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UTC Reading

Assignment 1

Unit 2

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# P1 – Functions of computer hardware

## Motherboard Diagram

# Table of Hardware

|  |  |  |
| --- | --- | --- |
| Name | Picture | Description |
| PSU |  | It takes power from a wall socket and converts it into power that is usable by individual components. It also takes on input and often converts it into multiple outputs (to go to multiple pieces of hardware). |
| Motherboard |  | The motherboard is the part of the computer that links all pieces of hardware together. All pieces of hardware must plug into the motherboard. This allows connections to be made between hardware such as CPU to RAM. |
| CPU |  | CPU stands for Central Processing Unit. As the name suggests, it is the part of the computer that does most, if not all computing. It contains many registers and buffers and cooperates with the RAM to complete tasks. |
| RAM |  | RAM stands for random access memory. It is primary memory for the CPU which means it connects directly to it. It is very fast memory however it is volatile. This means that when your computer turns off, all data in it is lost. RAM contains all of the instructions for the CPU to do, these are split into operators and operands. |
| Heat sink |  | The Heat Sink is basically a massive set of fins that is ‘glued’ to the CPU. The purpose of these fins is to increase its surface area. The so called ‘glue’ is actually thermal paste, it is a very good conductor of heat. The purpose of the heat sink is to cool the CPU to stop it from getting to hot. As of this it is common to have a fan in built to the heat sink. |
| Fan |  | A computer fan is no different to a standard desk fan. Its purpose is to either push or pull air. This needs to be done in combination and is a very bad thing to get wrong. A PC needs constant airflow through the case, to remove hot air. This means that you need at least one fan blowing in, and one out. |
| Graphics Card |  | A graphics card is basically another computer within the computer, with its own RAM (VRAM) CPU (GPU) etc. This computer only deals with putting graphics on the screen. This means that the CPU doesn’t have to deal with all of the graphics freeing up space for running extra processes. A graphics card isn’t vital however it is a very good idea if you are doing any rendering or gaming. On some modern motherboards a GPU may be built in. |
| Sound Card |  | The sound card in laymen’s terms is a graphics card… for sound. This again may already be on the motherboard. Again it isn’t vital however may be good for music editing/high end playback. |
| Hard drive / SSD |  | A hard drive is a set of spinning disks, containing data that is read by a magnet. Unlike RAM it is secondary, non-volatile memory. This means it is connected through the motherboard and all data remains on it when the PC turns off. An SSD is basically non-volatile RAM in high volume, this is *a lot* quicker than a hard drive. |

# P2 – Purpose of Operating Systems

## Introduction

In this section I will firstly explain what an OS actually does in comparison to hardware, software and a user. I will then explain the following features of OS’s:

* Functions and services
* Device Drivers
* Security
* Stability
* Reliability
* Ease of management
* Associated utilities
* Cost
* Support for the User

## What does an OS do?

An operating system is a piece of system software (software designed to provide a service to other software) that links the hardware of a computer to applications and therefore the user. Most operating systems also organise tasks so that they are more efficient and completed for when they are needed. They may also include accounting software for cost of processor time, mass storage, printing, and other resources.

For hardware functions such as input, output and memory allocation, the OS will sit between the software and computer hardware even though the input is made from hardware of the computer. This is so it can verify/record the information submitted.

## Functions and services

The functions of an OS (as mentioned above) are mainly Machine and Peripheral Management, Security and File Management.

#### Machine and Peripheral Management

This basically means that the OS allows your computer to properly talk to and receive information from peripherals (keyboard, mouse, monitor etc.). This allows for easy plug and go capability without having to go through the steps of configuration and testing.

#### Security

In this case security is a background activity that a lot of people don’t think about. An OS has mainly a firewall, login page, encrypting data, basic antivirus. Antivirus and Firewall both aim to remove/prevent malware (malicious software) from your computer.

#### File Management

An OS will also manage files. They will insure that a path to the files are remembered and also that the correct applications are used to display certain files. This is all read from the metadata, something an OS saves alongside a file.

## Device Drivers

Device drivers are the things that translate hardware actions (e.g. key press, mouse move etc.) into readable code for the OS that can then send it to the hardware. More modern computers use very similar or the same for the same type of hardware. This means that the OS only need to install the drivers once whereas on older computers, the OS would have to find, download and install the drivers for each new piece of hardware that you plug in.

The OS still has the important job of selecting which driver is needed to interact with the hardware. If this is wrong then the hardware will not work in the way intended and could possibly cause damage to the computer.

## Security

OS’s will often come with pre-installed software to provide security. One example of this is Windows which comes shipped with ‘Windows Defender’ and ‘Windows Firewall’. These are antiviruses and firewalls respectively.

Other than these applications, an OS prevents a user directly contacting hardware of a computer, possibly damaging it or taking information from it. Some of these things include not being able to access certain memory slots (memory slot 0 which contains the BIOS). Another way is by only accessing pieces of data through certain procedures which could include certain security features such as administrator/root password protection. This is also a common feature on ‘Log On’ to a computer.

## Stability/Reliability

Due to the amount of memory and storage management that an OS does, it is a lot more stable than direct access. It also offers the ability to manage certain applications without closing the whole computer. This means that unstable applications will not cause a computer to shutdown, this puts less pressure on developers.

An OS can also give the ability of giving “stable crashes”. This means that when a computer may crash, it will display an error message which can supply the user with the reason for a crash. When crashing an OS can also have the ability to save any unsaved work so that it is not lost from the user. This means that when the user logs back on, the application will be able to recover unsaved work.

## Ease of management

Management with an OS is very easy. This is because they often come with the built features such as disk defraggers, drive formatting, cookie removals etc. This means that you can run these procedures with a click of a button rather than manually going through and doing it yourself. These tools also allow you to remove wasted space on a drive/memory allowing the speed of a computer to be increased.

## Cost

The cost of an OS is inevitably an important factor. There are a lot of free OS’s on the market however they are known for being a lot more complicated than they need to be. This is mainly because they are either entirely terminal based or terminal based for more advanced features. Mainly the paid OS’s still have a terminal however they also have built in applications that do the purpose of a command line.

The cost is such an important factor as in the end, you will either be getting an OS for a whole business/school or will be wanting to gain the compatibility benefits that you receive from running multiple devices on the same OS.

## Support for the User

User support is a big factor when it comes to investing in an OS. The main support that you will find in an OS is probably when it crashes, they will mainly display error messages which you can then research and find advice on how to prevent this error again (e.g. install more RAM).

Another place where you may find support is when using in built applications. This will mainly be a link taking you to either a web page specific to your current situation, or to an inbuilt help application which won’t require the internet to function. This allows users to search their problem or just get general help.

# P3 – Security and Maintenance Tools

## Antivirus

An antivirus scans and removes malicious software and viruses from your computer. It is very important to have an antivirus on your computer to prevent information being taken and to keep the speed of the computer to a good standard.

## Firewall

Firewalls prevent data being sent into and out of your computer based on specific rules. It is highly important to put a firewall onto your computer and to keep the rules up to date. This is because, like an antivirus, a firewall can prevent a virus from effectively operating on a computer.

## System Clean-up

Over time computers accumulate unused or underused files. These can include things such as cookies and browser history. A system clean-up tool can remove these files from the hard disk. The style that most disks are formatted means that overtime, it could come fragmented. A lot of system clean-up tools can also defrag the disk to again increase speed. NOTE: SSD’s don’t need to be defragged as they are formatted in a different way.

## Drive Formatting

Drive formatting is when you partition a drive and install a file system onto it, by doing so removing all data on it. This may be done for a few reasons: removing all data from the disk to get a new start for speed reasons (e.g. being overrun with malware), making a new drive suitable for use in a computer, removing all personal information before resale/disposal.

# P4 and M2 – Recommended System and Software

## Computers

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | Price (form Amazon) |
| AMD APU Athlon 5350 Quad Core Processor | Quad core 2.05ghz AMD CPU. Has enough cores to handle multitasking and enough speed to handle large applications. | £35.99 |
| ASUS AM1M-A Motherboard | An Asus motherboard that is compatible with the CPU. 2 DIM slots and 1 PCIE slot to ensure enough RAM and the option of a graphics/sound card. Comes with following ports: 4xUSB2.0, 2XUSB3.0, VGA, HDMI, DVI, Ethernet, PS2, headphones, microphone, line in. | £28.00 |
| Crucial 4GB (1x 4GB) PC1600 CL11 DDR3 SIMM RAM Memory Module | 4GB of RAM should be enough for any office work load however if a user needs more then they can install another one of the same stick into the spare DIM slot. | £14.84 |
| Western Digital WD10EZEX Blue 1 TB 7200 RPM 64 MB Cache SATA 6.0 GB/s 3.5 inch Internal Hard Drive | Has a mass amount of storage of 1TB which will be able to store all data and be partitioned to provide different OS’s as requested. | £39.99 |
| Silence 500W Black Edition ATX PC Power Supply PSU With 12CM Silent Fan And SATA / 24 PIN / 4 PIN / MOLEX | A 500W power supply will be more than enough for any future upgrades. It is also a silent edition meaning that it will keep the workplace quiet for phone calls being made. | £15.95 |
| Kingston Technology 60/120 GB Solid State Drive 2.5 inch V300 SATA 3 | Providing users with a boot SSD will mean that a lot of what they will be doing (inc. start up, searching, using applications etc) will receive great speed increases. | £34.82 |

**Total: £169.59**

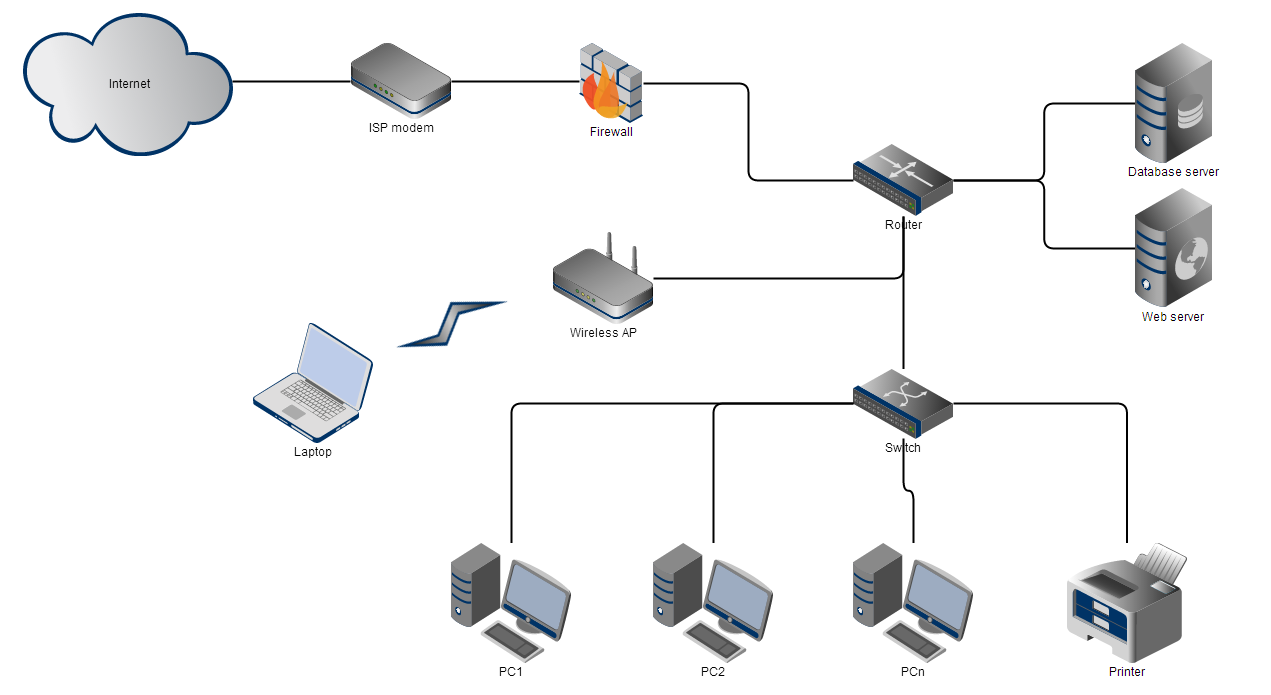
This total may be a little expensive for the client however the productivity increase the staff will see will be a massive return in itself. On top of this you will need some software for the computers:

* Antivirus – either comes with OS or OS will not need it - £0
* Office 365 – will allow staff to complete work at home - £10 per person
* OS – Is varied as requested. Windows price is listed - £15 per person.

Buying the software and hardware in bulk will definitely reduce the price by a fair way. This will provide a huge speed increase on the older computer that the company has and still provide space for upgrades in the future.

## Network

For the Network I am planning to follow a similar diagram to the one below.



Due to the fact that most of the computers on the network will be desktops I don’t plan to have wireless APs in the work areas. I will place some in the casual areas such as the canteen. This means I will only need around 4-5 Aps limiting the cost. It will also provide all of the desktops with a wired connection making the connection very fast. I will need to supply the network with 1200 wired access point but with capabilities to upgrade closer to 2000 in the future. No NAS or any other kind of storage should be needed as Office 365 gives all employees 1TB of OneDrive along with the opportunity to upgrade this. They all also have 1.2TB of on-board storage.

|  |  |  |  |
| --- | --- | --- | --- |
| Product | Image | Explanation | Price & Quantity |
| Cisco 867VAE Secure Router | http://www.cisco.com/c/dam/en/us/products/collateral/routers/800-series-routers/data_sheet_c78-693249.doc/_jcr_content/renditions/data_sheet_c78-693249_0.jpg | This router has a modem and therefore a firewall installed within. It has one input and 10 Ethernet outputs. It is suggested for use for up to 1000 people allowing for upgradability with 2 of them. | £216 \* 2  £432  (no need to upgrade for 2000 people) |
| TP-Link TL-SF1048 | TP-Link TL-SF1048 | This is a high quality 48 port switch. This means from each one we can supply 48 computers with internet. For 1200 people we will need 28 of these. To upgrade to 200 people, we will need 44. This is by spreading the load through the 2 routers. It also leaves room for the wireless Aps. | £65 \* 28  £1820 (1200 people)  £65 \* 44  £2860 (2000 people) |
| Ethernet cables | http://www.groundcontrol.com/galileo/images/Ethernet_Cable3.jpg | Ethernet cables will connect the routers to the switches and switches to computers. Due to the fact that the size of the building and therefore the length of the cables is unknown, my pricing is an estimate. | £1 \* 1200  £1200 (1200 people)  £1 \* 2000  £2000 (2000 people) |
| TP-LINK TL-WA801ND 300Mbps Wireless N Access Point | http://ecx.images-amazon.com/images/I/41PnXMAzZvL.jpg | Due to the fact that the router will not be under any type of heavy load I decide to choose a cheap and cheerful style access point. This one only requires one input and creates a 300 Mbps field. We will need around 4 to for fill the areas its required in however upgrading is very cheap and easy. | £25 \* 4  £100 (as a minimum) |

# M1 – OS comparison

I am going to directly compare 2 OS’s. These are Windows (the most popular OS) and Ubuntu (the most popular Linux based OS).

|  |  |  |
| --- | --- | --- |
| Feature | Ubuntu Linux | Windows 10 |
| GUI | Looks can be customised by a user manually or they can download premade packs. | Well known but a lot less customisable. |
| Development tools | Unix terminal which is favoured by developers. | Visual studio is a good IDE however there aren’t many more. |
| Firewall | Very open to configure and maintain firewall built in but it can seem complex. | Strong built in firewall which is configurable through a GUI. |
| Defragment utility | Does not require defragging. | Comes with a good one which can be pre-set to run at certain times. |
| User accounts and Security | Uses Unix style users which are well known for being very secure. | Very insecure, must always be logged in as administrator to use computer normally. |
| Battery Life | Can be customised to use battery very efficiently. | Well rounded but can give strange readings and spikes in power usage. |
| Font Rendering | Lots of fonts and options and can download more. | Fonts must align to a pixel grid. |
| Cost | Free. | Free for Windows 7 and 8 users. New copy costs around £50. |

# D1 – Benefits of Software Utilities

Detail

In this section I will explain reason why using the following utilities may increase performance:

* Virus Protection
* Firewall
* Internet History/Cookie Removal
* Disk defragment
* Drive formatting

## Virus Protection/Firewall

When a computer has viruses on it has to facilitate them running. This means when you have all of your big programs running, your computer has also got to run a virus. Viruses do a multiple of different things. This ranges from sharing your information with someone, scanning files, taking over/editing applications etc. Whatever a virus does it is usually a very large and therefore heavy application.

Obviously this is going to slow down your computer and even your network so you want to try and stop these applications running. Unfortunately viruses either don’t show up in task manager or are very difficult to identify with names such as “Windows Sound Drivers”. The only way to remove these application is with virus protection. Not only does it remove viruses from your computer but it also comes with a firewall which prevents more entering in the future. This means virus protection will speed up your computer as it won’t have any heavy viruses on it any more.

## Defragment

When you first install an operating system all of the files are closest to the start of the disk. This means the disk is very fast as the reader hasn’t got to go very far to read all of the files. When you start to use that disk files will be added and deleted regularly (whether you know about it or not). When new files are added they are put into the closet location to the top, when this is full it puts the rest of the file the new closest place from the top. This continues until all of the file is on the disk.

This means that the files on your disk will be split up (fragmented) over the disk. This means that when reading a file, the reader will have to firstly find all of the pieces of the file to display it in the first place, but also have to jump back and forwards on the disk to edit this file. This slows down the read speed massively as the reader has to do a lot more work.

Disk defrag tools move all of the data on the disk as close together as possible. This means that the read speed of the disk will be decreased greatly. When you start to use the disk again it will begin to become fragmented. This is why it is important to defrag your disk often and its why a lot of defragment tools come with scheduling in built.

## Cookie/History Removal

Removing cookies and history means that when it comes to defragging your disk, there will be less files taking up space. This means that the read time of the disk is going to be much quicker as the data is closer together. Removing these may result in favourite pages being lost and saved passwords being forgotten so you must be careful about which files you delete.

## Drive Formatting

Drive Formatting means that when you reinstall the OS onto the drive that is all that will be on there. This means that it will remove all of the very hard to find and sometimes impossible to remove files. This means that when you use the disk there will be a very compact set of storage with no little files allowing the disk to be read quicker as detailed above.