Surname	Centre Number	Candidate Number
Other Names		2

WJEC CBAC

GCE AS/A level

1101/01

COMPUTING CG1

SOFTWARE AND SYSTEM DEVELOPMENT

P.M. THURSDAY, 13 January 2011

3 hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	5	
2	3	
3	4	
4	4	
5	7	
6	8	
7	7	
8	5	
9	6	
10	8	
11	7	
12	9	
13	6	
14	8	
15	13	
Total	**100**	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Answers should be written in the spaces provided. Where the space is not sufficient for your answer, use a continuation sheet, taking care to number the continuation 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 15.

Examiner only

1. A property developer specialising in building retirement apartments stores the details of all customers and the apartment they purchased on a computer.

(a) State the data type that would be most suitable for storing the number of bedrooms in the apartment. [1]

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(b) State the data type that would be most suitable for storing the customer's phone number. [1]

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(c) State the data type that would be most suitable for storing the internal floor area of the apartment in square metres, for example 43.5. [1]

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(d) State the data structure that would be most suitable to store all the data required for the customer and the apartment they purchased, briefly describing why it is the most suitable data structure. [2]

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5

2. The Data Protection Act gives individuals the right to know what information is held about them. Companies that hold data about an individual must comply with the eight principles of the Act. Two principles are that personal information:

- should not be stored for longer than necessary
- should be processed in line with your rights meaning an individual can check and amend data stored about them.

State **three** other principles. [3]

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3. Philip is developing a spreadsheet as a school exercise. A section of the spreadsheet is shown below with the formula in cell C6 being displayed. The current pass mark is stored in cell B2 but this may change in future years.

	A	B	C
1			
2	**Pass Mark**	40	
3			
4	*Pupil Name*	*Exam Mark*	*Pass or Fail*
5			
6	Juan Castillo	71	=IF(B6>=B2,"PASS","FAIL")
7	Anwen Lloyd	30	
8	Julie Smith	92	
9	Harry Webb	55	
10	John Hughes	34	
11	Ismal Noor	89	

(a) Philip wants to copy the function in cell C6 to cells C7 to C11. His teacher tells him that he will need to use *absolute cell referencing* for the copied function to work correctly.

(i) State the cell used in the 'IF' function that will have to be referenced *absolutely.* [1]

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(ii) Why is *absolute* referencing used? [1]

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(b) Philip has created a *macro* which enables him to print a section of the spreadsheet. Briefly explain the term *macro* and give a reason why Philip would create a *macro.* [2]

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Examiner only

4. *(a)* In **each** case name the component of the Central Processing Unit (CPU) whose function is:

(i) to manage the execution of instructions; [1]

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(ii) to process and manipulate data; [1]

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(iii) to temporarily store data or control information used for a specific purpose. [1]

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(b) What is the purpose of the address carried by the address bus? [1]

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4

5. John has nearly a thousand digital photographs stored on his home personal computer. He is concerned that they will be lost if the computer is stolen or damaged.

(a) The capacity of John's hard disc is 160 gigabytes. Name the **most** suitable storage medium to back up the entire hard disc. Justify your choice of storage medium. [3]

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Examiner only

(b) The storage required for each picture is about 3 megabytes. The approximate storage required to store all John's photographs is calculated below.

3 megabytes x 1000 = 3000 megabytes (approximately 3 gigabytes)

John wants to send all of his photographs to his friend Alison. Alison has told him that 3 gigabytes is too big to send using e-mail and has suggested that John sends them using conventional mail.

(i) Name, giving reasons, the **most** suitable medium to send the photographs to Alison using conventional mail. [3]

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(ii) Briefly describe how John could reduce the storage requirements of his photographs so that he could email them. [1]

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7

Examiner only

6. Validation and verification checks are carried out on employee data being entered into a computer system.

(a) Using an example of acceptable data describe a suitable validation check for each of the items of data below. In each case give an example of invalid data that would be detected by the check.
A different validation check must be used in each case. [4]

Employee salary

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Employee mobile telephone number

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Examiner only

(b) Each employee has a unique three digit code. A check digit is calculated as shown below:

The three digits are added together to produce a single or double digit number.
The check digit is either:
- the single digit produced, for example, 314 gives 8
- the right digit of the double digit number produced, for example, 539 gives 7.

(i) Find the check digit for the code **736**. [1]

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(ii) This method produces the same check digit for codes that contain transposed digits (the same digits in a different order) for example, **245** and **254** would both produce **1** as a check digit.

Describe how the method could be improved to give different check digits for these codes. [2]

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(iii) Find the check digit for **745** using the new method. [1]

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Examiner only

7. A kitchen design company has a large office in the centre of a city. The company currently have a network of computers connected using a bus topology. There is a workstation on each desk, a server and several specialised printers for printing the kitchen designs.

Designers from the company visit a client's home to design a kitchen and create an estimate for a project. All the data is stored on a laptop computer. The designer returns to the office and transfers the estimate and design from the laptop computer to the workstation on his desk and prepares them for printing.

(a) Describe **two** possible drawbacks of using a bus network. [2]

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(b) The company needs to update their computer system and have employed an IT consultant to recommend a new computer system.

The recommendation is to install a wireless network in the office and issue all the kitchen designers with new laptop computers.

(i) Briefly describe the hardware required to connect **each** laptop computer to the wireless network. [2]

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(ii) Describe any benefits for the company of the designers using a wireless network. [2]

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(c) The designers will be able to use mobile internet access when in a client's home. Briefly describe one possible improvement in the service clients receive. [1]

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7

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8. Computer files can be organised in *serial* or *sequential* order.

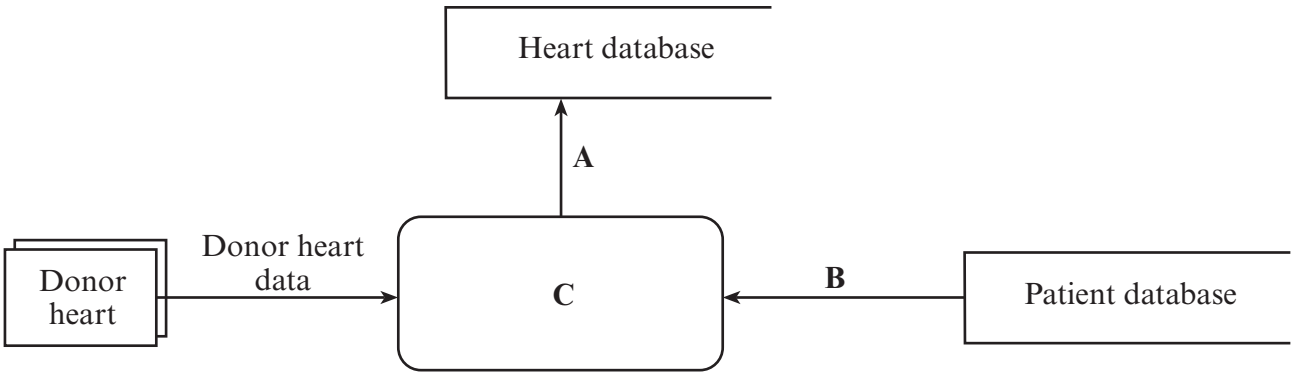
(a) Briefly describe how records are added to a *serial file* and added to a *sequential file.* [3]

(b) Computer files can contain *fixed length* or *variable length* records. Describe **one** advantage of using *fixed length* records and **one** advantage of using *variable length* records. [2]

5

Examiner only

9. A national heart transplant service stores information on thousands of patients awaiting a heart transplant. When a donor heart becomes available, the system attempts to match the donor heart's characteristics against the details of all the patients. Details of the donor heart are also stored.



(a) Diagrams like these are often used in discussion with users. Give one reason why this is the case. [1]

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

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(c) Draw the shape used in the diagram that represents an *external entity.* [1]

(d) Give a suitable name for the data flow shown as **A** in the diagram. [1]

.....

(e) Give a suitable name for the data flow shown as **B** in the diagram. [1]

.....

(f) Give a suitable name for the process shown as **C** in the diagram. [1]

.....

Examiner only

10. Customers of an on-line travel agent can book hotels, flights, and many holiday extras using the agent's web site. When a booking is made a customer can log into their account and view and amend all their current bookings.

(a) A password is required to log into a customer account. When a customer creates the password it has to be at least eight characters long and be a mixture of letters and digits. Describe two other rules that could be applied to the password in the future. [2]

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Examiner only

(b) The web site has a forum where customers can write reviews of hotels. Discuss in detail the benefits and drawbacks for the hotel owners and prospective hotel guests of this type of forum. [6]

8

Examiner only

11. Below is an algorithm.

```
Algorithm CompareNumbers

Num1 is integer              {number input by user}
Num2 is integer              {number input by user}

startmainprog

        output "type in first number"
        input Num1
        output "type in second number"
        input Num2

        if Num1>Num2 then output "Biggest is", Num1

        if Num2>Num1 then output "Biggest is", Num2


endmainprog
```

(a) Write down **one** example of annotation from the algorithm. [1]

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(b) Using an example from the algorithm, describe in detail the purpose of *selection* in computer programs. [3]

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(c) The algorithm works correctly for the following data:

Num1 = 5 and Num2 = 3
Num1 = 7 and Num2 = 9

Write down an example of data that will not produce any output, [3]

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and amend the algorithm above to produce appropriate output for this data.

Examiner only

12. Computer systems require both testing and maintenance.

(a) Three testing methods often used are *alpha, beta* and *acceptance* testing; briefly describe **each** of the three methods. [3]

(b) Briefly describe **each** of the three types of maintenance *perfective, adaptive* and *corrective.* [3]

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(c) Two components of maintenance documentation are *annotated listing* and *data dictionaries*. Briefly describe **each** of these components and state who might make use of this type of documentation. [3]

9

Examiner only

13. Below is a segment of an algorithm that determines if an item is present in an array and if present at what position the item is located in the array.

```
Start = 0
End = 7
Found = False
Position = -1

input SearchValue

repeat
        Mid = (Start + End) DIV 2

        if SearchValue = MyArray(Mid)
                Found = True
                Position = Mid
        endif

        if SearchValue>MyArray(Mid) then
                Start = Mid + 1
        endif

        If SearchValue<MyArray(Mid) then
                End = Mid – 1
        endif

until (Found = True) OR (End < Start)
```

Test data

MyArray

(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	25	32	47	58	65	71	77

SearchValue = 71

Complete the table below to show how each variable changes when the algorithm is performed on the test data given above.

Start	End	Mid	MyArray[Mid]	Found	Position
0	7	3	47	False	-1
4	7			False	-1
	7			True	

[6]

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14. A large organisation with many offices throughout the country is upgrading its computer system.

The new system has been designed and developed and is ready for installation. Discuss, with reasons, the suitability of different methods of *changeover* which could be considered by the organisation. [8]

Examiner only

15. Describe **in detail** the role of the operating system in:

- managing the resources of a computer system
- providing an interface between the user and the hardware. [13]

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