DipIT05 – Computer Architecture and Operating System

TOPIC: TECHINCAL REPORT

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Submitted date: 4/13/2019
Submitted to: Ms. Kritika Tuladhar
Word Count: 2149

Marking Scheme:

Report (50 marks)

Assignment Criteria	Marks	Remarks
Computer Components and Equipment ✓ List and state the functions of the main components of the computer **(6 marks)** ✓ Distinguish between different types of processors. **(5 marks)** ✓ Distinguish between different types of RAM (random Access Memory) **(5 marks)** ✓ Distinguish between different types of ROM (Read Only Memory) **(5 marks)** ✓ Distinguish all the different types of memory systems present **(3 marks)** ✓ Distinguish between different types of Hard-drive controllers. **(3 marks)** ✓ Distinguish between the different internal power connectors **(3 marks)**	**/30**	
Budgeting and Planning for PC ✓ Draft a budget for a cheap and top range PC. **(5 marks)** ✓ Research components and get costings for individual components. **(5 marks)** ✓ Calculate the total cost of cheap and top range PC. **(5 marks)**	**/15**	
Report Format	**/5**	
Total	**/50**	

Contents

1. Computer Components and Equipment

1.1. Main components of the computer.

"All the different pieces of electrical hardware that join together to make up the complete computer system." (Nicholle, n.d.)

There are two main components of Computer System:

- Software

System which manages other software and devices within its peripheral of the computer. Operating System is example of system software. For example Android OS, iPhone OS.

Application software is designed for end users to perform a specialized assignment in order to output useful information. For example, Microsoft Word, Adobe Photoshop. Software is written in computer language such as Java, C, and Visual Basic. (Amuno, 2019)

- Hardware

Internal Computer components are designed to fit inside the computer system. They are as followings:

1. Motherboard

Central to any Computer System is known as Motherboard. Either directly or indirectly all components are plugged into the motherboard. Once connected to motherboard all components eventually get connected and can work together to form the computer System. BUS network is used by components to communicate and send signal.

The Central Processing Unit (CPU) is brain of the computer. What computer does is controlled by the CPU and is responsible for performing calculations and data processing.

2. Internal Memory(RAM,ROM)

RAM and ROM are used to store computer data and can be directly accessed by the CPU. They are also referred as ‘Primary Storage’. RAM is used to temporarily store information, it is fast memory and volatile memory. ROM is used to permanently store instruction. Those instructions are known as BIOS (Basic input/ Output system). ROM is non-volatile memory.

3. Video Card(Graphics Card)

Graphics card are hardware devices which plug into motherboard and enables computer to display images on the monitor.

4. Sound Card

Sound card plug into motherboard. Its main function is to allow the computer system to produce sound but they also allow user to connect microphones in order to input sounds into the computer.

5. Hard Disk Drive

They are used to store data that are not suddenly needed by the computer. They permanently stores data and programs for as long as we need. These devices are also used o backup data. (Nicholle, n.d.)

1.2. Different Types of Processors.

There are mainly two types of manufacturers of Processors.

Intel Processors	AMD Processors
• Intel Pentium Dual Core Processors It deliver great desktop performance, low power enhancements, and multitasking for everyday computing. • Intel i3 Processors 4-way multitasking capability is provided by intel i3 processors, runs at fixed speed ideal for typical tasks and media playback but not games. • Intel i5 Processors It is usually quad core but some dual processors deliver the next level of productivity. Mostly is same as i3 but with Intel Turbo Boost Technology, it delivers extra speed when you need it. Integrated graphics is included but is only ideal for normal use not for gaming. • Intel i7 Processors Intel i7 processors are dual or quad core for the most applications with cache and faster clock speeds. Quad-core processors feature 8-way threading, four cores will run faster, and more L3 cache, but will consume more power. High-end use, video and gaming with appropriate video card needed.	• AMD A4 AMD A4 processors have 2 processor cores and include a Radeon graphics chip. Meant for use with lower end systems. • AMD A6 AMD A6 processors are dual core, includes turbo function which is similar to Intel allows for the processors to adapt to the task needed. Core i3 range, integrated graphics. • AMD A8 This processor is comparable to the i3 and low i5, its graphics is faster than Intel's version and can handle light gaming with ease. • AMD A10 AMD A10 processors have quad cores are comparable with the Intel i5, and some i7s. ASeries processors use the FM2 socket so they will only fit in a Motherboard with FM2.

(Anon., n.d.)

1.3. Different types of RAM.

Static RAM	Dynamic RAM
• Time in market: 1990s to present. • Products using SRAM: Digital cameras, routers, printers, LCD screens. The SRAM needs constant power flow in order to function because of the continuous power, SRAM doesn't need to be 'refreshed' to remember the data being stored. That's why SRAM is called 'static', no change or action is needed to keep data intact. SRAM is a volatile memory, which eventually means that data that had been stores would lost once power is cut off. The advantage of using SRAM is lower power consumption and faster access speeds. The disadvantage of using SRAM is lesser memory dimensions and higher cost of manufacturing.	• Time in market: 1970s to mid-1990s. • Products using SRAM: Video game consoles, networking hardware. DRAM requires periodic 'refresh' of power in order to function. The capacitors that stores data in DRAM gradually discharge energy, no energy means the data becomes lost. This is why DRAM is called 'dynamic'. C constant change or action. Refreshing is needed to keep data intact. DRAM is also a volatile memory, which means all stored data becomes lost once power is off. Disadvantage of DRAM over SRAM is it is slow and have higher power consumption.
It is also used in CPU cache, hard drive buffer/cache.	It is typically used in System memory, Video graphics memory.

(Goodner, 2018)

1.4. Different types of ROM.

PROM	EPROM	EEPROM
• Its full form is Programmable ready-only memory. Once a program has been written onto a PROM, it remains there forever. Unlike RAM, PROMs recollect their contents when the power is cut off. The difference between a PROM and a ROM (read-only memory) is that a PROM is manufactured as blank memory, whereas a ROM is programmed during the manufacturing process. Special device called PROM programmer or PROM burner is needed to write data onto a PROM chip. Burning the PROM is also called programming a PROM.	• Its full form is Erasable programmable read-only memory. EPROM is a special type of memory that holds its contents until it is exposed to ultraviolet light. Its contents is cleared by ultraviolet light. PROM programmer or PROM burner is used to write to and erase an EPROM.	• Its full form is electrically erasable programmable read-only memory. EEPROM is special type of PROM that can be erased by exposing it to an electrical charge. Like other PROM, EEPROM recollects its contents even when power is cut off. Like other ROM, EEPROM is not fast as RAM.

(Thakur, n.d.)

1.5. Different type of memory system.

Memory is a computing system's most essential element because computers cannot perform simple tasks without it.

RAM	ROM
It is volatile in nature. It stores data in MBs. It is used in normal operation. Writing data is faster.	It is non-volatile in nature. It stores data in GBs. It is used for startup process of computer. Writing data is slower.

(Mittal, n.d.)

1.6. Different type of hard drive controllers.

The interface device between computers and hard disk driver is hard drive controller. Hard disk controller is used to obtain and interpret the computer order, and then send various control signals to hard disk adapter.

SAS Technology	SCSI
It is very advanced but high priced hard disk controller. SCSI can support devices like multi-hard disk, CD-ROM and scanner. It can also connect up to 30 devices and peripherals through the daisy chain. For studio that needs enormous capacity, it is the most suitable. SCSI controller can reach the speed of 160MN / s, traditionally faster than IDE, and the new controller being developed can even reach 320MB / s. They have different versions just like IDE and SCSI.	Serial attached SCSI is new technology of hard disk attachment. It combines the benefits of current parallel SCSI and serial attached technology (such as fiber channel, SSA, IEEE1394 and InfiniBand), sets serial communication as protocol infrastructure, adopts extended instruction set SCSI-3 and can be compatible with SATA devices. It's a stack of multi-level storage devices. And SAS disk is a disk that adopts this technology of the interface. It has better performance, Simple Cable Link and Better Scalability.

(Sarah, 2015)

1.7. Different internal power connectors.

Power connectors are devices that allows an electrical current to pass through it for purpose of providing power to a device. It can also be used with many different types of electronics, customers can find the specific type of connector that best matches their electronics geometry and electrical. Power connectors can carry either alternating current (AC) or direct current (DC). Depending on the national standards of the country you are in, these types of plugs and sockets differ in voltage, current rating, size and design. Even though it comes in all shapes and sizes and with different capabilities, options and accessories, a power connector's purpose always comes back to one important thing: power. These connectors are primarily used for transferring energy, and this is a task they do admirably. (Anon., n.d.)

4 Pin Peripheral Power Connector

4 Pin Peripheral to SATA Cable Assembly

SATA Power Connector

ATX 20 Pin Main Power Connector

ATX 24 Pin Main Power Connector

4 Pin ATX +12V Power Connector

8 Pin EPS +12V Power Connector

6 Pin PCI Express Power Connector

(Mulqueen, 2017)

2. Budgeting and planning for PC.

2.1. Components, Budgeting and planning for Low-end PC.

Components	Price(Indian Currency)	Price(Nepalese Rupees)
CPU(Intel Core i3-8100)	11390	18224
Radeon RX 580 8GB	21000	33600
MSI Z370-A Pro	11599	18559
Crucial DDR4-2400 8GB (2x4GB)	3549	5678
Crucial MX500 500GB	6475	10360
EVGA 450W 80+ Bronze PSU	5753	9205
Circle Gaming Phoenix ATX Tower Case with Transparent Side Panel Cases	5060	8096
Total	64826	103,722

(Amazon.in, 2019)

For the pricing of the components I've researched on 'Amazon India' and multiplied by 1.6 times as there was no price for all components I had searched in our E-commerce sites.

2.2. Components, Budgeting and planning for High-end PC.

Components	Price(Indian Currency)	Price(Nepalese Rupees)
CPU(Intel Core i7-9700K)	44373	70997
Gigabyte Z390 Aorus Ultra	26423	42277
NVidia GeForce RTX 2080	68233	109173
G.skill TridentZ RGB 2x8GB DDR4-3200	12500	20000
Samsung 970 Evo 1TB	20999	33599
EVGA SuperNOVA 850 P2	25419	40671
NZXT H500 Case	11000	17600
Total	208,947	334,316

(Amazon.in, 2019)

For the pricing of the components I've researched on 'Amazon India' and multiplied by 1.6 times as there was no price for all components I had searched in our E-commerce sites.

2. Conclusion

First, I would like to thank my tutor Ms. Kritika Tuladhar for assigning this coursework and teaching this module Computer Architecture and Operating System. While completing this coursework, I gained knowledge about different computer components and their respective functions. I also was able to prepare budget required to build a high-end and also low-end Personal Computer. I understood various phases of assembling a personal Computer.

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