N08/5/COMSC/HP1/ENG/TZ0/XX/M+

International Baccalaureate®
Baccalauréat International
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MARKSCHEME

November 2008

COMPUTER SCIENCE

Higher Level

Paper 1

14 pages

Subject Details: Computer Science HL Paper 1 Markscheme

Mark Allocation

Section A: Candidates are required to answer **all** questions. Total 40 marks.
Section B: Candidates are required to answer **all** questions. Total 60 marks.
Maximum total = 100 marks.

General

A markscheme often has more specific points worthy of a mark than the total allows. This is intentional. Do not award more than the maximum marks allowed for that part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- Each statement worth one point has a separate line and the end is signified by means of a semi-colon (;)
- An alternative answer or wording is indicated in the markscheme by a "/"; either wording can be accepted.
- Words in (…) in the markscheme are not necessary to gain the mark.
- If the candidate's answer has the same meaning or can be clearly interpreted as being the same as that in the markscheme then award the mark.
- Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalising them for what they have not achieved or what they have got wrong.
- Remember that many candidates are writing in a second language; be forgiving of minor linguistic slips. In this subject effective communication is more important than grammatical accuracy.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalized. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with "**FT**".

SECTION A *Total: [40 marks]*

1. An operating system is a set of programs;
That manages the operation of a computer; ***[2 marks]***

2. (a) An editor is a program that is used to write the source code;
And to make modifications (insert, delete, copy, *etc.*); ***[2 marks]***

(b) A compiler is a program that translates source code;
Into bytecodes/machine code; ***[2 marks]***

(c) An interpreter is a program that reads bytecodes/machine codes and translates;
And executes instructions one by one; ***[2 marks]***

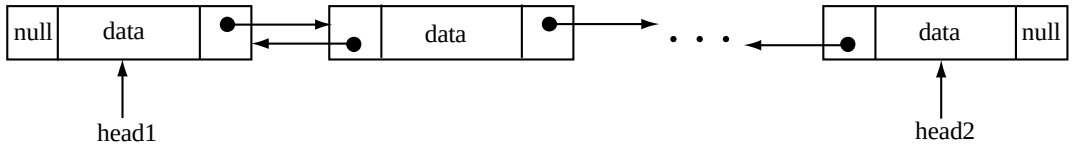
3. Buffering is a technique to speed up communication between devices;
That operate at different speeds; ***[2 marks]***
Accept examples such as: output to a printer may first be written to a buffer and when the printer becomes free the output will be sent to printer from the disk's buffer.

4. *Award up to **[2 marks max]**. Do not accept hybrid because it is not basic.*
Star;
Bus;
Ring; ***[2 marks]***

5. *Award up to **[6 marks max]**.*
To find the target in the sorted array;
The middle item;
Is examined to test if it is equal to the target (searched item);
If it is equal then binary search terminates;
If not, then if it is greater than the target, the right (upper) half of the array is of no further interest;
Otherwise the left (lower) half of the array is discarded;
And process repeats;
By examining the middle item of the selected half of the array; ***[6 marks]***

6. *Award marks as follows up to **[3 marks max]**.*
*Award **[1 mark]** for two external pointers.*
*Award **[1 mark]** for showing that each node has two link fields and one data field.*
*Award **[1 mark]** for two null pointers.*

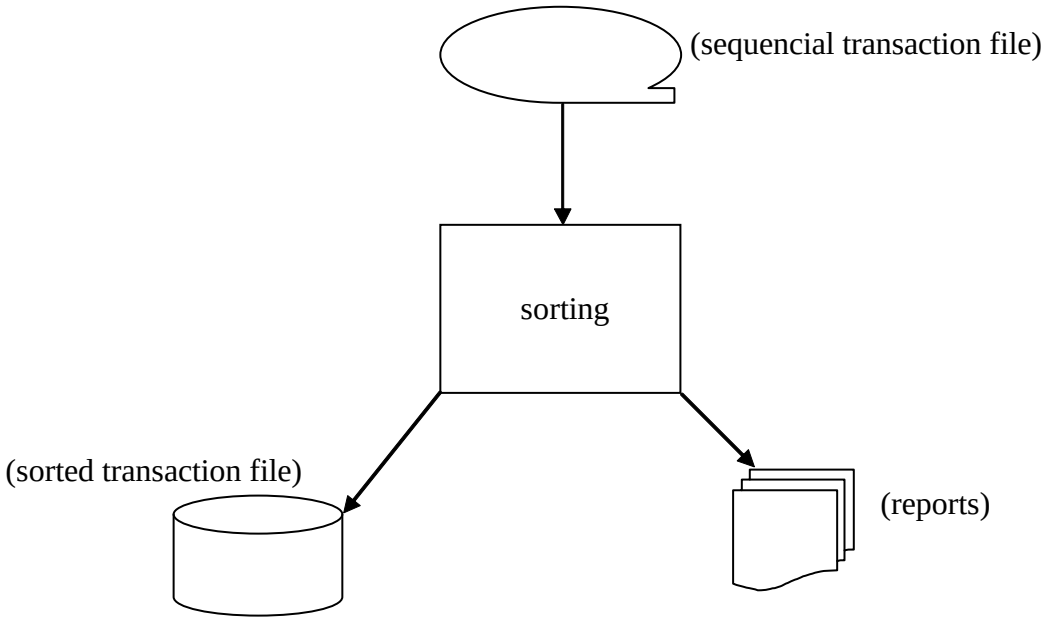
Example:



[3 marks]

7. *Award up to **[2 marks max]**.*
Observation;
Interview;
Questionnaire; ***[2 marks]***
etc.

8. Award ***[1 mark]*** for each labelled flowchart symbol, up to ***[4 marks max]***.



[4 marks]

9. (a) *Award up to **[2 marks max]**.*
*Award **[1 mark]** for* $15_{(10)} = 1111_{(2)}$.
*Award **[2 marks]** for correct 8-bit representation.*

0	0	0	0	1	1	1	1

[2 marks]

(b) *Award up to **[2 marks max]**.*
*Award **[1 mark]** for the sign bit 1, representing a negative number.*
*Award **[1 mark]** for the correct contents of the register.*

1	1	1	1	0	0	0	1

[2 marks]

10. *Award **[1 mark]** for the correct whole part and **[1 mark]** for the correct fraction part.*
$11110.01_{(2)} = 2^4 + 2^3 + 2^2 + 2 + 2^{-2}$
$= 30.25_{(10)}$ ***[2 marks]***

11. To establish standard method/agreed way;
For transferring data between devices; ***[2 marks]***

12. *Award **[1 mark]** for all correct input variables and **[2 marks]** for correct output column, up to **[3 marks max]**.*

A	B	A **XOR** B
0	0	0
0	1	1
1	0	1
1	1	0

[3 marks]

13. *Award up to **[2 marks max]** for any one application.*
Video control/security
Making video clips/pictures and posting them onto websites/for face recognition.
etc. ***[2 marks]***

SECTION B *Total: [60 marks]*

14. (a) (i) *Award **[2 marks max]** for any description of data collected over the period of time and for all data processed at the same time.*
Example:
Transaction files created during the day are used to update master files or to print out reports. ***[2 marks]***

(ii) *Award **[2 marks max]** for any description of a task which involves the access to information held on the company's computer.*
Examples:
Look up the description of the company's products.
On-line shopping.
etc. ***[2 marks]***

(b) *Award **[1 mark]** for the interface, **[1 mark]** for description of how it can be used, for **three** different examples. Award up to **[6 marks max]**.*

Examples:
***Menus:** list of options available – any variation of menus such as hierarchical menu system, pop up or pull down menus.*

***GUI:** any description of using icons, pointing devices and windows.*

***Dialogue boxes:** any description of "forms" that allow users to enter data by filling them in, for example, customer names, addresses.*

***Speech input/output:** any description of using voice recognition systems, for example, company's automatic call handling system.*

Command driven interfaces:** used by employees who are computer specialists to quickly instruct the computer what to do.* ***[6 marks]

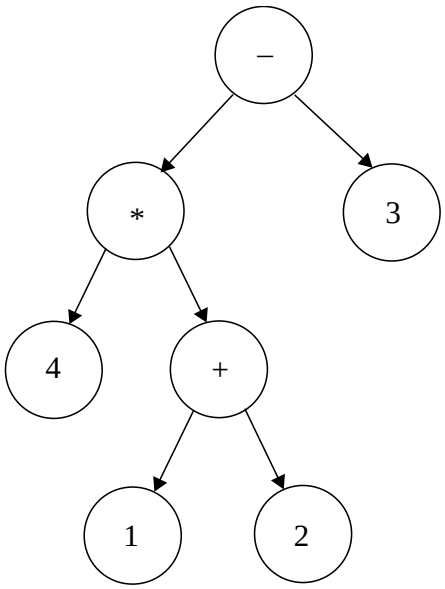
Total: [10 marks]

15. (a) (i) A data structure;
Which can be accessed only at one end (top) / LIFO; ***[2 marks]***

(ii) Push (adding an item onto the stack);
Pop (removing an item from the stack);
Push could cause stack overflow error; ***[3 marks]***

(b) (i) *Award **[2 marks]** for correct answer and only **[1 mark]** if there is a minor error.*
4 1 2 + * 3 – ***[2 marks]***

(ii) *Award **[1 mark]** for each operator at correct place/node, up to **[3 marks max]**.*



[3 marks]

Total: [10 marks]

16. (a) An organized;
Collection of data; ***[2 marks]***

(b) (i) *Award up to **[3 marks max]**.*
New copy of the file could be made;
Copying in all data until the new line;
Writing the new line in its proper position;
And then copying the rest of data from the old to the new file;

OR *(time consuming method)*

Append the new line at the end of file;
Sort the contents of the file;
Copy sorted data back to file; ***[3 marks]***

(ii) Create a new file;
Copy all the data lines from the old to the new file;
Except the one to be deleted; ***[3 marks]***

(c) Data in a direct file can be quickly stored/retrieved/changed/deleted;
Using a disk address or the relative position of the data within the file; ***[2 marks]***

Total: [10 marks]

17. (a) (i) Central processing unit; ***[1 mark]***

(ii) *Award up to **[2 marks max]**.*
Example:
A register that holds the address;
Of the next instruction to be fetched and then executed; ***[2 marks]***

(iii) *Award up to **[2 marks max]**.*
A device;
Which is used to transfer data along;
From one device (sender) to another (receiver); ***[2 marks]***

(b) (i) *Award marks as follows, up to **[4 marks max]**.*
*Award **[2 marks]** for all correct values in the x-column, **[1 mark]** if there is a minor error or missing line(s).*
*Award **[2 marks]** for all correct values in the y-column, **[1 mark]** if there is a minor error or missing line(s).*

A	**B**	**C**	*x*	*y*
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	1	0
1	0	0	0	0
1	0	1	0	0
1	1	0	0	1
1	1	1	0	0

[4 marks]

(ii) They are not equivalent because the last two columns are not identical; ***[1 mark]***

Total: [10 marks]

18. (a) *Award up to **[3 marks max]**.*
Examples:
Each user should have a password;
Regularly changed;
Software should be used to record statistics on who has logged in and out from which computer;
Computers/terminals should be attended, security lock on the door, or video control;
etc. ***[3 marks]***

(b) *Award **[1 mark]** for each different user (up to two) and **[1 mark]** for the explanation, up to **[3 marks max]**.*
Examples:
Because some information may be for all employees to read/access but only authorized employees to change.
OR
The payroll department will need to access confidential information about salaries that other employees should not have access to.
OR
Senior management can have access to company's secrets which are not to be accessed by other employees. ***[3 marks]***

(c) Master file should be regularly backed up;
All data/information/transactions that have occurred since last back up should be saved;
The most recent master file backup is then loaded;
And all stored data/information/transactions applied to master file to bring it up to date; ***[4 marks]***

Total: [10 marks]

19. (a) *Award **[1 mark]** for each correct column, up to **[3 marks max]**.*
*Award **[2 marks]** if only correct output is shown.*

sum	k	k< 5	output
0			
1	0	true	
1	1		
3	2		
4	3		
5	4		
	5	false	
			The sum is 5

[3 marks]

(b) (i) *Award **[1 mark]** for each correct output line, up to **[5 marks max]**.*
The sum is 4;
The sum is 4;
The sum is 7;
The sum is 5;
The sum is 11; ***[5 marks]***

(ii) *Award up to **[2 marks max]**.*
Examples:
Calculates and displays;
The sum of row elements;
For each of 5 rows in the array;

Outputs;
The sum;
Of each row of the table; ***[2 marks]***

Total: [10 marks]