Answers to Cameroon GCE O/L Computer Science Paper 2, June 2017

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1.

(a)

i. **Data Encryption** : This is a security method by which data is converted to a form where you need a secret key to access or read it. This secret key is formally called Encryption key. The converted text is called ciphertext while the original text is plaintext

ii. **Backup** : this refers to making copies of data to use in the event the original data is lost

iii. **Firewall** : this is a security system that filters incoming and outgoing traffic(messages) based on defined sets of rules. It is similar to a physical barrier that filters access in and out of the compound.

(b) **Data integrity** is the accuracy and completeness (consistency) of data throughout its lifecycle. Data integrity can be maintained through the use of various error-checking methods and validation procedures.

(c) **Data Verification** is a way of ensuring the user types in what he or she intends .i.e making sure the user does not make a mistake when inputting data. An example of this includes double entry of data when creating a password to prevent incorrect data input

Data Validation on the other hand is about checking if the input data conforms with the data requirements of the system to avoid unwanted data. An example is a date check to avoid inputting dates that are beyond the current date.

(d)

i. **Computer Simulation**: this refers to the use of a computer to imitate a system usually a real-world system. The imitation process is based on a sets of mathematical equations (mathematical model). The purpose of simulation is to predict the results of something

ii. Advantages:

Avoid disturbing real world systems: With Computer Simulation, it is possible to test the behavior of something. We can model a system close enough to real world. Experiments are done on the model without disturbing the real world system.

Help Students: Teachers can do simulation of systems and explain to students. Students can get an idea of any system easily be seeing a simulation

Disadvantages:

Expensive : Computer simulation is expensive because it requires a group of highly qualified individuals build the simulation model

Computer limitation : Complex simulation involves a computer with higher memory and processor speed. This is another drawback of simulation.

2.

(a)

i. Batch processing is a method of running data jobs **periodically** with **little or no user interaction**. Batch jobs are collected in bulk rather than direct input from user and are processed at a later time. **Example** :Scheduling the automatic payment of employees every month

ii. Online processing is a method of running data jobs **continuously** as they are inputted. The inputted data is directly processed and outputted. Example: the bank ATM is an example of online processing as data is immediately processed and outputted as customers send input to the machine.

Illustration 1: A bank ATM

(b)

i. A **command-line interface** is a text based way of interacting with a computer program where the user issues commands to the program in the form of successive lines of text called command lines and receives responses also in the form of successive lines of text. This type of interface is not ideal for novice users as you must remember the range of different commands

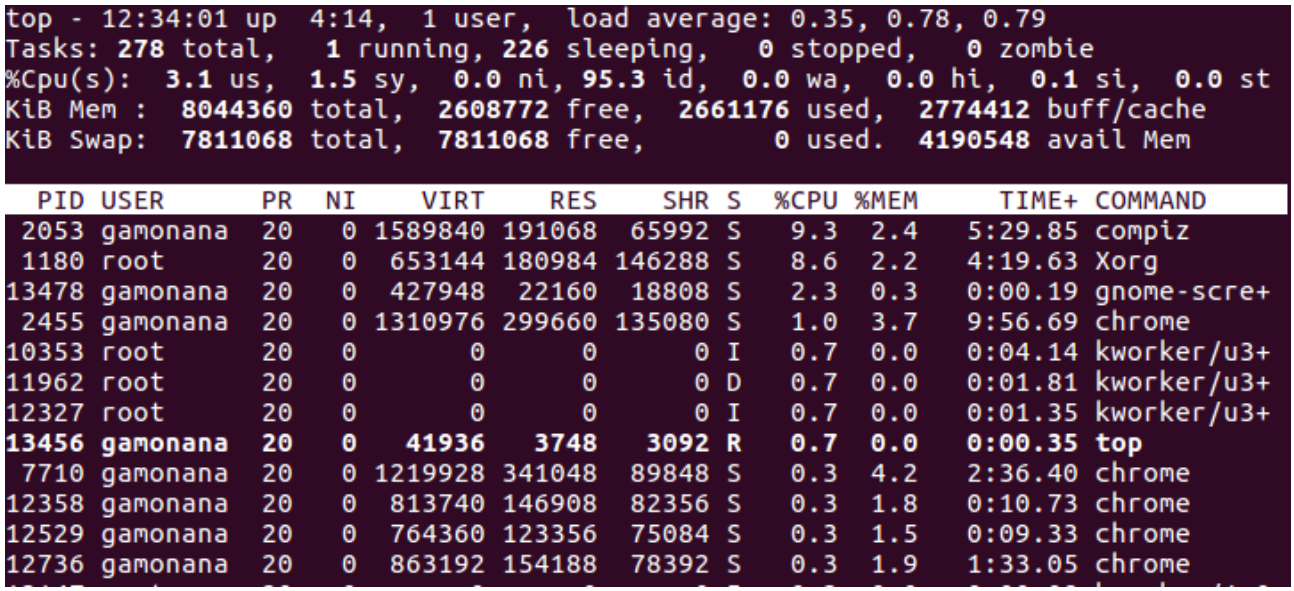


Illustration 2: A command line interface

ii. A **GUI** is a visual way of interacting with a computer program using items such as Windows, Icons, Menus and Pointers (WIMP)

Illustration 3: A GUI

iii. **Menu Driven Interface** : this is an interface that consist of a series of menus and sub-menus which the user accesses by pressing buttons, often on a touch-screen device. A common example is the ATM

Illustration 4: Example of Menu driven Interface

(c)

i. **NOT YET ANSWERED**

(d) **Synchronous data transmission** is a data transfer method in which data blocks are continuously and consistently being transfer. Examples include : telephonic conversations, video conferencing

Asynchronous data transmission is a data transfer method in which data is transmitted discontinuously and a start and stop being must being insereted in each data block to inform the receiver where it begins and ends. Examples include : emails

3.

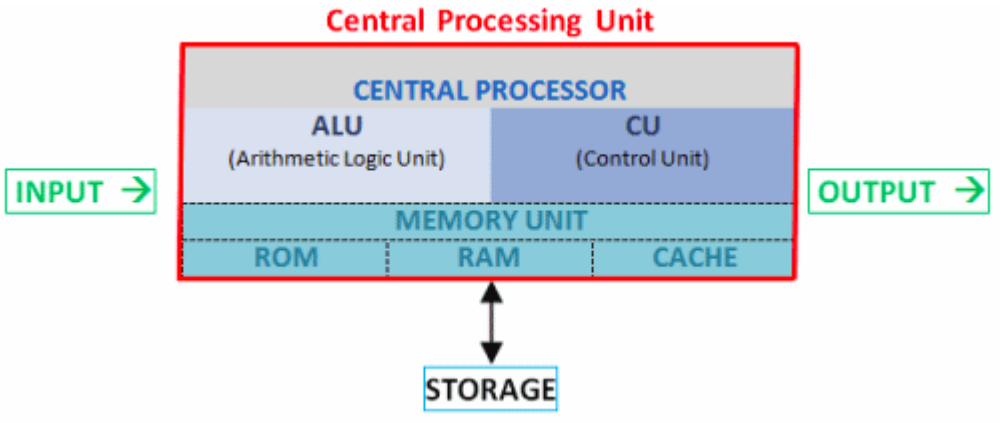


Illustration 5: Basic Components of a CPU

(a) **EXPLANATION:** C.P.U :- The CPU is the heart and brain of a computer .**The three components of the CPU**:

- (A.L.U) Arithmetic logic unit .
- (C.U) Control Unit .
- (M.U) Memory Unit .

A.L.U :- An arithmetic logic unit is a digital circuit used in computers to perform arithmetic and logic operation .

C.U :- A control unit is circuitry that directs operations within a computer's processor.

M.U :- Memory unit is the amount of data that can be stored.

(b) **Address Bus**: It is a group of wires which carries **address only**.Address bus is unidirectional because data flow in one direction, from microprocessor to memory or from microprocessor to Input/output devices

Data Bus:It is a group of wires which carries Data only.Data bus is bidirectional because data flow in both directions, from microprocessor to memory or Input/Output devices and from memory or Input/Output devices to microprocessor

Control Bus: It is a group of wires, which is used to generate timing and control signals

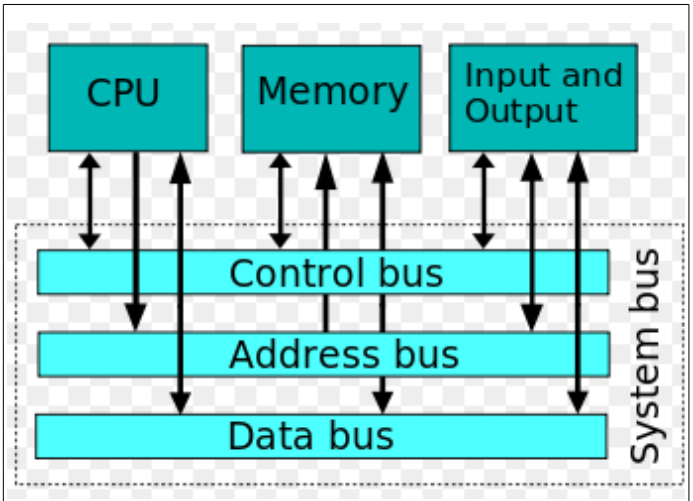


Illustration 6: Types of buses in a Computer

(c) the machine instrcution cycle consists of : Fetch the instruction, decode the instruction, Execute and Store result.

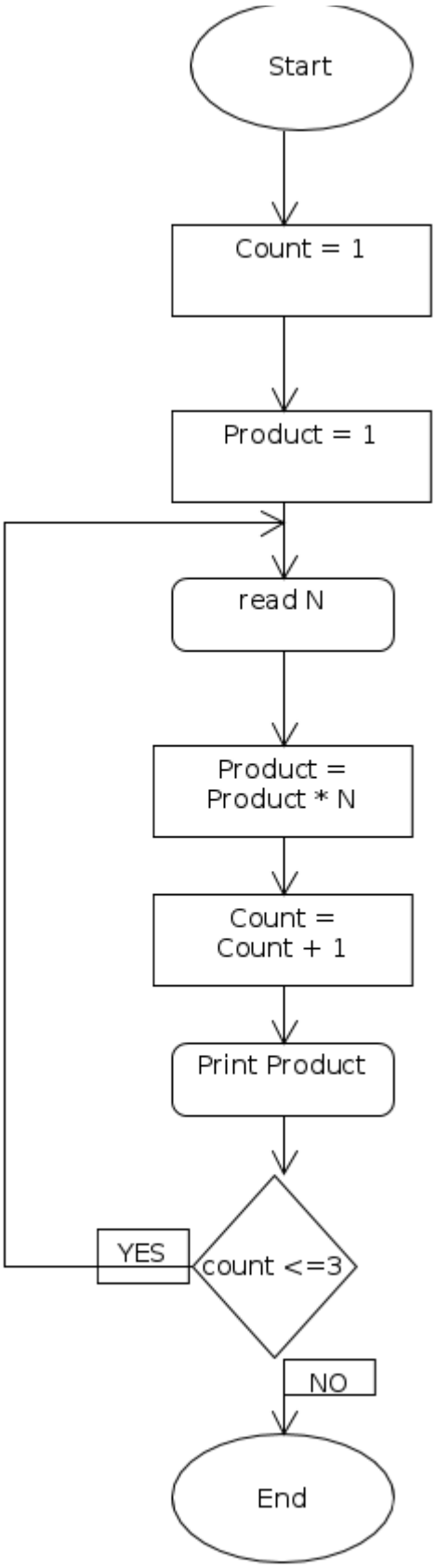
(d)

i. for N = 2, Product = 2

for N = 3, Product = 6

for N = 5, Product = 30

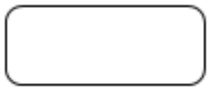
ii.


Start
Count = 1
Product = 1
read N
Product =
Product * N
Count =
Count + 1
Print Product
count <=3
YES
NO
End

EXPLANATION: The decision symbol always appear at the end of a while loop. If the condition is true, the arrows goes back to the start of the loop otherwise the loop is terminated

the input/output symbol is .

but because my software does not have it I have used



4.

(a)

i. F represents the result of an AND GATE: A.B

G represents the result of an OR GATE: C+D

ii. H: F + G

H:(A.B) + (C+D)

iii. F: FALSE

G: TRUE

H: TRUE

(b)

i. An **input device** is a hardware device that sends data to a computer allowing you to interact with it. Examples include : keyboard, mouse, scanner, microphone, bar code reader.

ii. An **output device** is a hardware device that displays (or receives) data from a computer. Examples include: Printers, Monitors, Projectors

iii. An **input / output device** is a device that can both send data to a computer and display (or receive) data from a computer. Example: A USB Drive sends data to a computer and displays (or receives) data from a computer

(c)

i. 1 100 101 (represents 101 in base ten) - 0 001 010 (represents 10 in base ten) = 1 011 011 (represents 91 in base ten)

EXPLANATION: with binary subtraction 0 − 1 = 1 and 1 is borrowed from the next significant bit. Note that with successive borrows, the values are deducted accordingly.

Eg 1: consider 1001 − 101 . in the third substraction (I.e 0 − 1) 1 is borrowed and appended to zero which now becomes 10 − 1 (I.e 2 −1) which is equal to 1. The fourth substraction becomes 0 − 0 = 0. the final result gives 100.

Eg 2: Consider 1000 − 111 = 0001. In the first substraction (I.e 0 - 1) 1 is borrowed from the 1 at the fourth position. This 1 is appended to the zero at the third position becoming 10. 1 again is deducted here so that what is left is 1 and the second position becomes 10. 1 is again deducted here so that what is left is 1 and we have a 10 at the first position. We now have 10 − 1 which gives 1. The next substractions are 111 − 111 which gives 000. hence the result 0001. Visit this to learn more about Binary subtraction and here to have for binary to decimal conversions

ii. 1 101 011 (represents 107) + 00 011 01 (represents 13) = 1 111 000 represents 120 note that with binary addition 1 + 1 = 0 and 1 is carried. Also 1+1+1=1 and 1 is carried

(d) $505_8 = 1\,010\,001\,01_2$. **EXPLANATION**: octal means base 8 notation. There are only 8 symbols : from 0 to 7. the algorithm to convert from octal to binary is :

- convert each digit in the octal number into its 3 digit binary equivalent.
- The result is the binary number

5.

(a) **Character** : it consist of 8 bits. 8 bits can also be called a byte. A bit is the smallest unit of data representation. The value of a bit is either 0 or 1.

Field : a field consist of a group of characters. A field is used to descrie an entity (object, person, place or event). E.g the entity person may have as field: name

Record : a Record is a collection of fields, with each field describing the entity. E.g the entity person may have a record consisting of the fields : name, age and sex

File: A group of related records make up a file. E.g the Person's file consisting of a series of records of persons

Database : it refers to an integrated collection of related records or files. Databases are managed by specialised software called Database Management Systems (DBMS)

EXPLANATION: These items from the **Hierachy of data**.

(b)

i. 5 fields and 5 records

ii. key: it is the field that enables to uniquely identify a record

iii. EMPLOYEE → ID; DEPARTMENT → DEPTCODE; SALARY → SALCODE

iv. by using the ID field which will be different for both employees

v. NO. Because the entry in the ID field shoud be unique. The ID 6 has already being used

vi. some of the employee's corresponding record might not figure in the DEPARTMENT and SALARY tables. Add the corresponding record to the DEPARTMENT and SALARY tables

6.

(a)

i. **Computer literacy** is defined as the knowledge and ability to utilize computers and related technology efficiently

ii. Booting, Memory management, Disk management, Providing Interface.

(b)

i. keyboard, mouse, monitor, printer

ii. Hardware device: keyboard

software: A Word Processing software

iii. Internet browser: Mozilla Firefox, Google Chrome

iv. Spreadsheet Software : A tool used to create letters, word sheets

Desktop Publishing Software: A tool used to create illustrative worksheets, banners

Database Software: A tool used to store data like text information

Presentation Software: used to create multimedia apps

7.

(a)

EXPLANATION: SDLC stands for Software Development Life Cycle. It represents all the phases involved in the development of a software.

i. **Parallel conversion** is an implementation technique in which an existing system runs in parallel with the new system, to verify that both produce identical results and thus ensure that the new system can correctly takeover the existing system.

ii. **Plunge conversion** is an implementation technique in which there is an abrupt change from the old system to the new system at a predefined time. This method forces the users to make the new system work since they have no other method to fall back on.

iii. **Pilot conversion** is an implementation technique in which a working version of the system is implemented in one part of the organization, such as a single department. As the system is being used, changes can be made to improved it. When the system is deemed complete, it is installed throughout the organization, either at once (direct conversion) or gradually (phased or piece meal conversion). Pilot conversions are only possible in organizations that have discrete sections or branches.

iv. **Piecemeal conversion** otherwise called Phased conversion is an implementation technique in which the new system is introduced gradually. It can be used when it is not possible to install a new system throughout an organisation all at once.

(b)

i. **Machine Language** is a programming language consisting of binary or hexadecimal instructions which a processor can respond to directly. Such programming langages need no translations to be understood by the processor. Machine languages are processor dependent and thus not portable (ie the code written for one processor can not be used on a different processor). Machine langages are difficult to read, write and maintain

ii. **An assembly language**, also reffered to as ASM, is a low-level programming language in which there is a very strong correspondence between the program's statements and the instructions which the processor understands. Assembly langages are translated into machine langage using an assembler Assembly langages are also difficult to read,write and maintain. They are not very portable.

iii. **High level language** is a programming langage close to human langage, is machine independent and thus portable. They are easier to read, write and maintain. They are translated into machine langage using a compiler or interpreter

(c) two disadvantages of Machine Language: difficult to read, write; not portable

advantage: quickly interpreted by the Processor