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MARKSCHEME

May 2012

COMPUTER SCIENCE

Standard Level

Paper 2

10 pages

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General Marking Instructions

After marking a sufficient number of scripts to become familiar with the markscheme and candidates' responses to all or the majority of questions, Assistant Examiners (AEs) will be contacted by their Team Leader (TL). The purpose of this contact is to discuss the standard of marking, the interpretation of the markscheme and any difficulties with particular questions. It may be necessary to review your initial marking after contacting your TL. **DO NOT BEGIN THE FINAL MARKING OF YOUR SCRIPTS IN RED INK UNTIL YOU RECEIVE NOTIFICATION THAT THE MARKSCHEME IS FINALIZED.** *You will be informed by e-mail, fax or post of modifications to the markscheme and should receive these about one week after the date of the examination. If you have not received them within 10 days you should contact your TL and IB Cardiff. Make an allowance for any difference in time zone before calling.* **AEs WHO DO NOT COMPLY WITH THESE INSTRUCTIONS MAY NOT BE INVITED TO MARK IN FUTURE SESSIONS.**

You should contact the TL whose name appears on your "Allocation of Schools listing" sheet.

Note:
Please use a personal courier service when sending sample materials to TLs unless postal services can be guaranteed. Record the costs on your examiner claim form.

General Marking Instructions

1. Once markscheme is received mark in pencil until final markscheme is received.

2. Follow the markscheme provided, do **not** use decimals or fractions and mark only in **RED**.

3. Where a mark is awarded, a tick (✓) should be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark.

4. Sometimes, careful consideration is required to decide whether or not to award a mark. Indeed, another examiner may have arrived at the opposite decision. In these cases write a brief annotation in the **left-hand margin** to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking.

5. Unexplained symbols or personal codes/notations on their own are unacceptable.

6. Record subtotals (where applicable) in the right-hand margin against the part of the answer to which they refer. Show a mark for each part question (a), (b), *etc.* Do **not** circle sub-totals. Circle the total mark for the question in the right-hand margin opposite the last line of the answer.

7. Where an answer to a part question is worth no marks, put a zero in the right-hand margin.

8. Record the mark awarded for each of the three questions answered in the Examiner Column on the cover sheet. Add up the marks awarded and enter this in the box marked TOTAL in the Examiner Column on the cover sheet.

9. After entering the marks on the cover sheet check your addition of all marks to ensure that you have not made an arithmetical error. Check also that you have transferred the marks correctly to the cover sheet. **We have script checking and a note of all clerical errors may be given in feedback to all examiners.**

10. Every page and every question must have an indication that you have marked it. Do this by **writing your initials** on each page where you have made no other mark.

11. A candidate can be penalized if he/she clearly contradicts him/herself within an answer. Once again make a comment to this effect in the left-hand margin.

Subject Details: Computer Science SL Paper 2 Markscheme

Mark Allocation

Candidates are required to answer ALL questions *[20 marks]* for question 1, *[20 marks]* for question 2 and *[30 marks]* for question 3. Maximum total = *[70 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 penalizing 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**".

1. (a) (i) It is the section of the program in which a variable is valid;
          e.g. the variable `t` can only be used within the `changes()` method;
          Note: *must have definition AND example for full marks.* ***[2 marks]***

    (ii) Access to method;
          Limited to class it is defined in   ***[2 marks]***

    (iii) 700; (not distance in 'changes' is local)
          600;
          Mexico City;   ***[3 marks]***

(b) (i) 6;   ***[1 mark]***

    (ii) "s";   ***[1 mark]***

(c) It is an array of integer;
    It has five positions, each one will hold the total for one vowel;
    Position 0 is assigned to the letter "a", 1 to "e" 2 to "i", 3 to "o" and 4 to "u";
    Could also be an object of a defined class, mark accordingly. ***[3 marks]***

(d) *Award marks as follows up to **[8 marks max]**.*
    *Award **[1 mark]** for correct parameters in signature;*
    *Award **[1 mark]** for initialization of vowel array;*
    *Award **[1 mark]** for correct outer loop – length of list;*
    *Award **[1 mark]** for input of word from list i.e. selecting word from the list;*
    *Award **[1 mark]** for correct inner loop – length of word;*
    *Award **[1 mark]** for selecting correct character;*
    *Award **[1 mark]** for check;*
    *Award **[1 mark]** for updating of vowel array;*
    Allow similar marks for the "object" alternative.

    Example answer:

```java
public void analyse(String[] w, int s)
{
  vowels[0] = 0; //must be an array, not a single total
  vowels[1] = 0;
  vowels[2] = 0;
  vowels[3] = 0;
  vowels[4] = 0;
  for (int x = 0; x < s; x = x + 1)
  {
    String word = w[x];
    for (int y = 0; y < word.length(); y = y + 1)
    {
      char c = word.charAt(y);
      if (c = 'a'){vowels[0] = vowels[0] + 1;}
      if (c = 'e'){vowels[1] = vowels[1] + 1;}
      if (c = 'i'){vowels[2] = vowels[2] + 1;}
      if (c = 'o'){vowels[3] = vowels[3] + 1;}
      if (c = 'u'){vowels[4] = vowels[4] + 1;}
    }
  }
}
```
                                                   [8 marks]

                                          Total: [20 marks]

2. (a) *Award up to [2 marks max].*
They are machine readable/legible;
They are unique for each item;
They correspond to a record in the database;   *[2 marks]*

(b) To be able to retrieve details of items being bought;
To be able to update the inventory when items are bought;   *[2 marks]*

(c) `main`;
`Customer` / the constructor;   *[2 marks]*

(d) *Award marks as follows up to [8 marks max].*
Award [1 mark] for initialization;
Award [1 mark] for any reasonable outer first loop including incrementing `count`;
Award [1 mark] for `readBarcode`;
Award [1 mark] for `getDetails`;
Award [1 mark] for `printItem`;
Award [1 mark] for updating `totalCost`;
Award [1 mark] for correct second loop;
Award [1 mark] for `updateInventory`;
Award [1 mark] for output of `totalCost` (outside of first loop);

Example answer:

```
public static void newCustomer()
{
  Item[] goods = new Item[500];
  totalCost = 0;
  int count = 0;
  repeat until END  // any reasonable statement accepted
  {
    String s = readBarcode();
    goods[count] = getDetails(s);
    printItem(goods[count]);
    totalCost = totalCost + goods[count].cost;
    count = count + 1;
  }
  for (int x = 0; x < count; x = x + 1)
  {
    updateInventory(goods[count].barcode);
  }
  output totalCost;
}
```
                    [8 marks]

Question 2 continued

    (e)   The method receives the barcode / gets barcode;
           A sequential/linear search is made / does search;
           Of the inventory file (to match the barcode) / match found;
           When found the `numberInStock` or equivalent is updated / update;   ***[4 marks]***

    (f)   *Award up to **[2 marks max]**.*
           If the `numberInStock` falls below a prescribed level;
           A reorder message is displayed / item is automatically ordered;
           Calculate trends in purchasing;   ***[2 marks]***

Total: [20 marks]

3. (a) *Award up to [2 marks max].*
Reduction in size of memory components/processor;
Reduction in costs of components;
Use of RISK instruction sets;
Demand from consumers;
Reduced power consumption requirements;   *[2 marks]*

(b) Less danger of damage when moving around;
As flash memory has no moving parts;

Low energy consumption;
Prolongs battery life;

Small (physical) size for size of memory;
Reduces weight of device / lots of memory for its size;

Fast processing;
To permit multi-tasking etc.

Can be used to supplement permanent memory (as cards);
Which also allows files to be transferred physically / creates unlimited storage space;   *[4 marks]*

(c) *Award up to [4 marks max].*
Can efficiently cover a suitably sized area (airport lounge, small building);
As it does not require line of sight;
Or cables / it's wireless;
High bandwidth is available now / high data transfer speed;
And data travels at the speed of light (between devices);
Suitable comparison with another technology (*e.g.* Infrared needs line of sight);   *[4 marks]*

(d) *Award up to [4 marks max].*
Most PCs run Windows operating systems;
So it is profitable for writers of viruses to write for Windows;
As different OS require reprogramming virus programs;
And as there is no such dominance in the smartphone market;
There are less viruses around for each OS;   *[4 marks]*

(e) (i) Set up each other's phones as "trusted" devices / use of passwords;
And enable "trusted devices" to communicate between themselves automatically / to allow safe communication between 2 phones;

Choose the mode that makes the user consciously accept (or decline) any requests;
Such as file transfer or the opening of files *etc.*;

Don´t accept encryption (students won´t do this on a smartphone)   *[4 marks]*

(ii) *Award up to [2 marks max].*
A music system and its remote/the speakers;
A pair of customers exchanging files;
A television with its satellite receiver;
A computer with a printer;
Cordless telephone and its receiver;
etc.   *[2 marks]*

Question 3 continued

(iii) *Award marks as follows up to [4 marks max].*
Award [1 mark] for the idea that different frequencies can be used;
Award [1 mark] for other devices could be using the same frequencies;
Award [1 mark] for the two on the same piconet switch frequencies;
Award [1 mark] for rapidly/often (to prevent/minimize interference);
Only award maximum marks for a clear knowledgeable answer.

A piconet can operate over a small frequency range, however, within this range there are many possible values. When two devices initially make contact they communicate on one of these values. They then (together) change this frequency many times per second to make it unlikely that another piconet will cause any significant interference.   *[4 marks]*

(f) *Award marks as follows up to [6 marks max].*
Award [2 marks] for a detailed description of the example/scenario;
Award [2 marks] for sound technical knowledge;
Award [2 marks] for discussing the advantages/disadvantages;

One example of many:
A doctor would be able to access a patient's records from anywhere with Wi-Fi access, for example, from within a different hospital or the patient's house or even the scene of an accident. This will provide the doctor with up-to-date medical information which might be vital.

However, any Wi-Fi network has security issues with the possibility of third party interception of data, especially for unsecured networks where no key is needed. Interception of data could have negative consequences for the patient concerned, as it could lead to problems regarding employment, insurance or even to circumstances in which blackmail may occur if particular conditions become known.   *[6 marks]*

Total: [30 marks]