INTERNATIONAL BACCALAURÉAT BACHILLERATO IBO BACCALAUREATE INTERNATIONAL INTERNACIONAL

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MARKSCHEME

November 2002

COMPUTER SCIENCE

Standard Level

Paper 1

12 pages

Subject Details: Computer Science SL Paper 1 Markscheme

Mark Allocation

Section A: Candidates are required to answer ALL questions. Total 30 marks.
Section B: Candidates are required to answer any three questions (10 marks each). Total 30 marks.
Maximum total = 60 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 part of a question.

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

- Each marking 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.
- The order of points does not have to be as written (unless stated otherwise).
- If the candidate's answer has the same 'meaning' or can be clearly interpreted as being the same as that in the mark scheme 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. Effective communication is more important than grammatical niceties.
- 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 penalised. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with **'FT'**.

SECTION A

1. (a) *Award **[1 mark]** for any of the following or any similar statement:*

- A syntax error is caused by the programmer typing a command incorrectly in a program;
- A syntax error could be caused by a spelling mistake, an unknown identifier, or a type mismatch;
- A syntax error is a command which the interpreter or compiler cannot understand, because it has been written incorrectly;
- An error in the rules which govern the structure of language statements; ***[1 mark]***

(b) *Award **[1 mark]** for a correct statement about how an interpreter reacts **or** a correct statement about how a compiler reacts. Award the 2nd mark if another statement clearly identifies a **different** reaction by the other type of translator. Do not award **[2 marks]** for two correct statements if they do not clearly identify **different** reactions.*

*Award **[2 marks]** for:*

- An interpreter detects the syntax error at run-time, whereas compilers detect syntax errors before running the program;
- An interpreter will suffer a run-time error, whereas a compiler will stop compiling and the program will not run;
- A compiler reads the entire program and then lists all the syntax errors it finds, whereas an interpreter starts running the program and stops (crashes) when a syntax error is discovered;

*Award **[1 mark]** for:*

- An interpreter suffers a run-time error, but a compiler doesn't;
- A compiler finds the error before running the program, but the interpreter runs the program first;
- A compiler will refuse to create and executable object module. The interpreter never produces an executable object module; ***[2 marks]***

2. *Award **[1 mark]** for any of the following **devices**:*

- Tape drive;
- Back up tape;
- Streamer; ***[1 mark]***

3. (a) 256 different colours; ***[1 mark]***

(b) *Award **[2 marks]** for suitable application for example.*

- When image is to be transmitted across network;
- or stored on restricted medium;
- Many small images (thumbnails) are to be displayed on screen; ***[2 marks]***

(c) 4; ***[1 mark]***

4. (a) Perform a **range check**, for example rejecting any input which is not between 1 and 120. ***[2 marks]***

*Award **[1 mark]** for stating that a **range check** (or "size" check) is necessary, and **[1 mark]** for stating reasonable limits. Accept any reasonable limits - 5-100 or 21-65 (e.g. working adults). Award **[0 marks]** for "Ask the user for confirmation - e.g. Is this correct?"*

(b) *Award **[2 marks]** for any of the following:*
- Search for the user's name in a data-file, and check that the age matches the age in the data-file;
- Ask the user to type their birth date, calculate the correct age, and check that this matches the age typed by the user;
- Ask the user to type the age again, and make sure the two versions match;
- Ask the user to check (proofread) their input, *e.g.* with a message; ***[2 marks]***

*Any other method which checks the age **against** some other data.*

5. In normal scientific notation, kilo stands for 10^3**,** which is a "round" number in decimal. In computers kilo stands for 2^10, which is a "round" number in binary, very close to 1000.

*Award **[1 mark]** for a correct statement about binary **or** a correct statement about the decimal system. Award **[1 mark]** for a correct statement about the other number system, which clearly identifies the difference between the two systems.*

*Award only **[1 mark]** for a statement like any of the following:*
- kilometre is in decimal, but kilobyte is in binary;
- a kilobyte is 2^10, which is 1024, not 1000;

*Award **[0 marks]** for a statement like:*
- computers don't always calculate correctly; ***[2 marks]***

6. *Award **[1 mark]** for any of the following:*
- any number of leading zeros, followed by 1111011; ***[1 mark]***

7. *Award **[2 marks]** for a correct advantage, together with some explanation – for example any of the following:*

- The hands are free from the keyboard and the eyes are free from the monitor, so the user can hold a sheet of paper and read off the values;
- Many people can read a list of numbers more easily than they can type them, so they would make fewer mistakes and probably finish faster;
- The data can be input without the need to be sitting at a computer, for example in a scientific laboratory where the values are being read from a scientific instrument;

*Award **[2 marks]** for a correct disadvantage, together with some explanation – for example any of the following:*

- Speech recognition systems are not 100 % reliable, so some of the numbers will probably be corrupted;
- A fast typist can type faster than speaking the numbers, especially because many speech recognition systems require slow, deliberate speech;
- Speech recognition is unreliable and/or unsuitable in an office situation where the talking could disturb other employees, or where other noises would interfere with correct recognition; ***[4 marks]***

8.

	[1]	[2]	[3]	[4]	[5]	[6]
After `ADD("BEE")`	**ANT**	**FLY**	**BEE**	**FREE**		
After `ADD("ANT")`	**ANT**	**FLY**	**BEE**	**ANT**	**FREE**	
After `ADD("FLY")`	**ANT**	**FLY**	**BEE**	**ANT**	**FREE**	

First row: ***[1 mark]*** *for* `BEE`;
[1 mark] *for* `FREE` in the correct place;

Second row: ***[1 mark]*** *for adding* `ANT`;

Third row: *Award **[1 mark]** for not changing*; ***[4 marks]***

9. In batch processing data recorded (manually) on source documents is gathered together in batches;
and input all at one time;
In on-line processing data is input immediately;
and processed immediately; ***[4 marks]***
*Award **[1 mark]** for each valid point. Maximum **[2 marks]** for batch processing and maximum **[2 marks]** for on-line.*

10. *Award **[1 mark]** for each up to **[3 marks]**.*
Defining the problem means to write the description of

- the desired output;
- the needed input;
- the algorithm needed to obtain the output from the input;
- identifying whether it is suitable for computer solution; ***[3 marks]***

SECTION B

11. (a) Vera; ***[1 mark]***

(b) ***[1 mark]*** *for record data type.* ***[2 marks]*** *for correctly declared fields, (****[1 mark]*** *for minor error).*

```
record
   NAME string
   REQ,PRES,SCORE real
endrecord
```
[3 marks]

(c) *There are many points that can be made and should be credited as follows:*

For example, award ***[3 marks]*** *for:*
serial file in which case binary search not possible, sequential search needed;
sequential file could be sorted by name in which case binary search for a name is possible, but then only sequential search is possible on score;
sequential organised by score but binary search on score **not suitable because of repeats**;

linear search good because not sorted;
binary search may not be the best method on such a small file ***[2 marks]***; ***[6 marks]***
Terms serial / sequential do not need to be used. Candidates can use any suitable data structure.

12. (a) (i) Star, bus or hybrid; ***[1 mark]***
If diagram does not correspond to the topology this mark should not be given.

(ii) Server identified;
labelled workstation;
at least one feature of network identified *i.e.* hub, token, bus, router *etc.*; ***[3 marks]***

(b) *Award **[2 marks]** for the following answer:*
The secretary should save documents on her local hard-disk, and save a second copy on the server;

*Award **[1 mark]** for the following answer:*
The secretary should save documents twice, using two different names; ***[2 marks]***

(c) *Award **[2 marks]** for any of the following, up to a maximum of **[4 marks]**:*
*Award **[1 mark]** for identifying and **[1 mark]** for suitably elaborated.*

- Each user receives their own account ID - *e.g.* Mrs Kim could be assigned account **K3028**;
- Each account receives a **secret** password, which cannot be read by other users **or** administrators (only the user can change their own password);
- Physical access to the servers should be restricted to administrators to prevent unauthorised access;
- The file system of the email program is not directly accessible to users - *e.g.* users cannot delete other users emails or accounts;

Award marks for any other correct answers, as long as they are not duplicates. ***[4 marks max]***

13. (a) *Award **[2 marks]** for any of the following:*

- The transaction can be removed before posting – for example, if the book is not available or the address data is incomplete;
- A batch process can be used for posting, with appropriate error checking;
- The transactions can also be posted to other files, such as customer accounts;
- The master file is protected from direct access from outside;

Accept other correct answers, as long as they are not duplicates. ***[4 marks]***

(b) ***[1 mark]** for feature and **[1 mark]** for elaboration.*

For example:

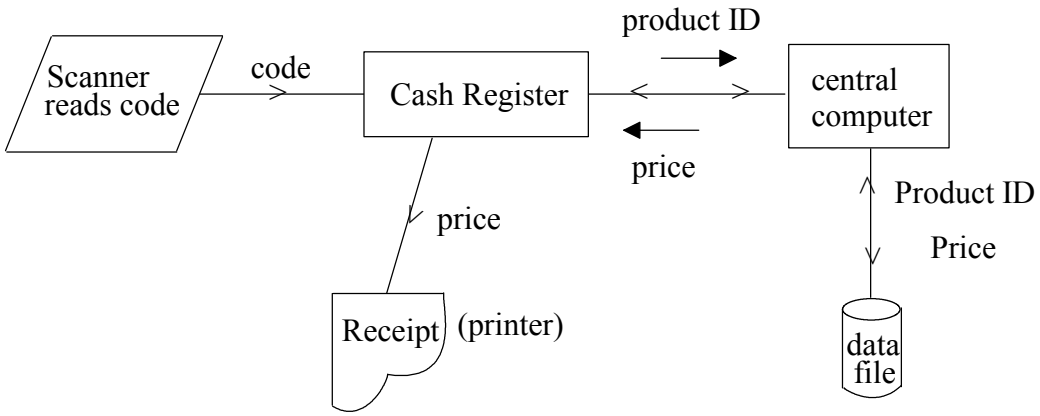
- Page is interactive – selection of book links to details;
- Ability to retrace actions – can go back and look at previous book details; ***[2 marks]***

(c) ***[2 marks]** for each possible problem.*
***[1 mark]** for identifying a problem **[1 mark]** for discussion.*

For example:

- Employee could use credit card number for their own purposes;
- Information can be passed on to other companies – junk mail;
- Information gained by outside agencies (type of book bought) and misused (any suitable example);
- Hackers could break in and steal credit card numbers; ***[4 marks]***

14. (a)



[1 mark] code sent from scanner;
[1 mark] receipt printed;
[1 mark] cash register (all inputs / outputs correct);
[1 mark] connection to data file (only award if it is clear that product ID checked and price sent);
[1 mark] product ID to central computer price returned; ***[5 marks]***

(b) *Award **[1 mark]** for any of the following:*
- The item does not have a bar code on it – *e.g.* fruit;
- The bar code is obscured – smeared or torn;
- The item is too large to pull over the scanner – *e.g.* 100 pounds of dog food; ***[1 mark]***

(c) *Award **[1 mark]** for any of the following:*
- The optical scanner works at a greater distance – *e.g.* up to 50 cm;
- A magnetic ink reader must be very close to the code (*e.g.* 1 cm);
- Magnetic ink is more expensive than printing bar codes;
- Magnetic ink might not work properly on metal cans;
- Bar codes are already printed as standard codes on many items; ***[2 marks]***

(d) *Award **[1 mark]** for identifying advantage **[1 mark]** for brief account:*
- Bar codes are machine readable, but price tags are generally not;
- It is easier to change a price, because only one change is required in the computer, without the necessity of relabelling all the packages on the shelves;
- Many items are produced by the manufacturer with a bar code, so no labelling is required at all;
- Price tags can be removed from one items and a lower price tags substituted (illegal), whereas the bar codes are not removable;
- People do not have to be employed to label all the goods sold (advantage to employer but not for employees); ***[2 marks]***