GCE AS/A level

1101/01

COMPUTING – CG1

Software and Systems Development

A.M. MONDAY, 1 June 2015

3 hours plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 2 _____

For Examiner's use only		
	Maximum Mark	Mark Awarded
Total	100	

INSTRUCTIONS TO CANDIDATES

Use black ink, or black ball-point pen or your usual method.

Write your name, centre number and candidate number in the spaces provided on the front cover.

Answer ALL questions.

Answers should be written in the spaces provided. If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

The intended marks for questions or part questions are given in brackets [ ]. You are advised to divide your time accordingly. The total number of marks available is 100.

You are reminded of the necessity for good written communication and orderly presentation in your answers. Assessment will take into account the quality of written communication used in your answers to question 16.

1. **A secretary in a solicitor's office creates many letters every day using a word processing package and often types identical lines of text in each letter. A colleague suggests creating a macro to insert these lines of text.**

Explain the term MACRO and give a benefit for the secretary of using a macro. [3]

2. **Data about children attending a nursery is stored on a computer system.**

(a) **State the most suitable data type for storing EACH of the following data items:**

Parent contact telephone number [1]

Gender of a child, M or F [1]

Number of whole days each week that a child attends [1]

Whether a child attends the after-nursery club [1]

(b) **State the minimum number of bytes that would be required to store the gender of a child. [1]**

State the minimum number of bytes that would be required to store the telephone number 02920265000. [1]

2(c) Explain why a two dimensional array would NOT be a suitable data structure to store all the data about one child. [2]

3. **Brian is trying to convince his parents of the benefits of using on-line storage, sometimes called cloud storage. Brian's parents have been storing their files on the hard disc of their computer and regularly back them up to an external hard disc that sits on top of their computer.**

Discuss the benefits and drawbacks of EACH method of storage described above. [6]

4(a) Briefly describe the function of the following components of the Central Processing Unit (CPU):

control unit; [1]

arithmetic and logic unit; [1]

register. [1]

4(b) The internal components of a computer are connected by a bus. Briefly describe TWO roles of the bus. [2]

5(a) **A computerised database system stores data about books and the members of a library. Describe how the library benefits from using this database. [3]**

5(b) **Opposite is the incomplete record structure for the book file in the database. On the table opposite give a FIELD NAME and a FIELD TYPE for the PRIMARY KEY.**

Complete the table by writing down two additional appropriate field names together with the FIELD TYPE and FIELD DESCRIPTION in each case. [3]

FIELD NAME	FIELD TYPE	FIELD DESCRIPTION
		Primary Key
Title	String	Title of the book

5(c) **When a new member joins the library, their details are input and validation checks are carried out on some of the data.**

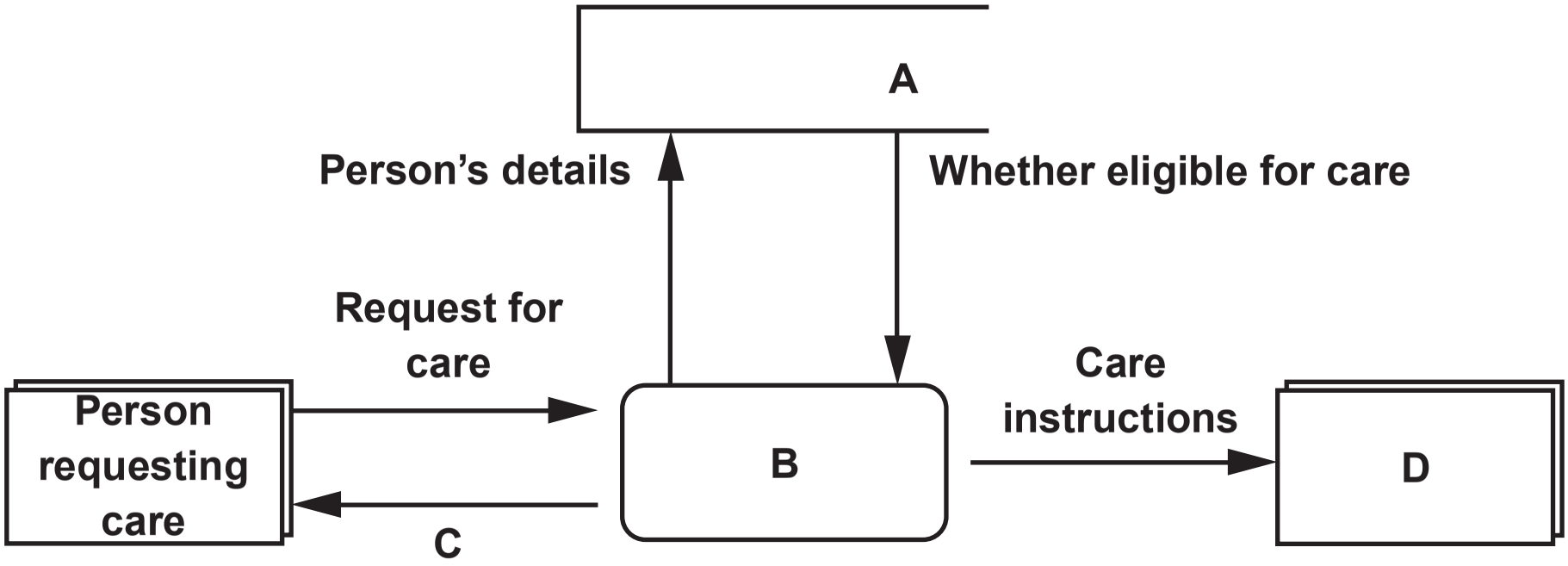
One item of data that is validated is their postcode. Describe a suitable validation check that could be carried out on this data. Give an example of invalid input data that would be detected by THIS check. [2]

5(d) **Another item of data that is validated is their telephone number. Describe a DIFFERENT suitable validation check that could be carried out on THIS data. Give an example of invalid input data that would be detected by this check. [2]**

6. **A local authority uses an agency that provides care workers who help and support people in their own homes.**

A request is sent to the local authority for a care worker. The local authority checks the electoral register to establish eligibility. If the person is eligible for care, the local authority instructs the agency to provide the necessary care. The result of the decision is sent to the person requesting the care.

The situation described is shown in the diagram opposite:


A
Person's details
Whether eligible for care
Request for care
Person requesting care
B
Care instructions
D
C

6(a) State the name of this type of diagram. [1]

_____

State who would normally produce this type of diagram. [1]

_____

(b) What type of object does the shape below represent? [1]

_____

(c) Give a suitable name for the object shown as A in the diagram. [1]

_____

Give a suitable name for the object shown as B in the diagram. [1]

_____

Give a suitable name for the object shown as C in the diagram. [1]

_____

6(c) Give a suitable name for the object shown as D in the diagram. [1]

_____

7. **People who regularly shop at an on-line supermarket are able to view past orders and amend contact details. This data could be subject to ACCIDENTAL DAMAGE.**

(a) **Identify ONE person who is able to cause accidental damage to the past orders stored by the on-line supermarket and describe a measure that could prevent this damage. [2]**

7(b) Identify a DIFFERENT person who is able to cause accidental damage to the contact details stored by the on-line supermarket and describe a DIFFERENT measure that could prevent this damage. [2]

7(c) **A computer hacker might try to access customer payment details to copy and use the data for financial gain. Describe ONE measure the supermarket should have in place to prevent the hacker accessing the data and ANOTHER measure that would make the data unusable by the hacker.**

[2]

8. A hospital stores data about patients and how it is performing against set targets. The DATA PROTECTION ACT and the FREEDOM OF INFORMATION ACT apply to this data.

(a) The hospital ensures that the data is held securely, and is accurate and up to date. State THREE other principles of the Data Protection Act that will apply to the patients' data stored by the hospital. [3]

8(b) Describe how the hospital must comply with the Freedom of Information Act when a request is received from a member of the public about how it is performing against set targets. [2]

```
1     Algorithm FindMean
2
3     Num is integer       {number input by user}
4     Total is integer     {stores the total of the
numbers input}
5     Count is integer     {stores the count of the
numbers input}
6     Mean is real         {stores the mean of the
numbers input}
7
8     startmainprog
9
10          set Total = 0        {initialise variables}
11          set Count = 0
12          set Mean = 0
13
14          output “type in first number”
15          input Num            {input first number}
16
17          while (Num >0) do
18                set Total =
19                set Count =
20
21                output “type in next number”
22                input
23          endwhile
24
25          set Mean =
26          output “The mean is”, Mean
27
28    endmainprog
```

9. **Opposite is an algorithm with some incomplete lines. The algorithm is intended to calculate the mean of a series of positive integers input by a user. All lines are numbered.**

Complete the following incomplete lines of the algorithm:

(a) **Line 18:** **set Total =**

[1]

(b) **Line 19:** **set Count =**

[1]

(c) **Line 22:** **input**

[1]

(d) **Line 25:** **set Mean =**

[1]

10. Giving suitable examples, describe IN DETAIL serial and sequential files. [7]

11. Opposite is an algorithm.

Here is a worked example of the use of the MOD operator:

10 MOD 3 = 1 (because when 10 is divided by 3 the remainder is 1)

Complete the table below to show the value of each variable when the algorithm is performed on the data given.

The value input for X is 25

Y	Z

[5]

```
Algorithm June2015

X is Integer
Y is Integer
Z is Boolean

startmainprog

    set Y = 2
    set Z = TRUE                {initialise variables}

    output "type in a number"
    input X

    repeat

        if X MOD Y = 0 then
            set Z = FALSE
        endif

        set Y = Y + 1

    until (Z = FALSE) OR (Y = X)


    if Z = TRUE then
        output  X, " is a prime number"
    else
        output  X, " is NOT a prime number"
    endif

endmainprog
```

12. Giving suitable examples, describe IN DETAIL the role of the operating system in providing a graphical user interface. [6]

13. Opposite is an algorithm that calculates the price of an item with VAT added.

(a) Give one example of annotation, a variable and a constant from the above algorithm. [3]

Annotation = _____

_____

Variable = _____

_____

Constant = _____

_____

(b) Explain why it is good programming practice to use constants where appropriate. [1]

_____

_____

_____

_____

_____

_____

_____

```
Algorithm CalculateVAT

NetPrice is real          {price without VAT input by
user}
AmountVAT is real         {amount of VAT to pay}
GrossPrice is real        {price with VAT added}

RateVAT = 0·2

startmainprog

        input NetPrice

        set AmountVAT = NetPrice * RateVAT

        set GrossPrice =  NetPrice + AmountVAT

        output GrossPrice

endmainprog
```

14(a) Explain how a linear search algorithm would determine whether an item called SEARCHVALUE is present in an UNSORTED array called SEARCHARRAY [3]

14(b) If the data in the array is in ASCENDING ORDER, briefly explain how the linear search method described above could be improved. [2]

15. Programmers can write applications, sometimes called ‘apps’, for mobile devices and sell them via the internet. Describe the benefits of selling apps via the internet for the programmers and for the customers. [6]

16. **A large organisation with offices throughout the country intend upgrading their existing computer systems. They will employ a team of analysts to investigate and identify problems with their current system.**

Describe IN DETAIL the different methods of investigation available to the team, clearly explaining the advantages and disadvantages of each method.

Describe the benefits of using a team of analysts to investigate the current system. [13]

Remember the quality of written communication will be assessed in this question.

END OF PAPER

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

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