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ST BENEDICT'S COLLEGE



SUBJECT
GRADE
EXAMINER
NAME
CLASS

Information Technology

11

Mr Gill

DATE

MARKS

MODERATOR

DURATION

14 July 2015

120

Mrs Kench

2 hours

COGNITIVE LEVELS

LOW ORDER

38 %

**MIDDLE
ORDER**

38 %

HIGH ORDER

25 %

INSTRUCTIONS
COMMENT

**TEACHER'S
SIGNATURE**
**PARENT'S
SIGNATURE**

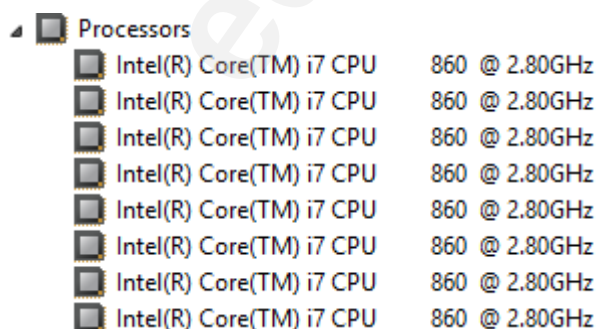
QUESTION 1**20 MARKS**

Write down the term that best matches the description provided:

- 1.1 When more than one program is stored in memory and they appear to run at the same time.
- 1.2 The hardware that transfers data between the CPU and RAM via Northbridge. It must have the same size as the register size.
- 1.3 The program in the operating system that determines the next ready process to be run.
- 1.4 The time taken waiting for a component to respond.
- 1.5 The hardware that connects the components on the motherboard, consisting of the Northbridge and the Southbridge.
- 1.6 RAM which has a capacitor and continually needs to be refreshed.
- 1.7 The hardware that stores the current instructions and data on the CPU.
- 1.8 The name we give to a program or thread that is currently loaded into the computer's memory.
- 1.9 A connection between two specific nodes.
- 1.10 A signal sent to the CPU from hardware or software indicating the need for the CPU's attention.
- 1.11 Hardware that divides a network into segments in order to reduce network traffic.
- 1.12 Hardware that boosts the signal of a single cable and passes it to the next portion of the cable.
- 1.13 A set of rules used by nodes on a network that determine how to send data.
- 1.14 An error in a program that will prevent the program from compiling.
- 1.15 An error in a program that does not prevent the program from compiling but will prevent it from running.
- 1.16 A method that returns a value.
- 1.17 A method which belongs to the class and is called with the class name.
- 1.18 A field that belongs to each object, a copy is made each time the object is instantiated.
- 1.19 The process of combining fields and methods into one class.
- 1.20 An event which occurs during a program that disrupts the flow of the program.

QUESTION 2**15 MARKS**

Your friend has decided to investigate his computer at home and spends some time looking through the Device Manager.



- 2.1 Your friend sees that the exact same line of text is repeated 8 times in the Processors category. He believes this is a bug. Explain to him what it means for a CPU to have more than one core. (2)

2.2 After explaining about cores he Googles his CPU and sees that it is 4 cores.

- 2.2.1 Name the technology that allows a CPU to double its physical cores (1)
- 2.2.2 Explain the differences and similarities between a physical core and a logical core (2)
- 2.2.3 Explain the benefit that the technology referred to in 2.2.1 has. (2)

2.3 Your friend looks at the Disk drives and Display adapters section of the control panel.



- 2.3.1 He asks you to explain to him why the Display adapter connects to the Northbridge and the Disk drives connect to the Southbridge (2)
- 2.3.2 Your friend hears about defragmentation and wants to know if he should defragment his hard drives.
 - 2.3.2.1 Explain, by referring to seek time and latency, how a fragmented file can slow down a magnetic disk drive's performance. (2)
 - 2.3.2.2 Explain why a solid state hard drive does not need to be defragmented. (1)

Installed memory (RAM): 8.00 GB

System type: 64-bit Operating System, x64-based processor

- 2.4 Your friend researches his motherboard and finds that it supports 64-bit architecture and can have more than 4GB of RAM. Explain, with reference to the function of the Address Bus, why a 32-bit computer can only use 4GB of RAM (2)
- 2.5 Name either of the two innovations that improved performance compared to the older Front Side Bus. (1)

QUESTION 3

14 MARKS

- 3.1 What three functions must an operating system perform in order to manage memory? (3)
- 3.2 One of the functions of an operating system is to provide virtual memory.
 - 3.2.1 Explain how virtual memory works. (2)
 - 3.2.2 A computer with 4GB of RAM tries to open a 5GB video file in a video editor, which it does through the use of virtual memory. Explain why the editor might unusually slow while editing the file (1)
- 3.3 Before modern operating systems if you wanted a program to be able to use the sound card you would have to specify the IRQ number and the DMA range of the sound card to each program.
 - 3.3.1 Explain the function of the IRQ number and the DMA range. (2)
 - 3.3.2 What capability does a modern OS have that allows for automatic management of IRQ numbers and DMA ranges? (1)

- 3.4 In a computer with **ONE (1) SINGLE** core explain how an operating system manages multitasking. (3)
- 3.5 Give **TWO (2)** differences between Symmetric Multiprocessing and Asymmetric Multiprocessing. (2)

QUESTION 4

33 MARKS

- 4.1 Explain the difference between UTP and STP and give an example of the problem that STP is meant to solve. (2)
- 4.2 Each network adapter has a unique MAC address. Explain how a MAC address is linked to an IP address. (2)
- 4.3 Topologies
- 4.3.1 A learner claims that star topology is better than ring topology because if one piece of hardware fails in a star topology then the network can continue running.
- 4.3.1.1 Explain how her statement can be considered correct (1)
- 4.3.1.2 Explain how her statement can be considered incorrect (1)
- 4.3.2 Explain how a network arranged in a bus topology is physically arranged. (3)
- 4.3.3 One of the only reasons to use a bus topology is cost. Give **TWO (2)** reasons why a bus topology is cheaper than a star topology (2)
- 4.3.4 St Benedict's College uses a tree topology. Explain what this means. (2)
- 4.4 A school has 2 campuses which are networked together. The computers use a CSMA/CD access method.
- 4.4.1 Explain what a collision is in the CSMA/CD access method. (1)
- 4.4.2 Explain how CSMA/CD deals with collisions. (2)
- 4.4.3 Explain why each node listens before transmitting. (1)
- 4.4.4 Explain how using a bridge to connect the two campuses could reduce collisions (2)
- 4.4.5 Explain how using a switch within each campus could reduce collisions (2)
- 4.5 Explain how the token ring access method works. (3)
- 4.6 A company connects two LANs that are 200m apart from each other by installing a bridge. You know that signals on copper cables are lost on distances over 100m.
- 4.6.1 Explain why it is not necessary to install a repeater into the network. (1)
- 4.6.2 The company wishes to connect a third LAN that uses a different protocol to the first 2 LANs. What hardware device do they need to join the networks? (1)
- 4.7 Explain the difference between the HTTP and the HTTPS protocols. (2)
- 4.8 You can transfer files over both the HTTP and the FTP protocols. Explain why you might choose to use the FTP protocol instead of the HTTP protocol to transfer a file. (1)

- 4.9 The TCP and UDP protocols differ in terms of reliability and message order. Copy the table below and fill in the specifications (4)

	TCP	UDP
Reliability		
Ordered		

QUESTION 5

22 MARKS

- 5.1 Examine the code in the table below

Sort A	Improvement on Sort A
<pre> for i ← 0 to size-1 for j ← i+1 to size if arr[i] > arr[j] swap arr[i], arr[j] endif endfor endfor </pre>	<pre> for i ← 0 to size-1 pos ← i for j ← i+1 to size if arr[i] > arr[j] pos ← j endif swap arr[i], arr[pos] endfor endfor </pre>

- 5.1.1 Name **BOTH** sorts shown in the table above (2)
- 5.1.2 Write Java code to implement the **swap** inside the inner loop. (3)
- 5.1.3 Explain the role of the inner and outer for loops in Sort A (2)
- 5.1.4 Why would it be pointless if the inner loop had an initial value of **i** instead of **i + 1**. (2)
- 5.1.5 Explain how the code on the right (the improvement on Sort A) is more efficient than the code on the left (Sort A). (2)
- 5.1.6 If the code was needed to run on a cell phone with extremely limited memory which version of the sort should you choose? Explain your answer. (2)
- 5.2 A bubble sort can be improved by adding a flag. Explain how the addition of the flag improves the performance of the bubble sort (3)
- 5.3 You need code to search an array many times. You decide to use a binary search because it is quick.
- 5.3.1 Explain in WORDS how a binary search works if the element being searched for is inside the array. (4)
- 5.3.2 Explain why it would be a bad idea to call the sort method from INSIDE the binary search method. (2)

QUESTION 6**16 MARKS**

- 6.1 You are writing a class. What criteria should you use to decide if a variable should be static and if a variable should be non-static? (2)
- 6.2 Why are helper methods private? (1)
- 6.3 Name the two types of methods you should use to provide access to private fields inside a class. (2)
- 6.4 One way to call the `toString` method of a class is to call it by name. What other way does Java provide of calling the `toString` method? (1)
- 6.5 When I instantiate an int array the default value of all the elements is 0. What is the default value of the elements when I instantiate a String array? (1)
- 6.6 Give **TWO (2)** advantages of using an array of objects over parallel arrays. (2)
- 6.7 A database has a table containing high jumpers names and the height they jumped at 10 different athletics meetings.
- 6.7.1 Why is there no need to store the average height jumped in the table (assume that the average is occasionally needed)? (1)
- 6.7.2 Give an example of a problem that could occur if the average was stored in the table. (2)
- 6.8 What is the difference between encapsulation and information hiding. (4)