88067014

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 2

Thursday 16 November 2006 (morning)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.

*Answer **all** the questions.*

1.   A person decides to write a birthday calendar program to be used to find out who has a birthday in any coming month, and how old they will be in that month. The program needs to store the name and date of birth of each person. The date of birth is stored as three separate integers: day, month and the last two digits of the year.

   (a)   Design a class `Relative` that would be suitable to hold these details.   *[3 marks]*

   The following code fragment is run at the beginning of the year.

```
int findAge(Relative aRelative, int currentYear)
  {int age = currentYear – aRelative.birthYear;
  if (age < 0)
      age = age + 100;
  return age;
  }
```

   (b)   By tracing the code fragment, copy and complete the following table for Luca, born on the 12th of October 2001, and Janet, born on 7th December 1955. You should use 06 as the current year.   *[3 marks]*

	currentYear	aRelative.birthYear	age
Luca	06		
Janet	06		

   (c)   Identify the circumstances in which this method would return an incorrect value and state the type of error that this would be.   *[2 marks]*

   (d)   Write a Boolean method `findBirthMonth()` that accepts a variable of type relative and a given month number and returns whether the relative has a birthday in that month.   *[5 marks]*

   (e)   The data on relatives is written to file and a method `getnext()` reads from the file. The end of the file is marked by a relative with the name "XXX". Construct a method `monthList(int amonth)` which will output a list of all those born within a given month and also the total number born in that month. You should use your method `findBirthMonth`.   *[7 marks]*

2.   A tourist board decides to set up an information service which will allow visitors to look up the distance between any two towns in the country or to see information about events in any town. The system is to be installed in public places such as railway stations, bus terminals and motorway service stations.

(a)   Suggest a suitable user interface for the system and outline how it would be used to look up the distance between two towns. *[3 marks]*

(b)   Describe **two** ways in which data for a first prototype could be collected from those who might use the system. *[4 marks]*

The data structures used for distances between towns are as follows.

A list (one dimensional array) `towns[]`   A two dimensional array `distance[][]`
For example: For example:

towns   distance

			[0]	[1]	[2]	[3]	[4]	[5]	[6]
[0]	Atown	[0]	0						
[1]	Bream	[1]	1236	0					
[2]	Broda	[2]	1332	342	0				
[3]	Calgari	[3]	234	456	2343	0			
[4]	Frenzia	[4]	543	1175	1534	373	0		
[5]	Newtown	[5]	223	432	554	2112	725	0	
[6]	Roetown	[6]	1667	83	347	534	245	875	0

Note that the distance between Atown and Newtown (223) is found in `distance[5][0]` and **not** in `distance[0][5]`.

(c)   State the distance between Frenzia and Calgari. *[1 mark]*

(d)   Construct a method to accept the names of two towns and return the distance between them. If a town is not found the method should return an error. You can assume that there are 500 towns in the system. *[6 marks]*

The system will also have updates on traffic problems in the country.

(e)   Describe **one** way in which the traffic data could be collected and distributed in a suitable form for display in the system. *[4 marks]*

(f)   Suggest how this information could be relayed to the motorist whilst driving. *[2 marks]*

This question requires the use of the Case Study.

3.   (a)   "MIDI takes about 10 Kbytes per minute of performance to store and digital audio takes about 10Mbytes per minute of performance to store."

Estimate the number of minutes of performance that could be stored in 1Gbyte:

(i)   Using digital audio   *[2 marks]*

(ii)   Using MIDI   *[1 mark]*

(b)   Outline the need for a *driver* when hardware such as a MIDI device is connected to a computer.   *[3 marks]*

(c)   Discuss any **two** implications of MIDI for intellectual property owners.   *[4 marks]*

(d)   Identify the parameters which would be sent to a MIDI module to form a note and describe the process that would be applied by the sound module before playing the note.   *[6 marks]*

(e)   MIDI data can be stored in three formats. A live concert is recorded for broadcast over the Internet. Suggest the best format to use for this and outline why.   *[4 marks]*

(f)   Compare the recording of music using MIDI with the use of digital audio recording.   *[6 marks]*

(g)   Music can now be generated from the movements of a dancer.

(i)   Outline the way in which data can be captured from the dancer's movements to make music.   *[2 marks]*

(ii)   Discuss **one** implication of making music from movement on the type of music produced.   *[2 marks]*