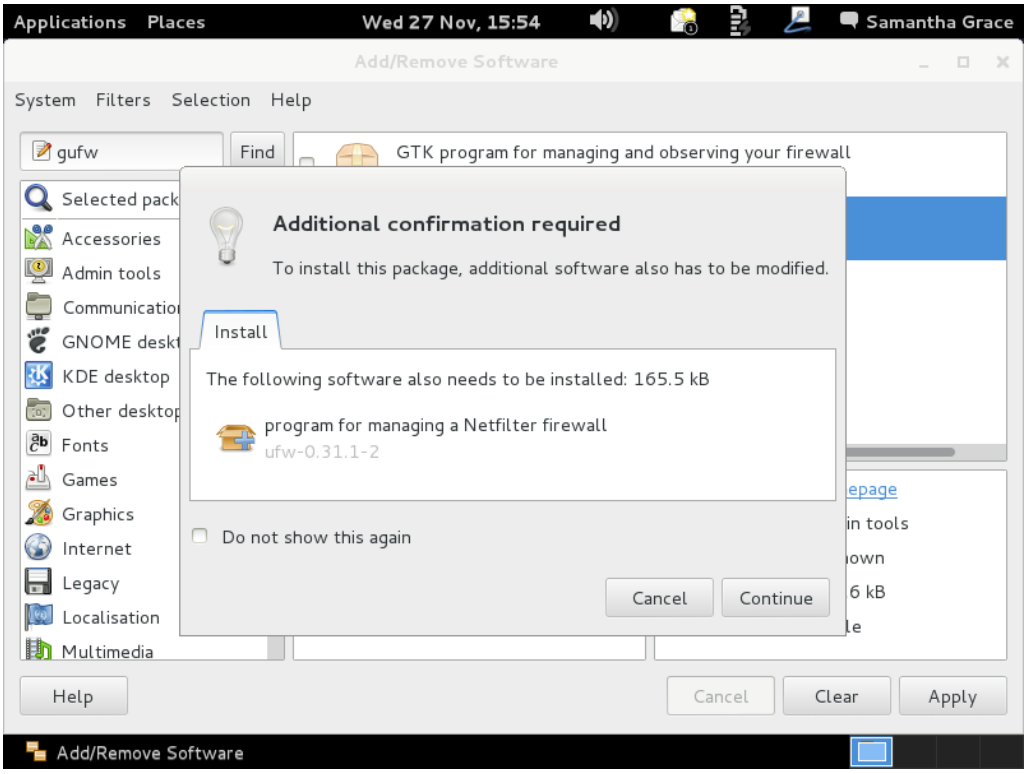
Firewall

A firewall is a software program or piece of hardware that helps screen out hackers, viruses, and worms that try to reach your computer over the Internet. The most effective and important first step you can take to help protect your computer is to turn on a firewall.

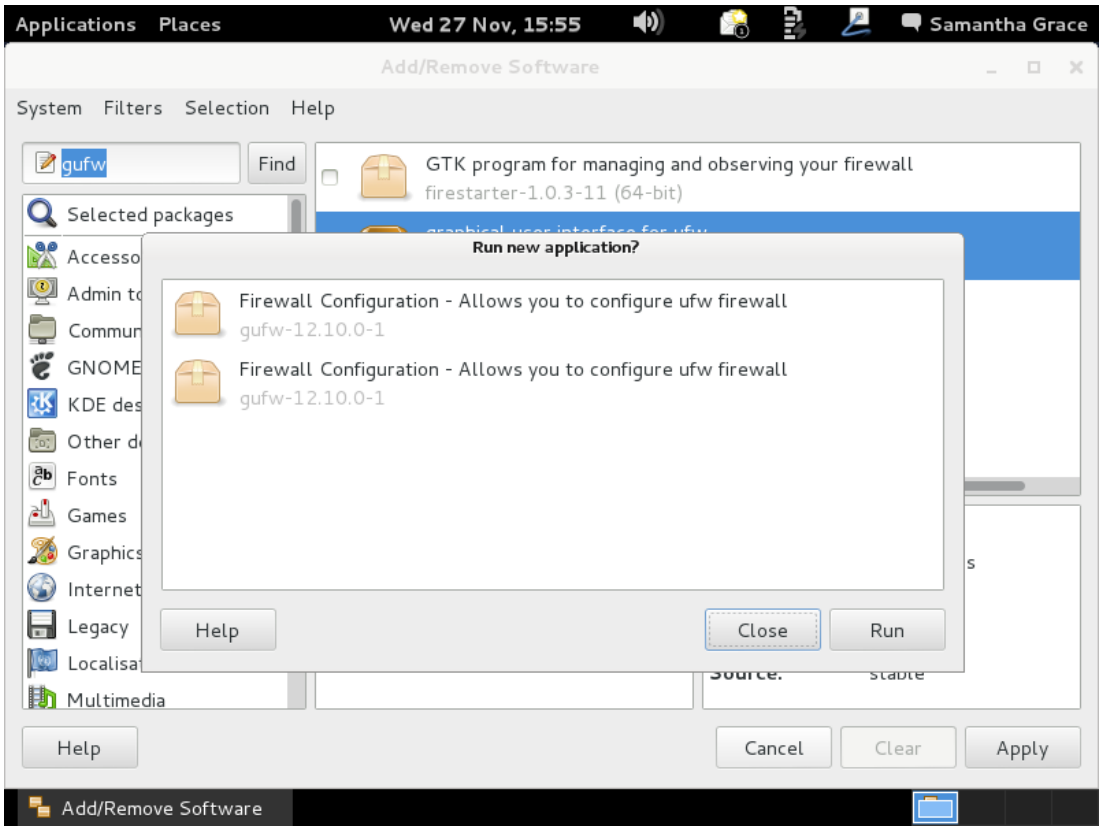
Iptables is a powerful firewall built into the Linux kernel. It can be configured directly from the command prompt or there are several front ends available to do this. I have decided to use **gufw (GUI for Uncomplicated Firewall)**, mainly because it was actually recommended when I searched for "firewall" in the **Add/Remove Software** screen and scrolled through the various software available. To install this firewall. Open **Applications** menu, select **System Tools.** System Tools menu is then displayed, select **Add/Remove Software**. The Add/Remove Software screen is displayed, type "gufw" into Find box. Highlight the "guwf" application and press **Apply.**



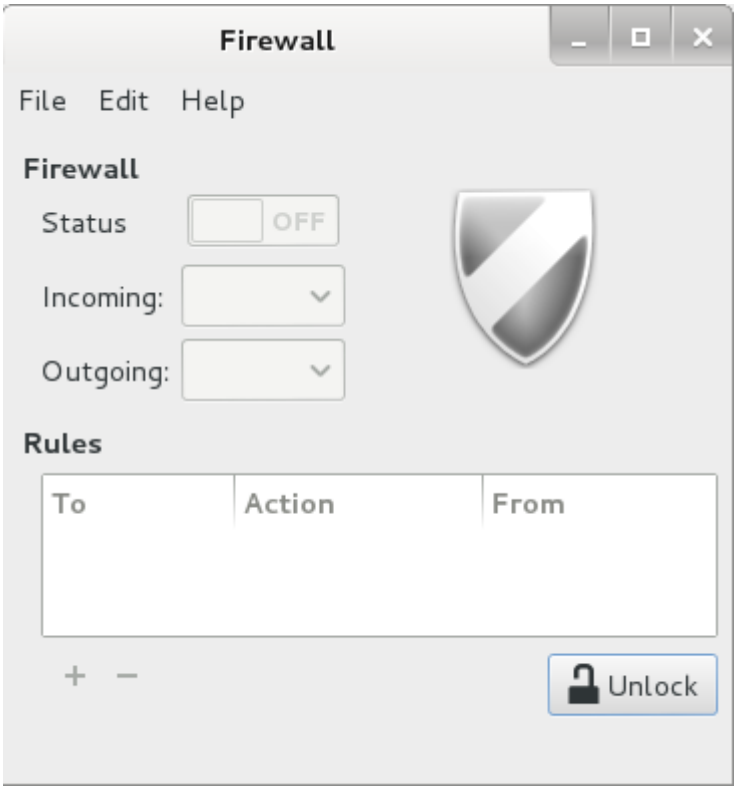
I am informed that additional software has to be installed in order to install this package. Press **Continue.**



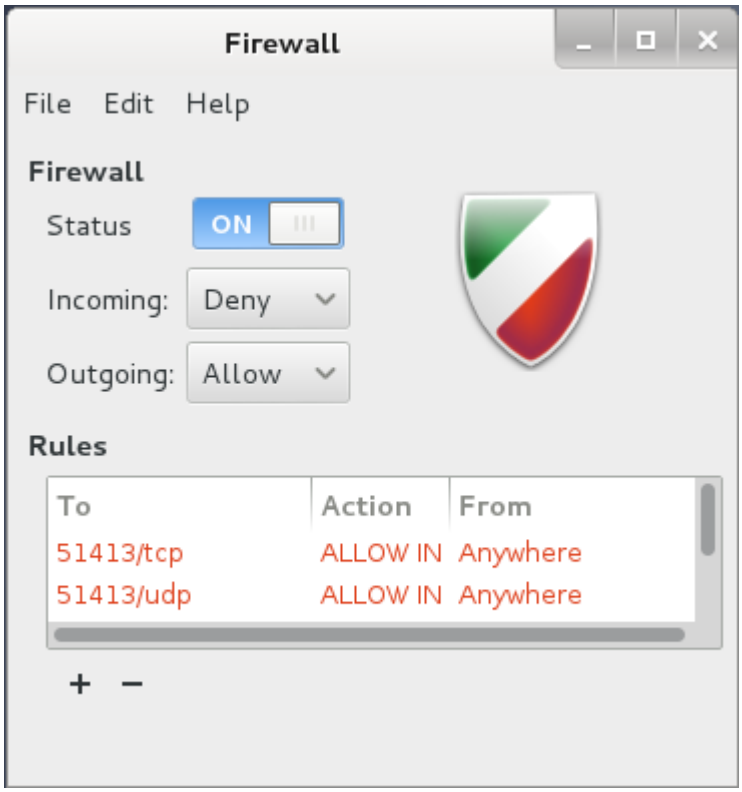
Because this is an administrative take, an authentication screen is displayed. Enter the password for the root user and press **Authenticate.** The installation only takes 30 seconds. You are then given the option to run the application.



Press **Run.** The Firewall screen is displayed. Press **Unlock.** You must again enter the root password. Press **Authenticate.**

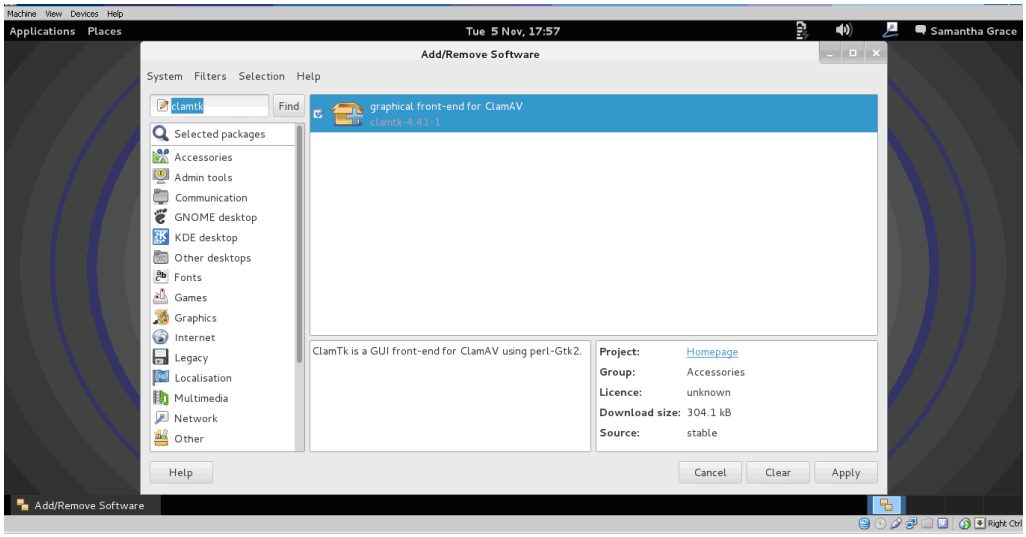


Change the status to **On.** From this screen you can add or remove firewall rules.



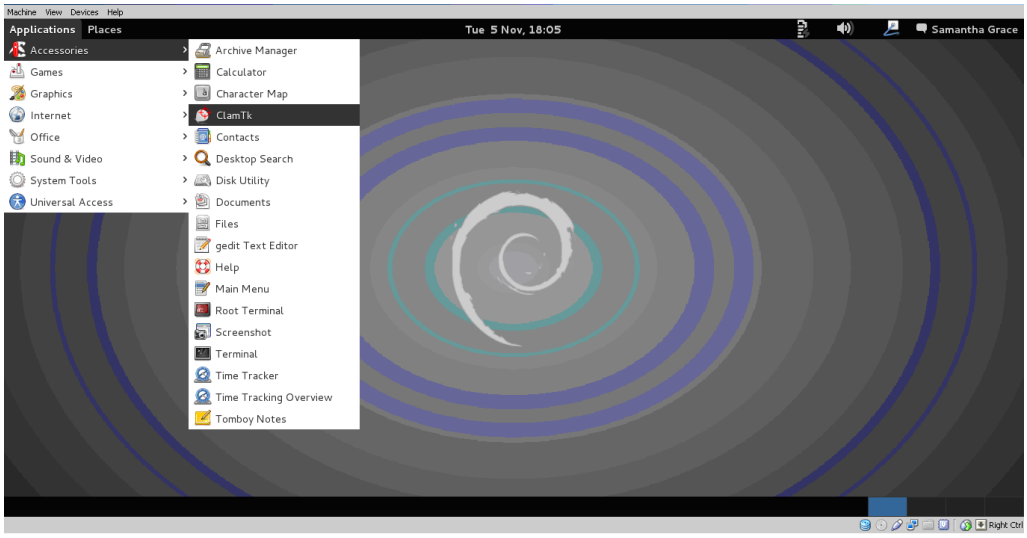
Anti Virus

On carrying out searches in google regarding free open source anti virus software, the most popular and widely used is ClamAV, which needs to be run from the command prompt. There is a GUI front end called "Clamtk". It is also packaged with the Linux Debian installation. I have, therefore, decided to install this anti-virus software. Open **Applications** menu, select **System Tools.** System Tools menu is then displayed, select **Add/Remove Software**. The Add/Remove Software screen is displayed, type "clamtk" into Find box.



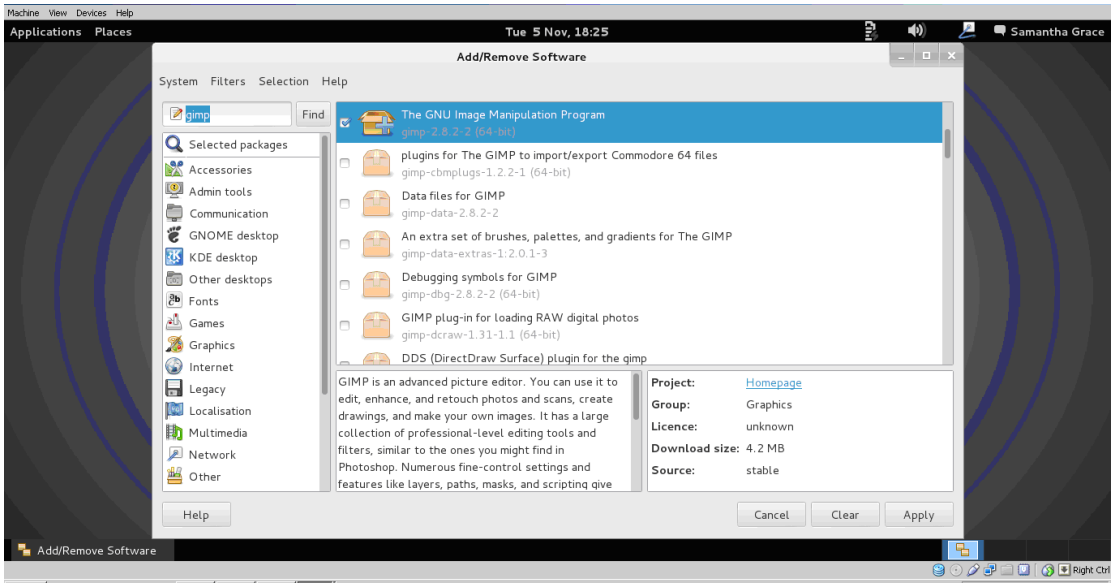
Highlight "Graphical front end for ClamAV" and press **Apply**. A list of software is displayed which needs to be installed in order to install this package. Press **Continue.** Because this is an administrative activity, I am prompted to enter the "root" password. Press **Authenticate.** It takes less than a minute to complete installation. We are given the option to run **ClamTK** or close the window. Press **Close.**

ClamTK is now listed on the **Accessories** menu. Open **Applications** menu, select **Accessories**, the Accessories menu is now displayed, which now includes **ClamTK.**

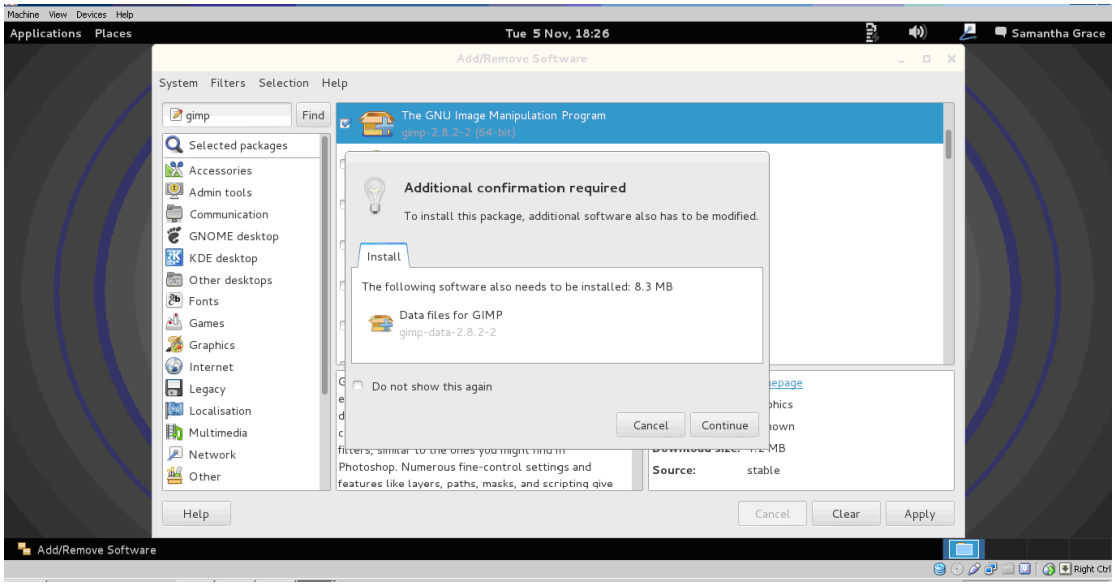


Graphics and Image editing package

On googling graphics and image editing packages, the most popular seems to be GIMP. It is also easy to install as it is included in the Linux Debian distribution package. Open **Applications** menu, select **System Tools.** System Tools menu is then displayed, select **Add/Remove Software**. The Add/Remove Software screen is displayed, type "gimp" into Find box. Highlight "The GNU Image Manipulation Program". Press **Apply.**

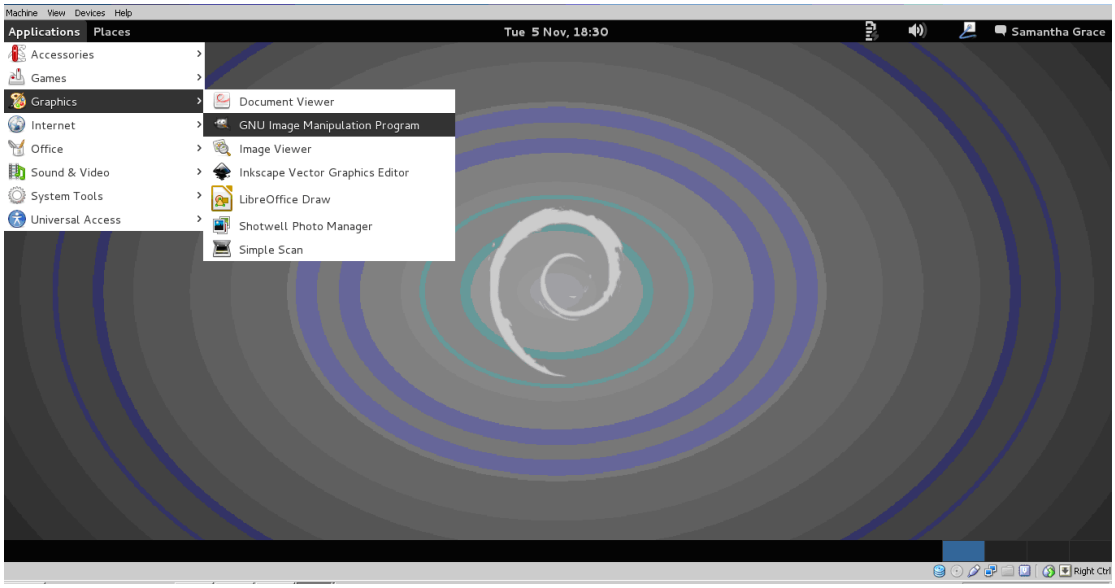


Screen displayed which lists software that needs to be installed with "GIMP" as listed below. Press **Continue.**



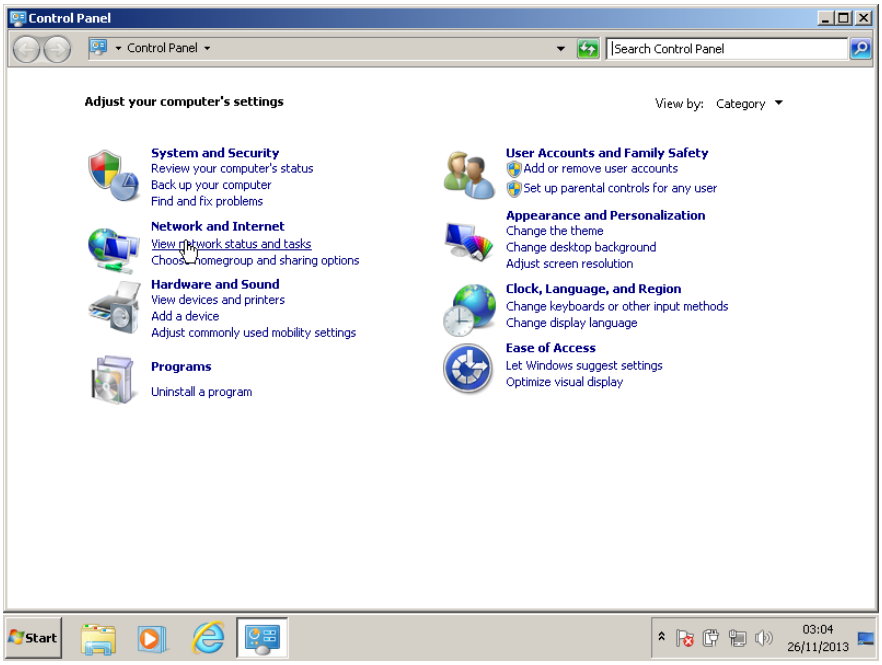
It takes less than a minute to complete installation. We are given the option to run **GNU Image Manipulation Program** or close the window. Press **Close.**

GNU Image Manipualion Program is now listed on the **Graphics** menu. Open **Applications** menu, select **Graphics**, the Graphics menu is now displayed, which now includes **GNU Manipulation Program.**

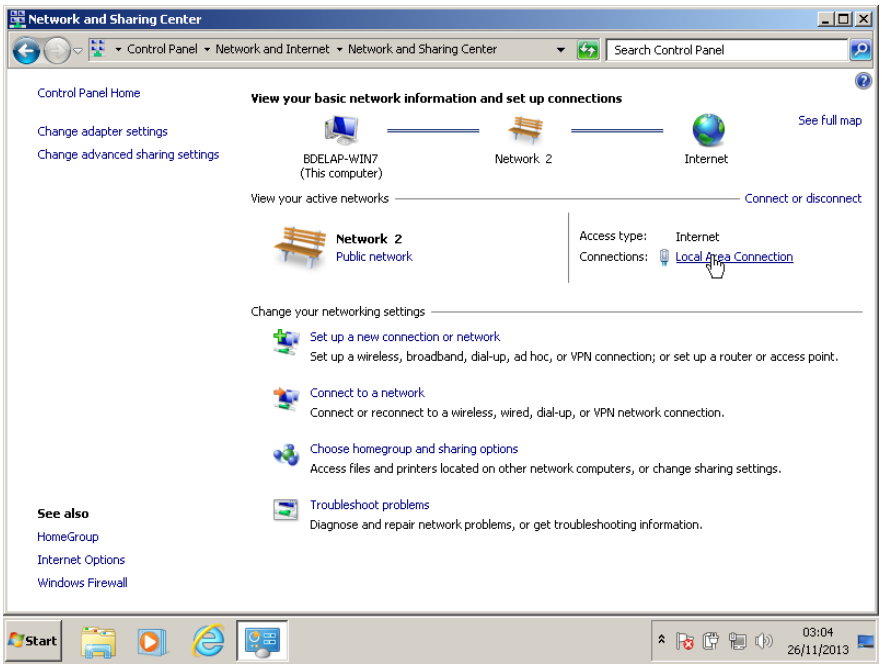


Setting Windows 7 machine to static IP address

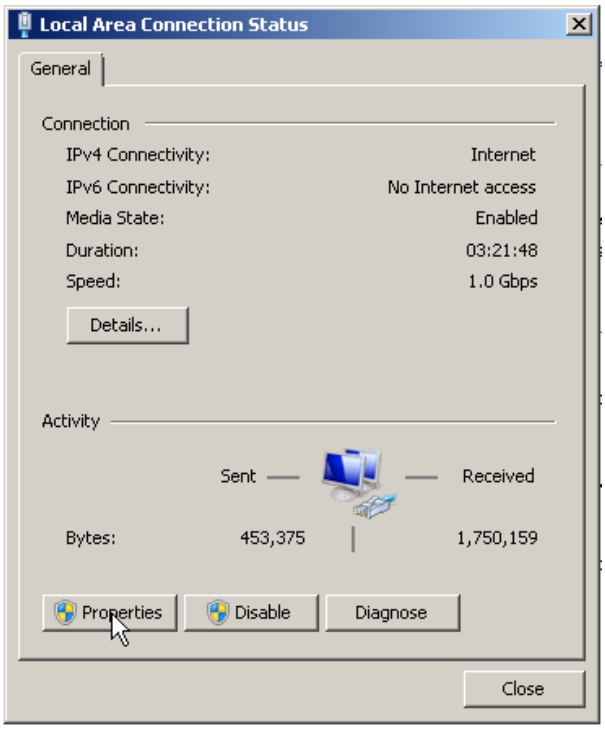
From the **Start** menu, select **Control Panel,** select **View network status and tasks**

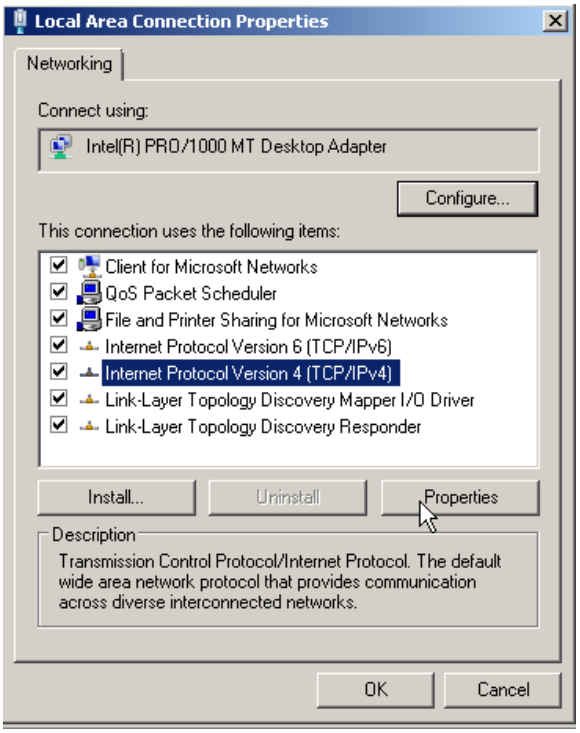


Double click **Local Area Connection**

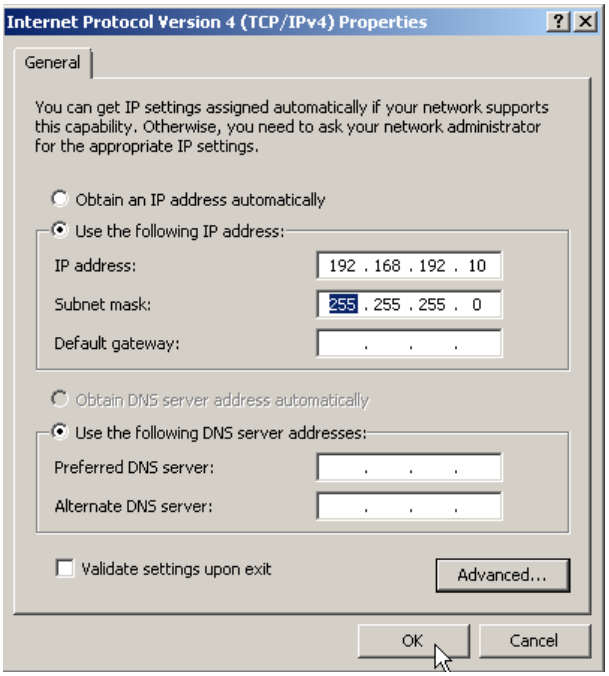


On the Local Area Connection Status screen press **Properties.** Networking screen is displayed. Highlight **Internet Protocol Version 4(TCP/IPv4)** and press **Properties.**

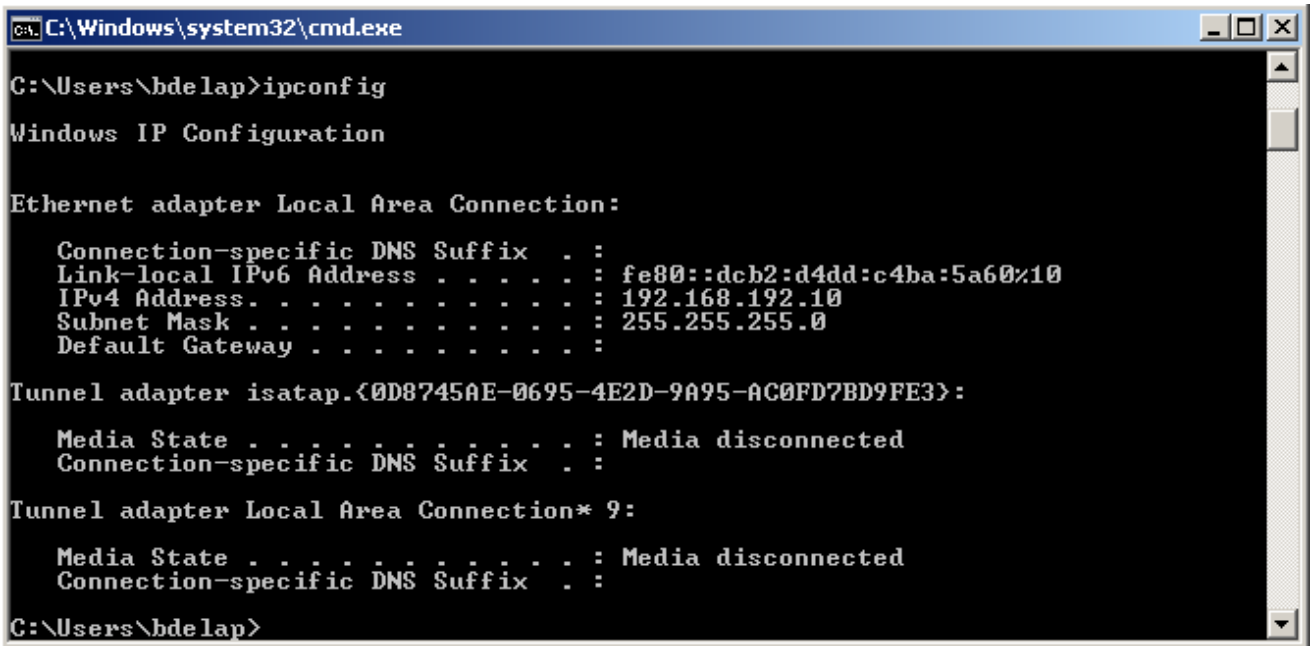




Deselect the **Obtain an IP address automatically** option and select **Use the following IP address** option**.** Type in the static IP address 192.168.192.10. Type in the Subnet mask 255.255.255.0. This is a Class C type IP address. Press **OK**

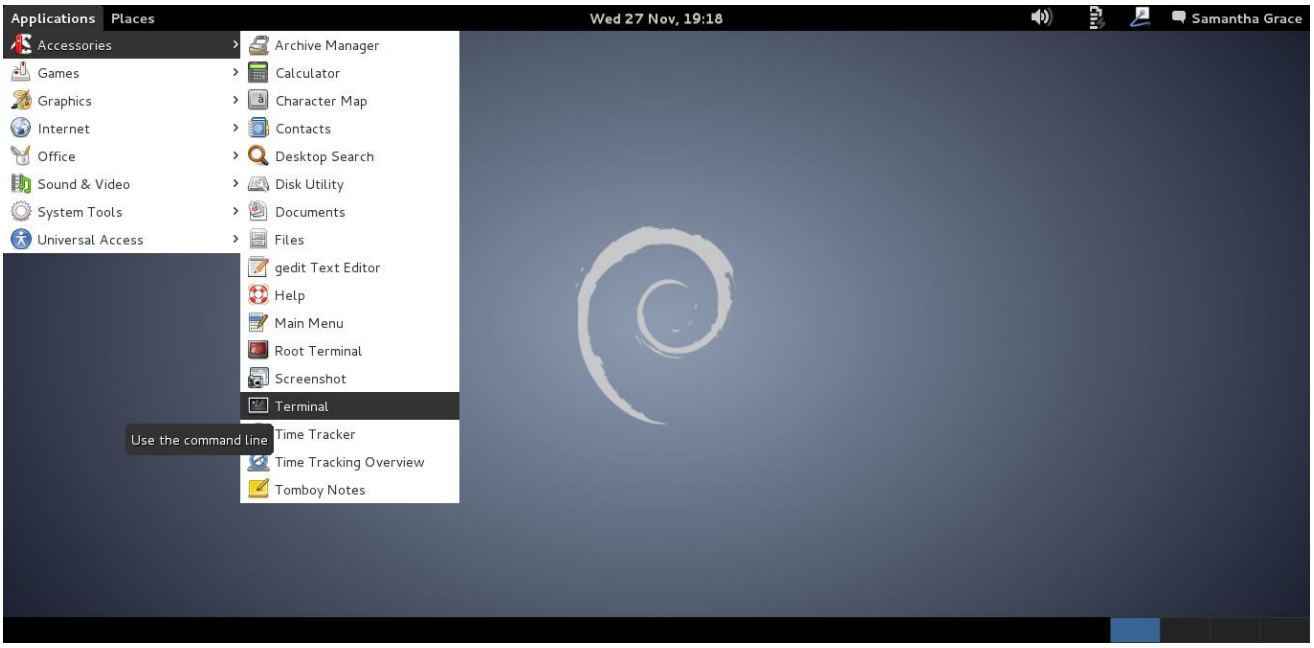


We will now ensure that the IP address is 192.168.192.10. From the **Start** menu type **cmd** in the "search programs and files" field. The command prompt is displayed. Type **Ipconfig.** As you can see our static address has been set as expected.

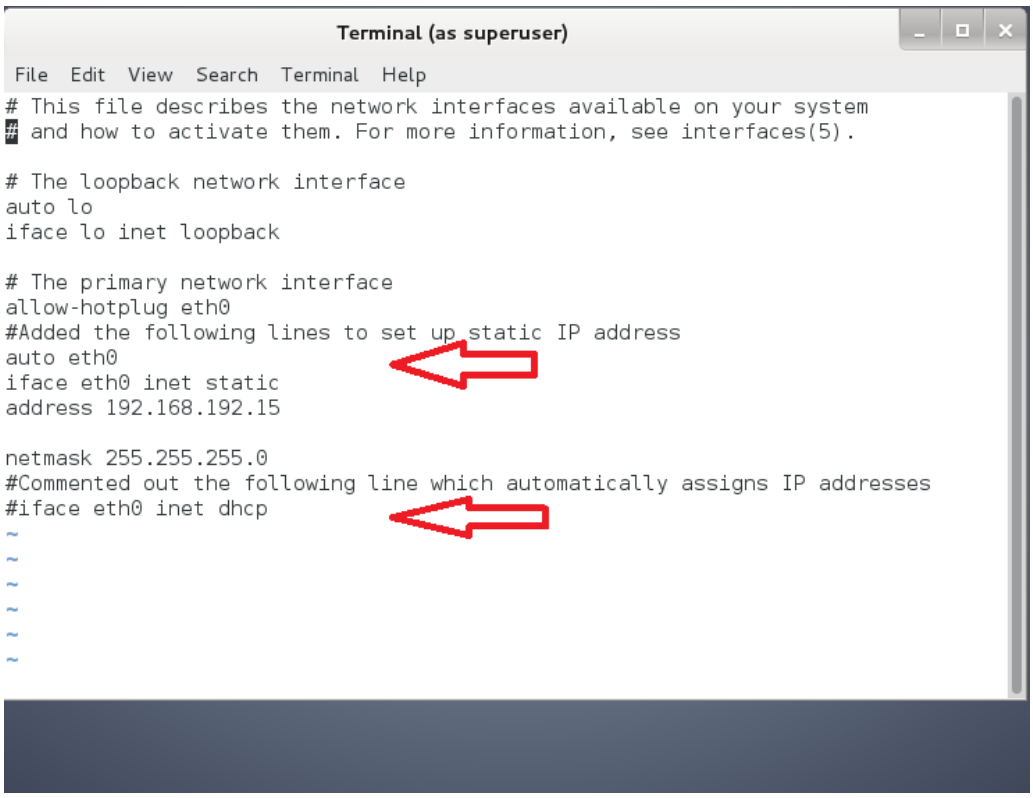


Setting Debian Linux machine to static IP address

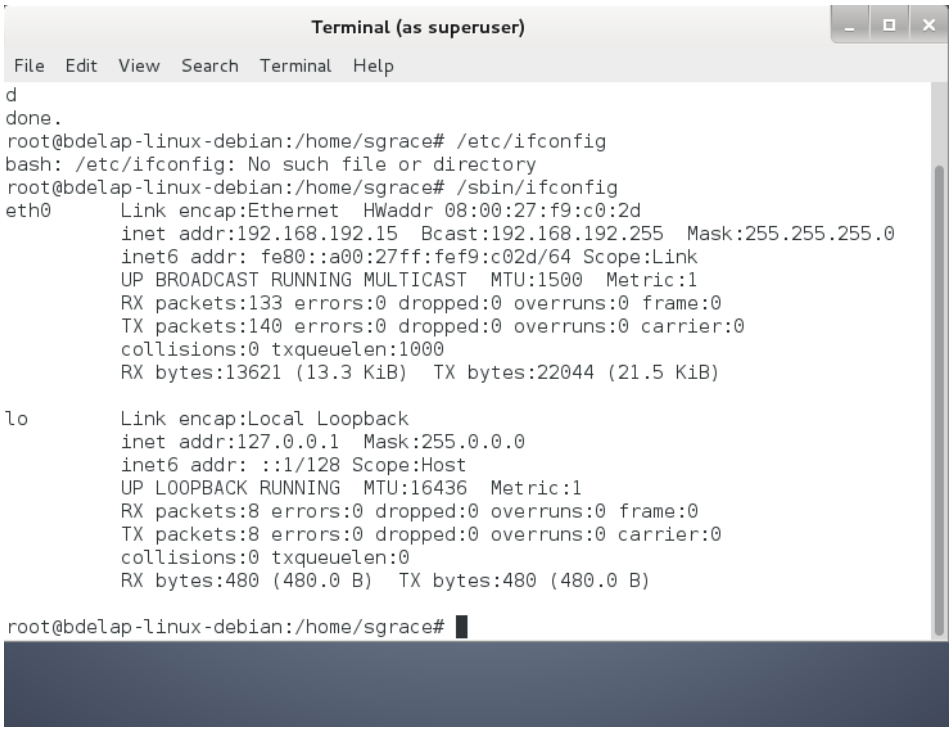
In order to set a static IP address in Debian, me must edit the interfaces file which is located in /etc/network. From the **Application** menu select **Accessories** and select **Terminal.** The command prompt is displayed.



At the command prompt type **vi /etc/networks/interfaces.** The interfaces file is displayed. You will need to comment out and add the lines outlined below with the red arrows:

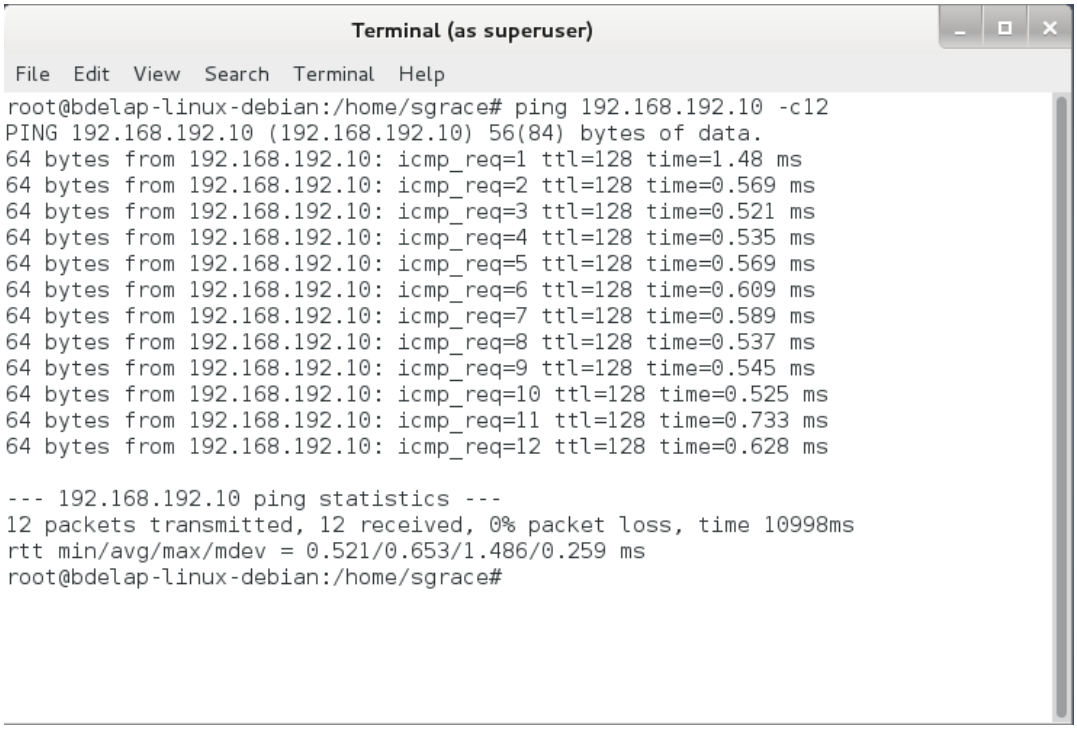


Use your cursor to go to the last line of the file and type ":wq" to save the file. On returning to the command prompt type **/etc/init.d/networking restart** to implement the changes. We must now make sure that the IP address is as expected. Type **/sbin/ifconfig**. You can see from the screen below that the static IP address is now in place.



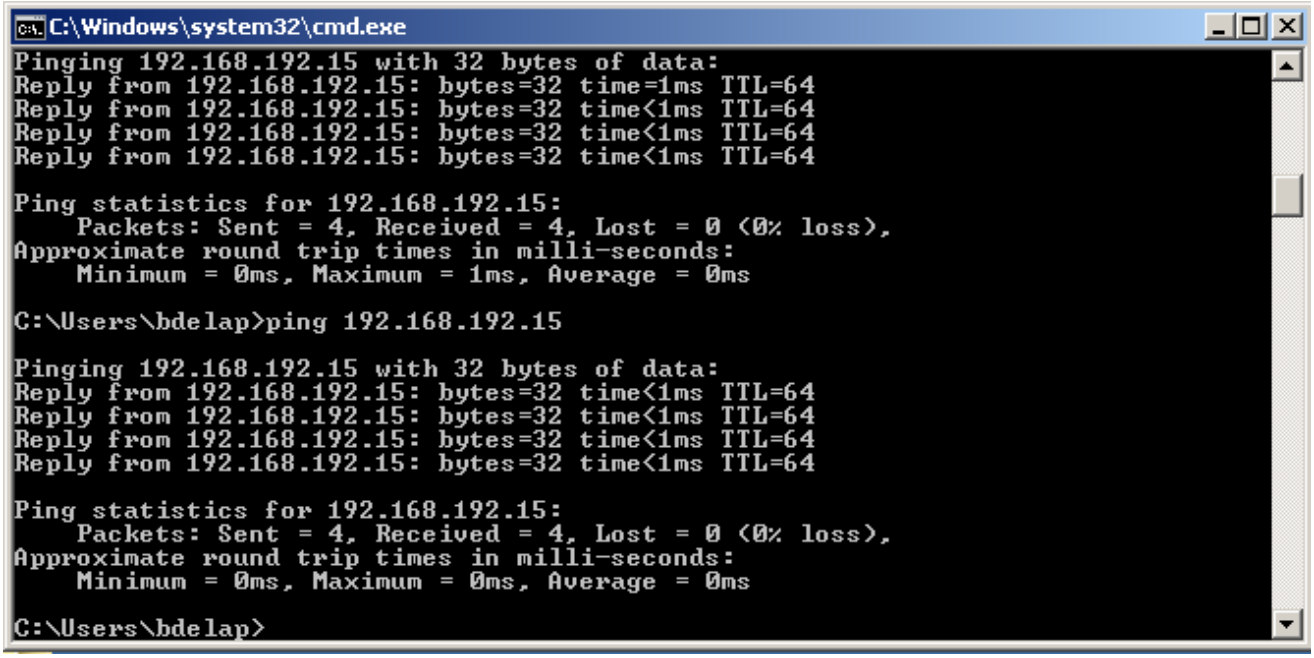
Check if Debian Linux machine communicates with Windows 7 machine

We will use the ping command with the static IP address of the Windows 7 machine 192.168.192.10. You can see that the ping command was successful.



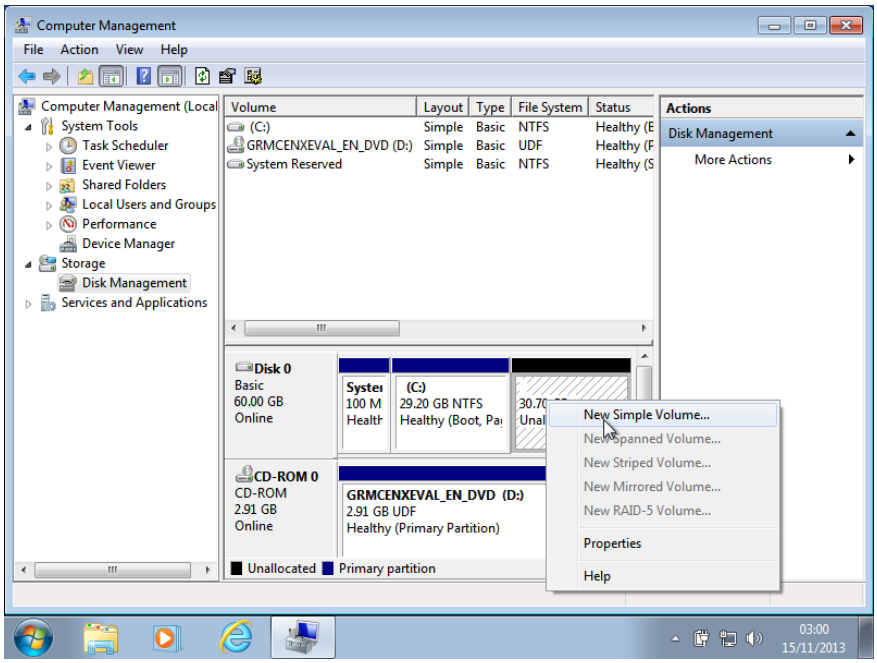
Check if Windows 7 machine communicates with Debian Linux machine

We will use the ping command with the static IP address of the Debian Linux machine 192.168.192.15. You can see that the ping command was successful.

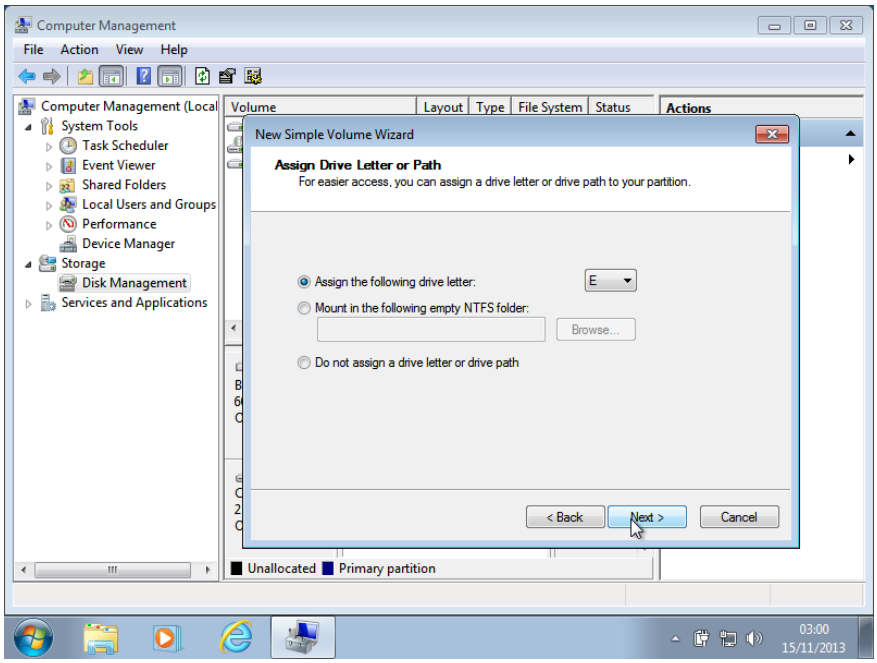


Appendix A – Allocating Disk Space

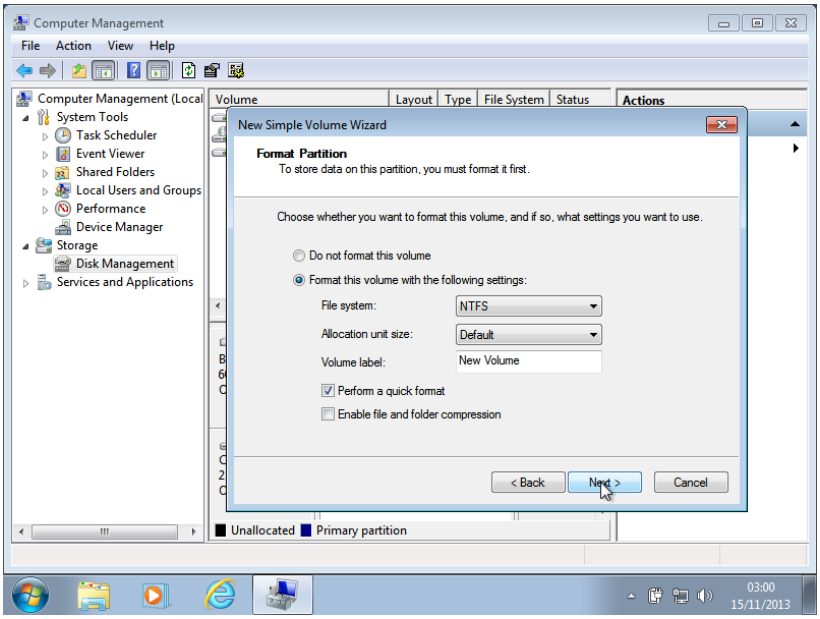
From your **Start** menu, right click **Computer** and select **Manage**. Then select **Disk Management**. The following screen is displayed, which shows drive information. Right click on the unallocated drive space (black header with diagonal lines and select **New Simple Volume.**



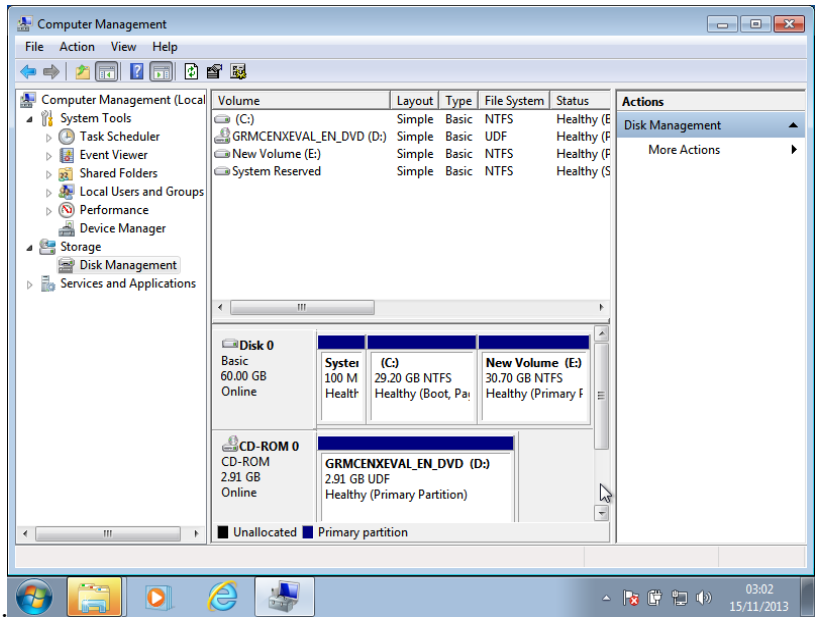
The Simple Volume Wizard screen is displayed. Press **Next.** You are then given an option to assign a letter to the drive, which defaults to the next drive letter in your computer (in this example E), press **Next.**



You are then given the option not to format or the default setting (which is selected) to format with the following settings. There is a choice of two files systems NTFS and FAT32. If you are working in a secure environment and you wish to be able to assign access rights to files and folders, then you should select NTFS. FAT32 should be chosen if you want to share files with other operating systems as NTFS is not compatible with all operating systems. Choose the **default** Allocation unit size. Volume label will give your volume a name. Tick **Perform Quick Format**. If you wish to compress files on this drive, tick **Enable file and folder compression.** Press **Next.**



You are then informed that you have successfully completed the Wizard. Press **Finish.** You are presented with a screen confirming that you wish to format the drive (details of the drive are displayed), click **Start,** you are then warned that all data will be deleted, press **OK.** When your drive has finished formatting, check in Disk Management, your drive will be listed.



Appendix B – 32 or 64 bit

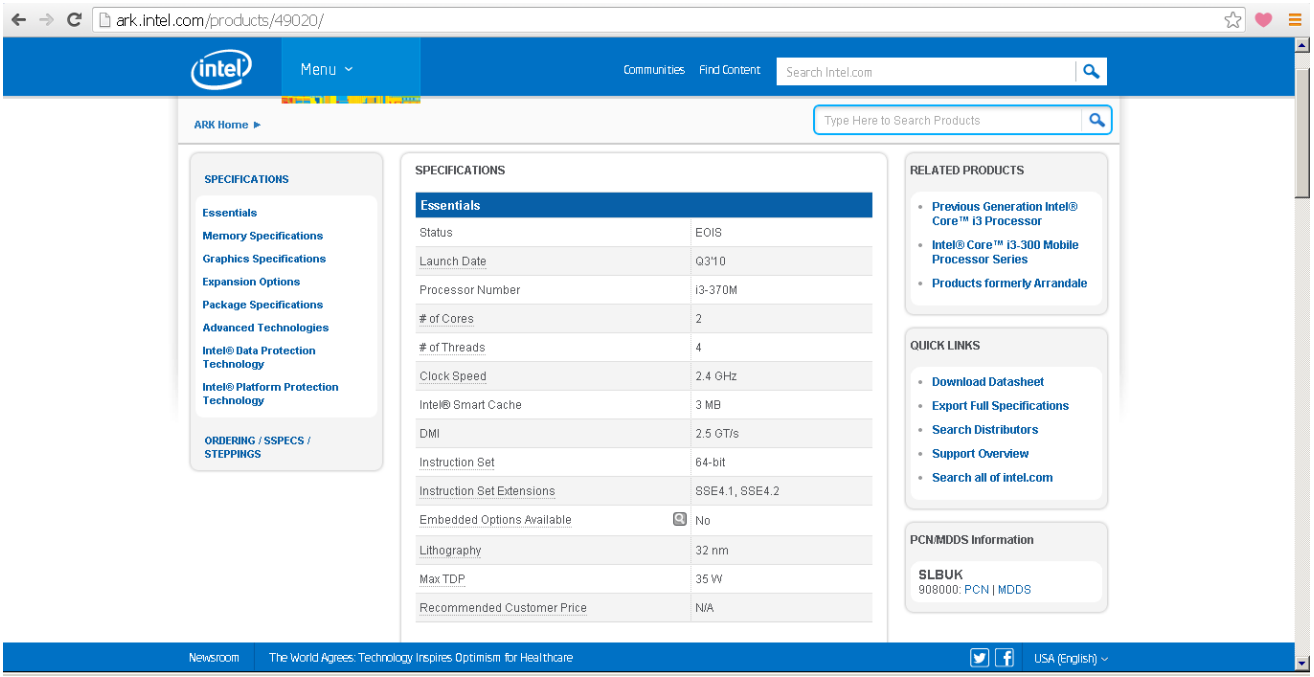
If you already have a version of Windows on your computer, you can determine whether you are running the 32 or 64 bit of Windows as follows:

From the **Start** menu, right click **Computer** and select **Properties**

If "64-bit Operating System" is listed next to **System type**, you're running the 64-bit version of Windows 7.

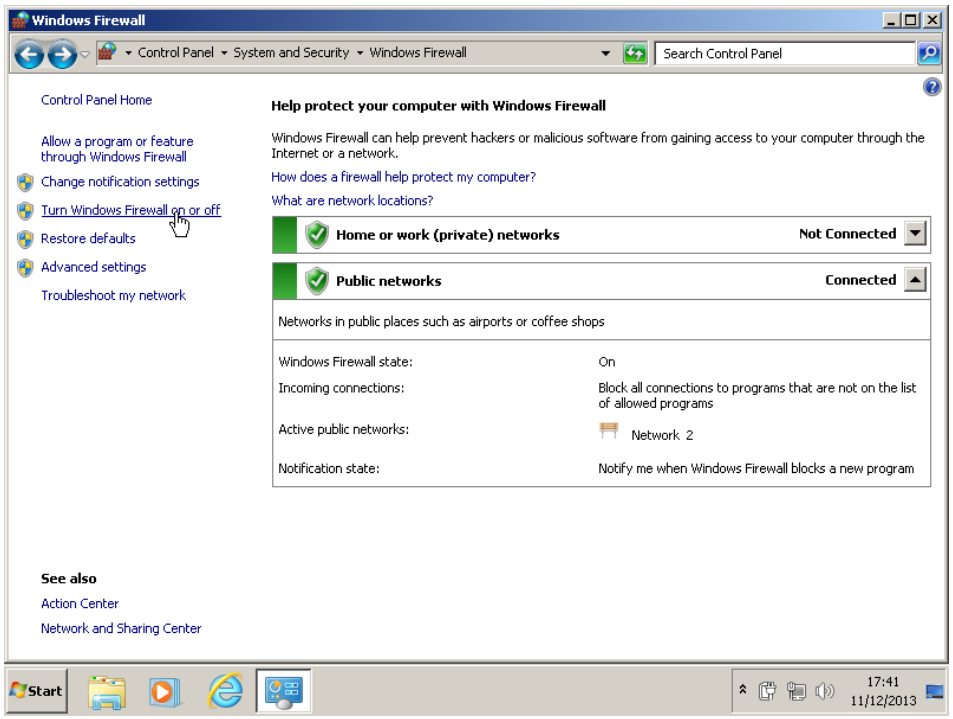
If "32-bit Operating System" is listed next to **System type**, you're running the 32-bit version of Windows 7.

If you do not have Windows installed, you must check what processor is in your computer. This is normally listed on the manual or box that came with your computer. If you do not have these, you can google your make and model of computer. When you have the processor name, you can check the specifications of the CPU on the processor's manufacturer's website. The following are the specifications for my processor from http://ark.intel.com/products/49020/ You can see that it supports a 64 bit instruction set.

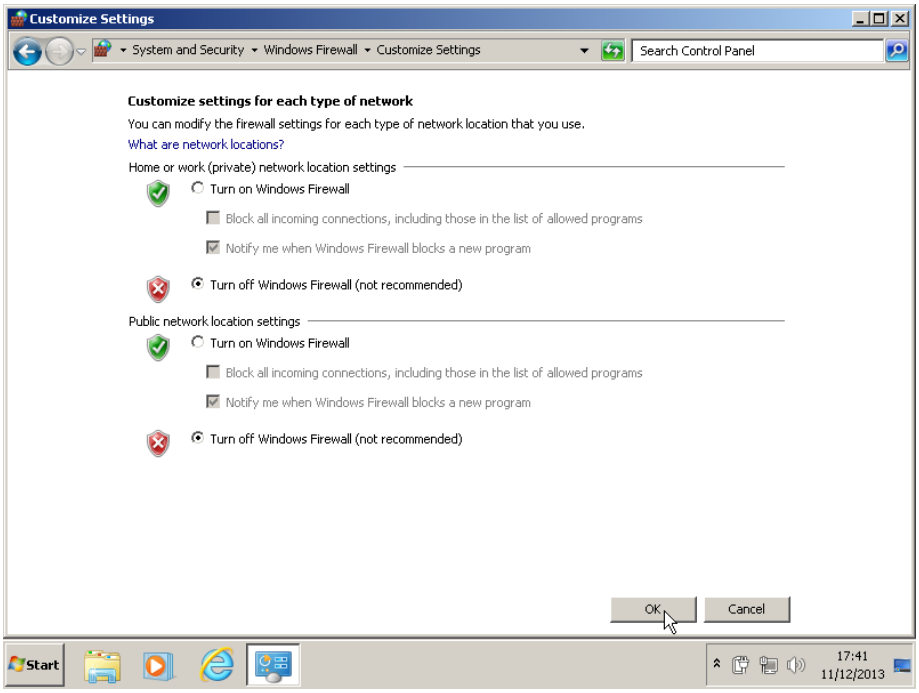


Appedix C – Disabling Firewall

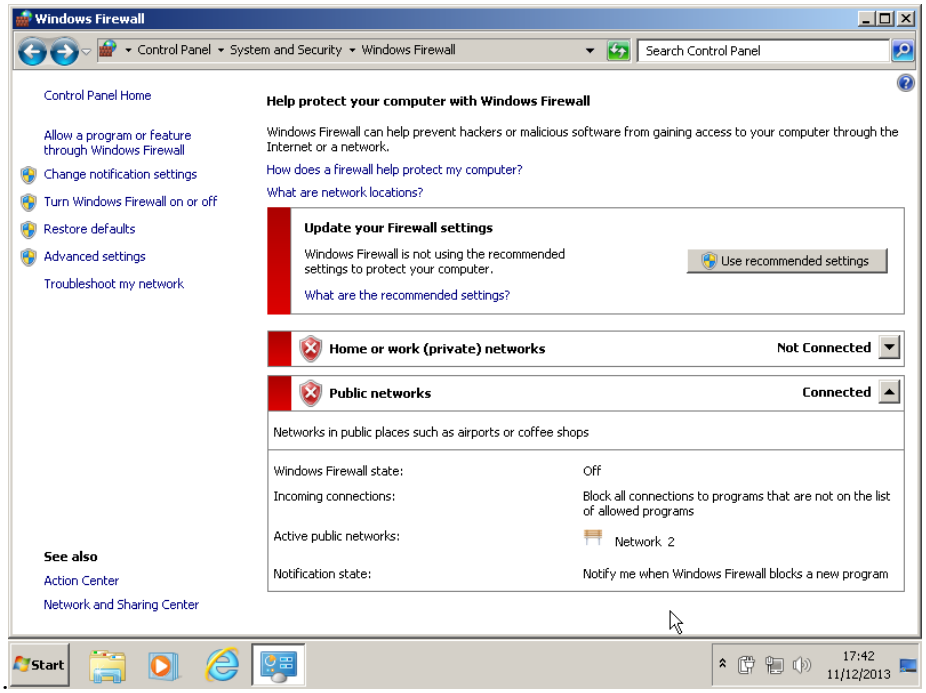
In order to disable your firewall, select **Control Panel, System and Security, Windows Firewall.**



Select the option **Turn Windows Firewall on or off.**



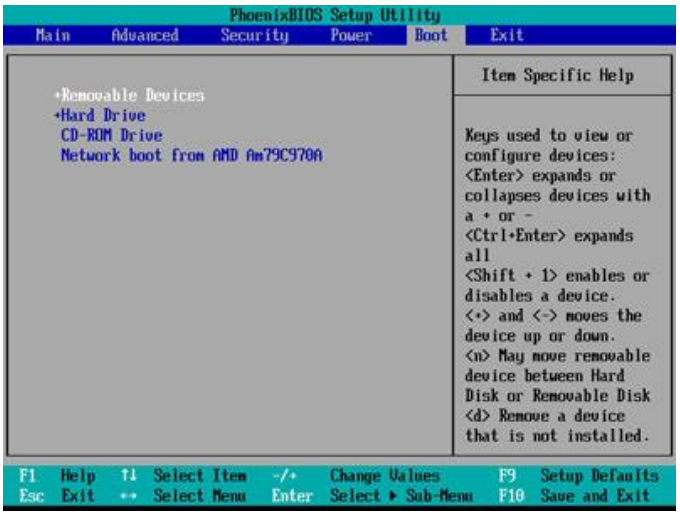
Select **Turn off Windows Firewall** on both the **Home or work network location settings** and **Public network location settings.** Press **Ok.** You are presented with a screen informing you that Firewall is turned off.



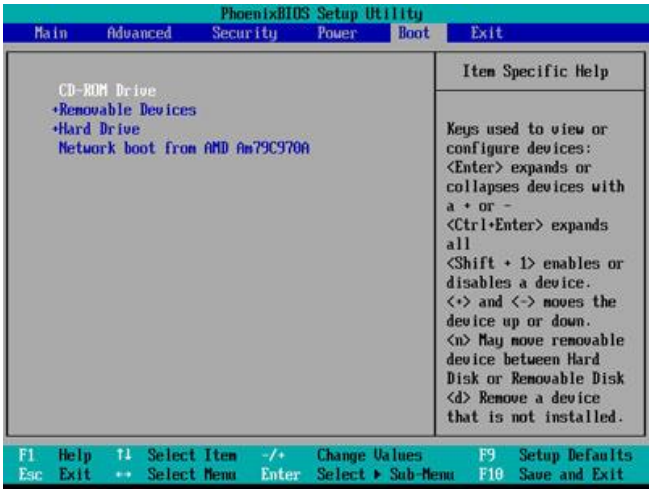
Appendix D – Changing CMOS Settings to boot from CD/DVD

The key to enter the Setup for CMOS settings can vary from computer to computer. The <F2> key and the <Del> key are the most commonly used keys. You may need to google your particular computer to find the key or combination of keys. My computer uses <F2> so will use that key for the purpose of this demonstration. The Setup Utility may also vary for different machines but tend to be similar.

Turn on or restart your computer. Press the <F2> key immediately. This will take you to the following BIOS Setup Utility Screen. Choose the **Boot** tab. You are presented with the following screen. Images on this Appendix are from the website http://pcsupport.about.com/od/fixtheproblem/ss/bootorderchange_3.htm



The order in which the drives are listed is the current boot order. To change which device to boot from first, follow the instructions on the screen. In this demonstration, the boot order can be changed using the + and – keys. Select the CD-ROM drive. You must save your settings before exiting. In this demonstration, choose **Exit** and select **Exit Changing Settings.** Confirm that you are changing the settings by pressing **Yes.** Restart the computer with the installation CD in the drive.



Appendix E - Restore Registry

Fortunately I have never had to restore a registry backup. The following instructions are from http://pcsupport.about.com/od/windows7/ht/restore-registry-key-windows-7.htm

Locate the Registration File you exported (in the above backup). This file will hava a REG file extension.. The REG file icon looks like a broken Rubik's cube in front of a piece of paper. Double-click on the REG file to open it.

Note: Depending on how you have Windows 7 configured, you could see a User Account Control dialog box appear next. You'll need to confirm that you want to open Registry Editor, which you never actually see because it only runs in the background as part of the registry restore process.

Next you'll be prompted with a message in a *Registry Editor* window:

Adding information can unintentionally change or delete values and cause components to stop working correctly. If you do not trust the source of this information in [REG file location], do not add it to the registry. Are you sure you want to continue?

Important: This isn't a message to be taken lightly. If you're importing a REG file that you did not export or one you downloaded from a source you can't trust, be aware that you could cause considerable damage to Windows 7, depending on the registry keys being changed.

Click the **Yes** button.

Assuming the registry key(s) import was successful, you should receive the following message in a *Registry Editor* window:

The keys and values contained in [REG file location] have been successfully added to the registry.

Click the **OK** button in this window.

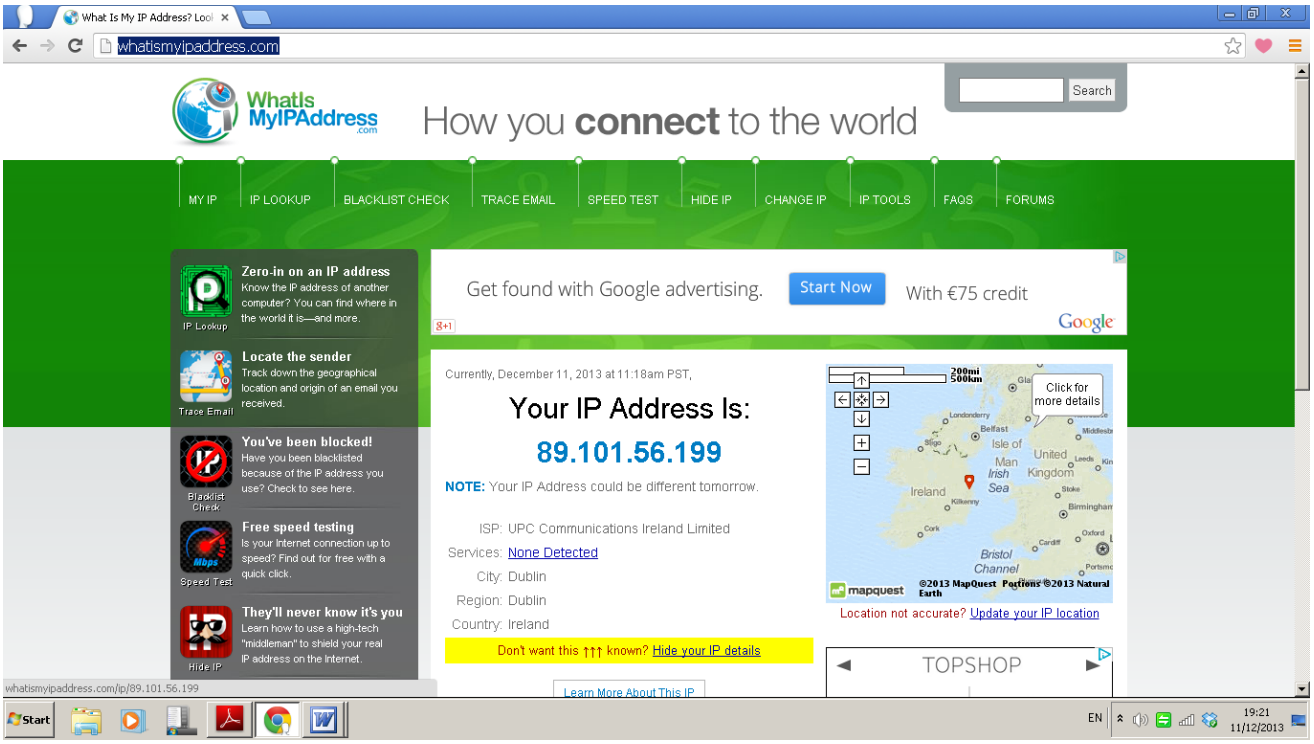
The registry keys contained in the REG file have now been restored to the Windows 7 Registry. If you know where the registry keys were located, you can open Registry Editor and verify that the changes were made as you expected.

Restart your computer.

Depending on the changes that were made restoring the registry keys, you may need to restart to see the changes take effect in Windows 7 or in your programs.

Appendix F – Finding your external IP address

The best way to find your external IP address is to go in to the website http://whatismyipaddress.com/ This instantly displays a screen with your IP address. You can see my IP address is 89.101.56.199



References

Intel

Specification for the Intel Core i3 M370 processor http://ark.intel.com/products/49020/

Microsoft References

Recommendation from Microsoft regarding the selection of Quick Scan or Full Scan

http://windows.microsoft.com/is-is/windows7/scan-for-spyware-and-other-potentially-unwanted-software

What is a firewall?

http://www.microsoft.com/security/pc-security/firewalls-whatis.aspx

Definition of Remote Assistance: http://windows.microsoft.com/en-ie/windows7/help-someone-with-a-computer-problem-using-windows-remote-assistance

What is a signed driver?

http://windows.microsoft.com/en-us/windows-vista/what-is-a-signed-driver

PC Support

Restore registry http://pcsupport.about.com/od/windows7/ht/restore-registry-key-windows-7.htm

Technet

Screen shot F8 screen http://blogs.technet.com/b/askcore/archive/2012/04/15/troubleshooting-boot-issues-due-to-missing-driver-signature-x64.aspx

Tom Brett

Virtual memory explained http://www.tombrett.ie/courses/msc-conversion/6%20Memory.pdf

WhatIsMyIPAddress

Finding your external IP address http://whatismyipaddress.com/

Wikipedia

Definition of a host file http://en.wikipedia.org/wiki/Hosts_(file)