

Tutorial 4 M150

Tutor : Rifat Hamoudi

Staff No. : 00567451

Pager No. : 07669-801 509

I have put this tutorial on the web. This tutorial can be viewed and downloaded from <http://www.users.totalise.co.uk/~rifat> then selecting M150 Tutorials then Tutorial 4.

- 1) Create a document in NotePad, write the followings in it : I like computers only when they don't crash. Close the document and reply no when the computer ask you if want to save your data. Can you retrieve your data? If not why not? How would you make your data persistant?
- 2) On your desktop create a folder called M150Data and then repeat the things you did in 1 but this time reply yes when the computer ask you to save the data. Describe the state of your data now and describe how you would locate the file you saved and copy it to a floppy disk?
- 3) Describe the meaning of the followings :
 - a) john@bbc.co.uk
 - b) andrew@ic.ac.uk
- 4) An ex-MI5 agent published a book naming British spies in foreign countries and method of spying used. This book was banned in the UK but the author put the book as pdf file on his website. Has a crime been commited and if so under what law?
- 5) A hacker in Russia wrote a malicious virus that scans the user hard disk for bank account details and as soon as the user logs in it transfers 10% of the money in the user's account to the hacker's account without the user's knowledge. Can the hacker be prosecuted and if so under what law can he be prosecuted. How likely is his conviction?
- 6) A user presses the "B" button on the keyboard but the CPU sends the number 1000010. Why is that? Convert 1000010 to decimal showing all your steps.
- 7) Describe simple information system
- 8) Briefly describe how information flow in the computer. Why is 16 bit faster than 8 bit architecture? Also what does the CPU speed mean?

- 9) Suppose a computer is described as having 128KB (i.e.128 kilobytes) of RAM.
- (a) How many bytes of memory does it have?
 - (b) If the word size of the processor is 64 bits,how many words can the memory store?
- 10) Describe what is RAM and ROM and state the differences between them?
- 11) Describe Fetch-Execute cycle?
- 12) What is an operating system and name the 3 most common PC operating systems in use today?
- 13) What is assembly language? and why was assembly language very popular in the 1960s and 1970s but its virtually unheard of today?
- 14) What is programming language? Give examples of programming languages in use today.
- 15) What distinguishes a low-level language from a high-level language?
- 16) Briefly explain the similarities and differences between an assembler, a compiler and an interpreter.

Answer to question 1

No data is lost because they are not persistent. To make the data persistent I would have to save the file.

Answer to question 2

The data is now persistent since the file is saved inside folder called M150Data on my desktop. To locate the file I would use Windows OS search facilities and then drag the file to the floppy disk.

Answer to question 3

john and andrew are usernames. @ is the email separator and bbc.co.uk is the host name here it means BBC, co means company and uk means United Kingdom. ic.ac.uk ic means Imperial College and ac means Academia and uk is United Kingdom.

Answer to question 4

Yes the crime is the violation of the Data Protection Act (for details refer to <http://www.informationcommissioner.gov.uk> and click on Data Protection) as well as any confidentiality agreement the ex-MI5 agent had signed because he made secret details public thus endangering the lives of the current MI5 agents.

Answer to question 5

The hacker may escape prosecution as the Russian courts may not acknowledge the existence of the Computer Misuse Act (refer to <http://www.ja.net/CERT/JANET-CERT/law/cma.html>). But if the Russian hacker did his hacking whilst in the UK then he will be prosecuted. The conviction depends strongly on which country he was when writing the distributing the virus.

Answer to question 6

This is because the letter B is represented inside the computer using ASCII code and B in ASCII is decimal 66 or binary 1000010.

To convert from decimal to binary we divide the decimal number and look whether or not there is remainder :

66 / 2 = 33	remainder 0
33 / 2 = 16	remainder 1
16 / 2 = 8	remainder 0
8 / 2 = 4	remainder 0
4 / 2 = 2	remainder 0
2 / 2 = 1	remainder 0
1 / 2 = 0	remainder 1

Therefore decimal 66 = binary 1000010

To convert from binary to decimal we reverse the process :

1000010

$0 \times 1 = 0$
 $1 \times 2 = 2$
 $0 \times 4 = 0$
 $0 \times 8 = 0$
 $0 \times 16 = 0$
 $0 \times 32 = 0$
 $1 \times 64 = 64$

Answer to question 7

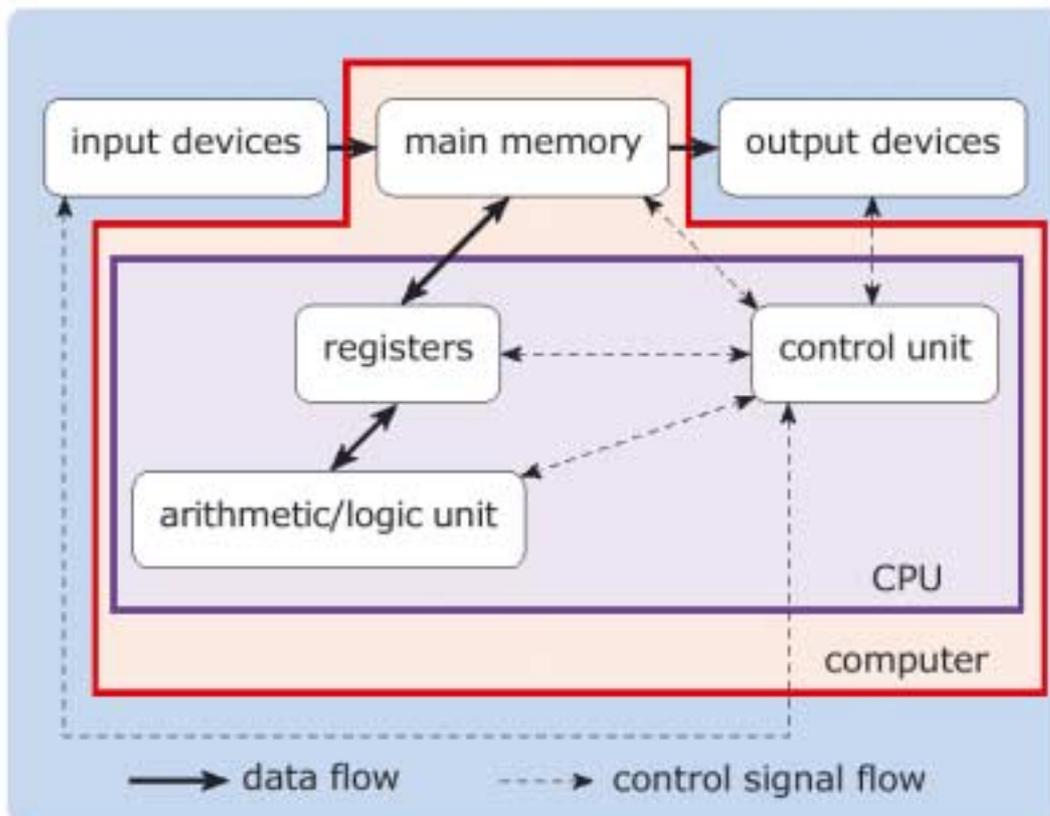
Simple information system is as follows :

Input -> Process -> Output

This is at the heart of computer systems

Answer to question 8

The flow of information inside the PC can be illustrated by the following diagram :



16 bit is faster than 8 bit because the data transfer rate is double i.e. the architecture is such that at each fetch-execute cycle 16 bits of information is transferred around the PC components. The speed of the CPU indicates how many instructions per second it can process i.e. its clock cycle so CPU of 1GHz means that it can process 1 billion instruction per second.

Answer to question 9

You learned about bits, bytes and words in Section 3 of Unit 3. In particular you should recall that a byte contains 8 bits, and a kilobyte contains 1,024 bytes.

Therefore

(a) There are 131,072 bytes of memory.

As a single kilobyte is 1,024 bytes, 128 kilobytes is 128×1024 bytes, i.e. 131,072 bytes.

(b) The memory can hold 16,384 words.

As each byte contains 8 bits, a 64-bit word is equivalent to an 8-byte word. There are 131,072 bytes in all, so the number of words is $131,072/8$, i.e. 16,384.

Answer to question 10

RAM is Read and Write Memory and ROM is Read Only Memory. Data can be written to or read from RAM but can only be read from ROM. RAM is volatile i.e. when the computer or the device is switched off the data is lost where as ROM is non-volatile and data remains even after the computer is switched off. This is why ROM is used to keep the BIOS program on it and gets loaded when the computer is switched on where which then instructs the bootstrapping procedure.

Answer to question 11

The process of locating, transferring and carrying out a single instruction during the execution of a computer program is known as the fetch/execute cycle or fetch/execute sequence. During each cycle the CPU must:

- a) locate the next (or if execution has just started, the first) instruction in the program, which is stored in main memory;
- b) transfer this instruction into the processor by placing it into an appropriate register;
- c) decode the instruction to see what it is to do;
- d) locate (in main memory) any data the instruction refers to, and fetch it into the processor by placing it into an appropriate register;
- e) do the processing on the data that the instruction requires (e.g. add a number to another number);
- f) place the result in an appropriate register;
- g) if necessary move the result back to main memory so that it can be used later in the processing;
- h) update the program counter to hold the memory address of the next instruction

Answer to question 12

An operating system is a complex piece of software that acts as an interface between the user (or an application program) and the computer hardware. It essentially enables the user to carry out a variety of complex tasks on the computer, without the need to know anything about what goes on 'inside the box'. The functions of the operating system include the management of the processor, memory and peripheral devices resources. Common operating systems for personal computers include Linux, Mac OS (for the Apple Macintosh) and the various versions of Windows, e.g. Windows 2000 and Windows XP.

Answer to question 13

Programming language is set of instruction that follow specific grammatical and syntactical rules that the user has to follow to enable him to instruct the computer to do useful things. Common programming languages are Java, C++, Perl, C and Cobol.

Answer to question 14

The most important distinguishing characteristic is that in a low-level language a single instruction is translated into a single machine language instruction whereas in a high-level language a single instruction might be translated into many machine language instructions.

Answer to question 15

They are similar in that they are all pieces of software that translate source code into machine language. There are several differences:

- a) an assembler is used specifically to translate source code written in assembly language to machine language;
- b) a compiler and an interpreter are both used to translate programs in high-level programming languages into machine language, but they use different mechanisms to do this:
- c) a compiler translates the whole source program, and creates and saves a whole new machine language version, which can then be run;
- d) an interpreter translates instructions into machine language one by one as the program is executing.