



Victorian Certificate of Education 2008

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

Figures

Words

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INFORMATION TECHNOLOGY: SOFTWARE DEVELOPMENT

Written examination

Thursday 13 November 2008

Reading time: 11.45 am to 12.00 noon (15 minutes)

Writing time: 12.00 noon to 2.00 pm (2 hours)

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	5	5	17
C	13	13	52
			Total 89

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 22 pages with a detachable insert containing a case study for Section C in the centrefold.
- Answer sheet for multiple-choice questions.

Instructions

- Remove the insert containing the case study during reading time.
- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- All written responses must be in English.

At the end of the examination

- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Multiple-choice questions**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

The main components of an information system are

- A. equipment, people, information, and procedures.
- B. equipment, people, data, and programs.
- C. equipment, people, data, and procedures.
- D. equipment, data, procedures and software.

Question 2

A ticket seller at a cinema uses a computer to

- check which seats are available for a customer
- allocate a vacant seat to the customer
- print a ticket for the customer.

What type of information system is the ticket seller using?

- A. an office automation system
- B. a management information system
- C. an expert system
- D. a transaction processing system

The following information relates to Questions 3 and 4.

One model of the systems development life cycle involves the process of creating a simplified version, or part, of a system as soon as analysis is completed. This helps to quickly identify misunderstandings between system users and developers, and to expose missing user requirements early in the systems development life cycle.

Question 3

The systems development life cycle model described above is most probably

- A. rapid application development.
- B. agile modelling.
- C. structured modelling.
- D. prototyping.

Question 4

It is clear that the model described above is **not** the waterfall model of systems development because

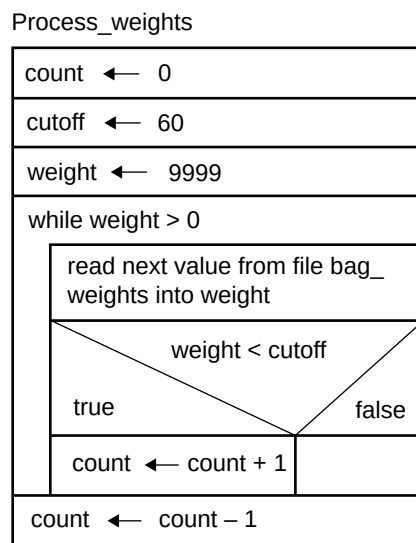
- A. in the waterfall model no part of the system is created until the design is complete.
- B. in the waterfall model users are not involved at all in the systems development life cycle.
- C. the waterfall model does not include an analysis stage.
- D. the waterfall model does not allow misunderstandings to occur between users and software developers.

Question 5

Data sent through a cable connection is naturally more secure than data sent through a wireless connection. This statement is

- A. true, because to dishonestly obtain data from a cable requires a physical connection to be made to the cable.
- B. false, because wireless transmissions are encrypted and so data is safe from unauthorised access.
- C. true, because when wireless is used, data is broadcast to all computers within a 10-kilometre radius of the transmitter.
- D. false, because cable connections can only go a certain distance before wireless has to be used.

The diagram below relates to Questions 6–8.



The algorithm **Process_weights** has been designed to process data contained in a file called **bag_weights**.

Question 6

The algorithm is to be tested using a pencil and paper. It is assumed that **bag_weights** will contain the test data: 55, 77, 60, 0, 58.

At the end of the test the final value in variable **count** will be

- A. -1
- B. 0
- C. 1
- D. 2

Question 7

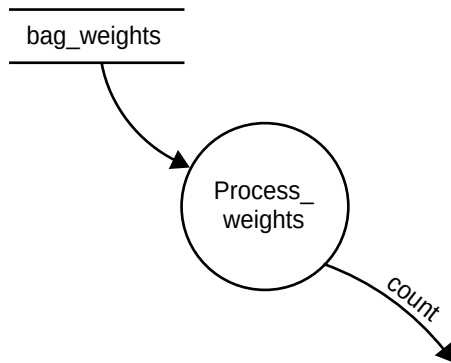
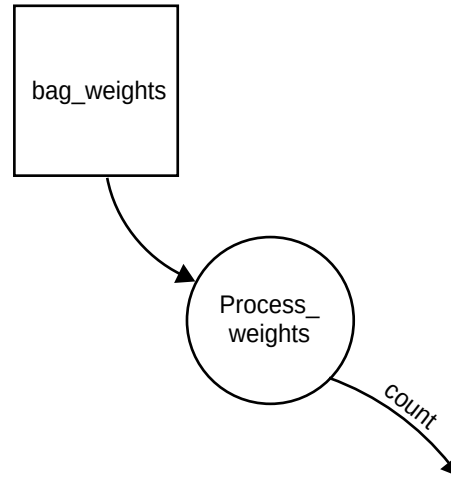
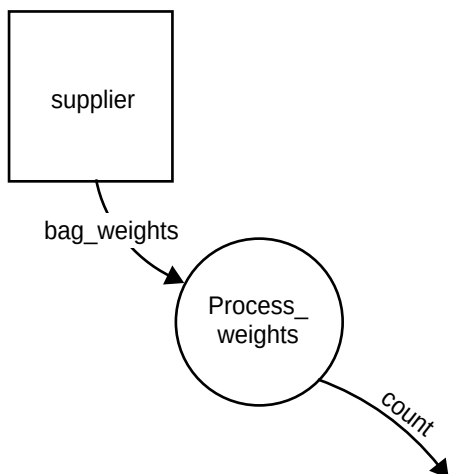
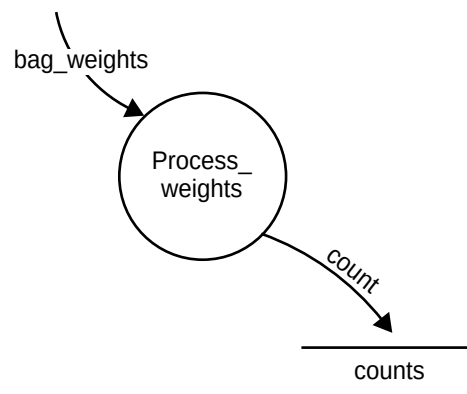
In **Process_weights**, the variable **count** will most probably only ever contain

- A. string data.
- B. floating point data.
- C. integer data.
- D. decimal data.

Question 8

Process_weights will be a small part of an information system. The information system is to be represented with a data flow diagram.

The part of the data flow diagram associated with the algorithm **Process_weights** is best drawn as

A.**B.****C.****D.****Question 9**

The major purpose of creating test data and expected results is to find

- A. syntax errors.
- B. logic errors.
- C. variable errors.
- D. documentation errors.

Question 10

The best data type to store a phone number in the format (99) 9999 9999, for example (03) 1234 5678, would be

- A. integer.
- B. floating point or decimal number.
- C. string or text.
- D. Boolean.

Question 11

A program for viewing high quality photographs on a computer screen is being written. The photographs are stored as JPEG files on a central fileserver and have an average size of 2 megabytes each.

To download one photograph to a computer that has a wireless connection running at 10 megabits per second will take about

- A. 0.2 seconds.
- B. 1.6 seconds.
- C. 5 seconds.
- D. 6.25 seconds.

Question 12

When evaluating the effectiveness of a software application you are mainly looking at

- A. how quick it is to load and run.
- B. how well it does its job.
- C. how little space it takes up.
- D. how quickly it can access data.

Question 13

A school database is being set up. The programmers wish to check that the entry of the date of birth of a student is what is expected for a student entering that year level.

Assuming that the date is a valid date, the best validation technique would be

- A. existence test.
- B. numeric test.
- C. string test.
- D. range test.

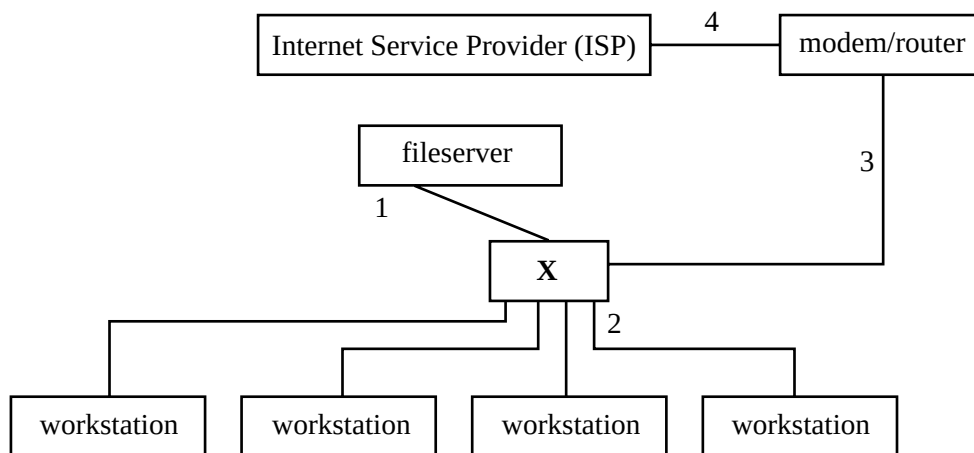
Question 14

Documentation that introduces new users to the commonly used features of software packages is called

- A. a tutorial.
- B. an installation guide.
- C. a data dictionary.
- D. systems documentation.

The following information relates to Questions 15–17.

The functional block diagram below is of a small company's local area network.



Question 15

In the network shown above, what is the name of the hardware shown as X?

- A. printer
- B. switch
- C. CAT 5 cable
- D. LAN

Question 16

The local area network above shows an example of a

- A. hybrid topology.
- B. bus topology.
- C. star topology.
- D. tree topology.

Question 17

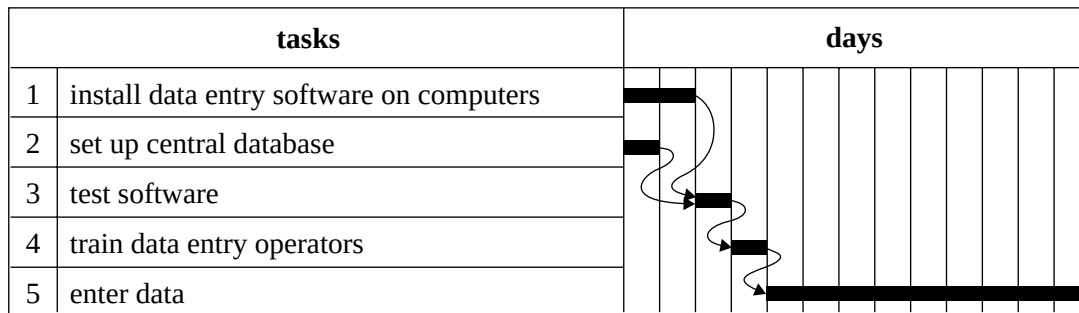
The company, on learning that its ISP does not have a firewall, must install one on its system.

Using the positions labelled 1–4, which is the best position for the firewall?

- A. 1
- B. 2
- C. 3
- D. 4

Question 18

A company that conducts surveys is setting up five of its networked computers for special data entry work. The person in charge created a Gantt chart to help manage the project. A section of the chart is shown below.



Which of the following statements is supported by the Gantt chart?

- A. Testing of software can begin as soon as the central database is set up.
- B. The critical path for this part of the project is the tasks numbered 1-3-4-5.
- C. Data entry operators must be trained before software testing can begin.
- D. Setting up the central database and installing data entry software cannot occur at the same time.

Question 19

A program reads a set of money amounts entered via a keyboard. It stores each amount into a file in the order it is received. This file is later accessed by reading the data in the order it was received.

This kind of file access is known as

- A. normal access.
- B. direct access.
- C. random access.
- D. serial access.

Question 20

A program is being written that will perform calculations involving temperature measurements taken over a long period of time. The programmer chooses T as the name for the variable which will hold a temperature measurement.

This variable name is

- A. a good choice because that is the symbol used in science.
- B. a poor choice because it is not clear whether it stands for temperature or time.
- C. a good choice because it is brief and quick to enter.
- D. a poor choice because it does not specify the size of the variable.

SECTION B – Short answer questions**Instructions for Section B**

Answer **all** questions in the spaces provided.

Question 1

Two important file management procedures are ‘archiving’ and ‘backing up’. Both involve copying files, but they have very different purposes.

- a.** State the main purpose of each procedure.

Main purpose of archiving

Main purpose of backup

2 marks

- b.** Describe one difference between them.

2 marks

Question 2

Explain the difference between user documentation and internal documentation for a software application.

4 marks

Question 3

List the main features of a naming convention for variables and procedures that you have used in your programming this year. State two advantages of this convention.

Main features _____

Advantage 1 _____

Advantage 2 _____

3 marks

Question 4

A program is being written that will require a file to be randomly accessed many times in order to read data from it. The file contains about 600 megabytes of data and is currently stored on a CD. The programmer has three options.

A – Write the program so that it reads the data as needed directly from the CD.

B – Write the program so that it first copies the entire file onto hard disk and then reads the data as needed.

C – Write the program so that it first copies the entire file into main memory and then reads the data as needed.

Which option should the programmer choose in order to minimise the program's running time? Give reasons for your answer.

2 marks

Question 5

A principal wants to purchase new software to enable teachers to design their own online examinations. On searching the web he finds Excellent Exams Software and decides to set up a criteria table to help him evaluate the software accurately. Excellent Exams Software makes the claims stated in the table below. Complete the table below by stating the evaluation criteria for each claim and provide a comment to help the principal make a decision.

Claim	Criteria for evaluation	Comment
Very easy to use	Usability	This should mean teachers will need very little training but you will need to check this
It takes only three minutes to load per user		
Operates without fatal errors on most networked systems		

4 marks

Total 17 marks

END OF SECTION B

SECTION C – Case study

Instructions for Section C

Answer **all** questions in the spaces provided. Remove the case study insert and read **all** the information provided before you answer these questions. Answers must apply to the case study.

Lucy began her analysis of Pattie's Parties' current system by interviewing Pattie and taking many notes. She then returned to her office and used the data in her notes to continue the analysis.

Question 1

From Lucy's notes it became clear that there were a number of reasons for Pattie to change her system. Each reason related to one of the three types of factors prompting changes in organisations. In the table below Lucy has identified an economic factor and has provided an explanation of why it is an economic factor.

From the case study, identify a technical factor and a social factor, and provide an explanation for why each is considered that type of factor.

Type of factor	Example	Explanation
economic	errors in quotes	leads to a loss of income for Pattie's Parties
technical		
social		

4 marks

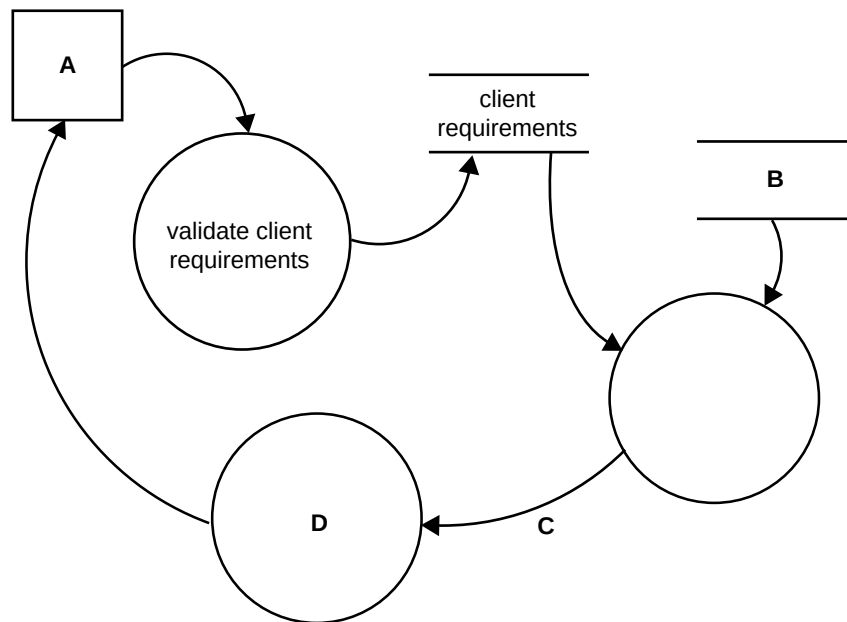
Question 2

Using the data in her notes, Lucy has drawn a system flow chart of Pattie's current system. Part of the chart is shown in the case study. Explain what Lucy should do with the completed chart before using it in the rest of her analysis.

1 mark

Question 3

Lucy has started drawing a data flow diagram (DFD) of the current system. A part of her DFD is shown below. It is based on the part of the system flow chart shown in the case study. Lucy has not yet labelled several parts of the diagram.



Suggest the best labels for the parts of the diagram currently labelled A, B, C and D.

A _____ B _____ C _____ D _____

4 marks

Lucy's analysis of Pattie's system is now complete and she proposes the system described in the case study. Pattie gives her approval to design the proposed system.

Question 4

There are two ways in which the data from the central database can be made available to Pattie and her staff.

System A Download the entire central database onto each mobile device at the start of the day. At the end of the day upload the new data from clients on to the central database.

System B Use the web to obtain access to the central database and update client data as required.

- a. Explain one advantage of System A compared with System B.

- b. Explain one advantage of System B compared with System A.

2 + 2 = 4 marks

Lucy advises that purpose-built software is the best way to go and provides Pattie with specifications. Pattie hires the company Baron Software to write the software for the new system.

Question 5

The software specifications show that a procedure is required to enable Pattie to see which event coordinators are available on a particular date. The algorithm for this procedure has been created and is shown below.

The algorithm uses the following variables.

Variable	Use
Date_Required	Stores the date Pattie requires a coordinator
Num_Coordinators	Stores the number of coordinators employed by Pattie
Count_Coordinator	Counter for coordinators
Coordinator_Available[]	Stores the availability (true/false) of each coordinator
Coordinator_Booking	Stores a booking date for a coordinator
Coordinator_Name[]	Stores the names of the coordinators

BEGIN

/* initialise data */

INPUT Date_Required

READ Num_Coordinators /* from the Bookings file */

Set_Up_Coord_Info /* a procedure that sets all Coordinator_Available[] to True */
/* and reads all names into Coordinator_Name[] */

Count_Coordinator ← 1

REPEAT

Count_Coordinator ← Count_Coordinator + 1

/* Read dates already booked for a Coordinator one at a time from the Bookings file */

REPEAT

READ Coordinator_Booking

IF Date_Required = Coordinator_Booking THEN

Coordinator_Available[Count_Coordinator] ← False

ENDIF

UNTIL Coordinator_Booking = Blank

/* Print Coordinator_Name if he/she is available */

IF Coordinator_Available[Count_Coordinator] = True THEN

PRINT Coordinator_Name[Count_Coordinator]

ENDIF

UNTIL Count_Coordinator = Num_Coordinators

END

Test data used to check algorithm

Variable	Test data
Date_Required	13/11/2008
Coordinator_Name[1]	Pattie
Coordinator_Name[2]	Charles
Coordinator_Name[3]	Manfred

Bookings file

3
2/5/2008
12/12/2008
Blank
13/11/2008
15/11/2008
Blank
2/11/2008
12/11/2008
Blank

- a. Using the test data above
- what output would you expect to get if the algorithm was correct

- what output does the algorithm actually give?

- b. Describe the error in the algorithm.

- c. Suggest **one** way the algorithm could be altered to fix this error.

2 + 2 + 2 = 6 marks

Question 6

From the variables used in the algorithm, select one of each type to complete the following table.

Type	Variable name
Boolean array	
String (Text) array	
Numeric	

3 marks

SECTION C – continued
TURN OVER

Question 7

The software specifications also require a program to be written for the mobile device. This program is to be used to prepare quotes at the client's house.

The programmer at Baron Software has designed a dialog box for checking the categories of staff required for the event, and for entering the number of guests. This will calculate the staff numbers required for the event.

Party details

staff required

- ☐ Event coordinator
- ☐ Chef
- ☐ Waiting staff
- ☐ Bar staff
- ☐ Kitchen hands
- ☐ Security
- ☐ Valet

Number of guests:

- a. Explain why the programmer has used checkboxes rather than text boxes to enter the staff required into the system.

- b. Explain two data validation techniques the programmer can use to ensure that the number of guests entered in the text box is suitable.

Technique 1

Technique 2

2 + 2 = 4 marks

SECTION C – continued

Question 8

Part of Pattie's agreement with Baron Software is to keep development costs to a minimum. When the programmers are discussing how best to store the client quotes on the mobile device, one programmer, Schroeder, argues that they must include encryption. Another programmer, Sally, disagrees as encryption will increase the overall development cost.

Discuss the ethical considerations from each point of view.

4 marks

Question 9

Pattie goes shopping to find the most suitable mobile computing device for her business. She knows that these devices need to

- use information obtained from the web-based central database
- show the client images (stills and video clips) of products and past parties so that the client can make decisions more easily
- efficiently enter all party requirements and a detailed description of the party venue
- upload bookings into the central database.

She also wants the device to promote her product in the best possible way.

Some of the specifications of her three favourite brands are stated below.

Considering the functions that Pattie wants the device to perform, list the **three** brands in the order that you would recommend to Pattie and clearly explain the reasons for the order of your choice.

Features	LINUS	MARCELL	FRANKLIN
RAM	1 GB	1 GB	1 GB
Storage	40 GB HDD	80 GB HDD	80 GB Hard drive
Screen	5" (12.5 cm)	12.5" (32 cm)	12.9" (33 cm)
Connectivity	Wireless LAN only	Wireless LAN + Ethernet CAT 6 LAN	Wireless LAN only
Ports	1 USB 2.0	2 USB 2.0	2 USB 2.0
Battery life	10 hours	9 hours	10 hours
DVD drive	External DVD + – RW	External DVD + – RW	External DVD + – RW
Input	Touch screen	Stylus + touch screen	Touch screen
Other	Integrated 2.0 Megapixel camera	Full keyboard	Bar code scanner Integrated 2.0 Megapixel camera

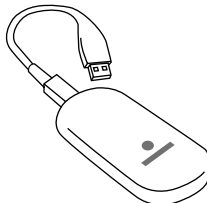
Order of preference

1 _____ 2 _____ 3 _____

Explanation for the order of your choice

4 marks

Question 10

 Hot offer 5 GB Mobile Broadband only \$39 a month Plus free USB modem Find out more >	Experience a high-speed wireless Internet connection whether you are at home on your PC or out and about with your laptop. When you go outside our 3G broadband areas, you will be switched seamlessly onto our GPRS network and you will only be charged one rate as long as you are in our coverage area.
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Later, Pattie receives this junk mail advertising. She realises that if this is true, then her staff could connect to the website and upload the accepted quotes immediately from the client's home. But she would need to ask the company for more information about its offer.

List three important characteristics of the Mobile Broadband that Pattie would want to use in her business and explain why each is important.

Characteristic 1 _____

Reason _____

Characteristic 2 _____

Reason _____

Characteristic 3 _____

Reason _____

6 marks

Question 11

Lucy has arranged for the Pattie's Parties database to be hosted remotely by an ISP called Illuminated Business Hosting. Pattie has asked to see its disaster recovery plan so that she can be confident that her business will not suffer if something goes wrong.

Identify two features she would want in this plan and explain why they are important to Pattie's business.

Feature 1 _____

Reason _____

Feature 2 _____

Reason _____

4 marks

In order to implement the new system, Pattie needs to provide her staff with appropriate training and user documentation to support them in its use.

Question 12

Baron Software has a room on its premises for training clients. It contains a set of networked desktop computers which can be loaded with the client's software. Baron Software has offered Pattie two training programs.

- 1 One day at Baron premises for Pattie and her staff at a total cost of \$300
 - 2 A half-day at Pattie's house and then at the home of each staff member at a total cost of \$600
- a. State **one** advantage, apart from cost, of each training program.

Advantage of training program 1

Advantage of training program 2

- b. Considering all factors, recommend which option would be better for Pattie's business and explain your choice.

Recommendation _____

2 + 1 = 3 marks

Question 13

One important goal Pattie established at the beginning of her system development was to provide accurate and timely quotes.

Using the headings below, outline a strategy Pattie could use to determine whether this system goal has been met after implementation.

Evaluation strategy

Time frame

Data to be collected and from where

How the data will be used to evaluate this system goal

1 + 2 + 2 = 5 marks

Total 52 marks

CASE STUDY INSERT FOR SECTION C

Please remove from the centre of this book during reading time.

Pattie's Parties

Pattie owns a small business: Pattie's Parties. It is a party planning and catering service that Pattie runs from her suburban home. Pattie advertises through the Yellow Pages and a simple website. She also has a team of event coordinators: people who she can hire on a casual basis to coordinate the event on the day.

When first planning an event, Pattie visits the home of a client and writes down information about their event. When she returns home she enters the information into a 'quotes' spreadsheet. The spreadsheet calculates the item costs and gives a total. Pattie enters this data into a word processor so a properly formatted quote and covering letter can be printed. The letter and quote are then sent either by post or email to the client.

If the quote is accepted, Pattie arranges the event including

- booking a venue
- ordering the catering and equipment for the event
- organising security if required
- selecting an event coordinator from her team.

Pattie keeps information about suppliers and products in a 'suppliers' spreadsheet. It is linked to the quotes spreadsheet so that quotes have up-to-date prices and product numbers. In the past, she updated the suppliers spreadsheet as soon as her suppliers provided her with new information.

The problem

Pattie's Parties has been so successful that a year ago Pattie had to hire two people to help her do the quote preparation and event arrangement work. So that her workers can also work from home, Pattie sends them a new version of her suppliers spreadsheet as soon as she updates it.

Unfortunately the continued increase in business, and having two staff to work with, has led to the following difficulties.

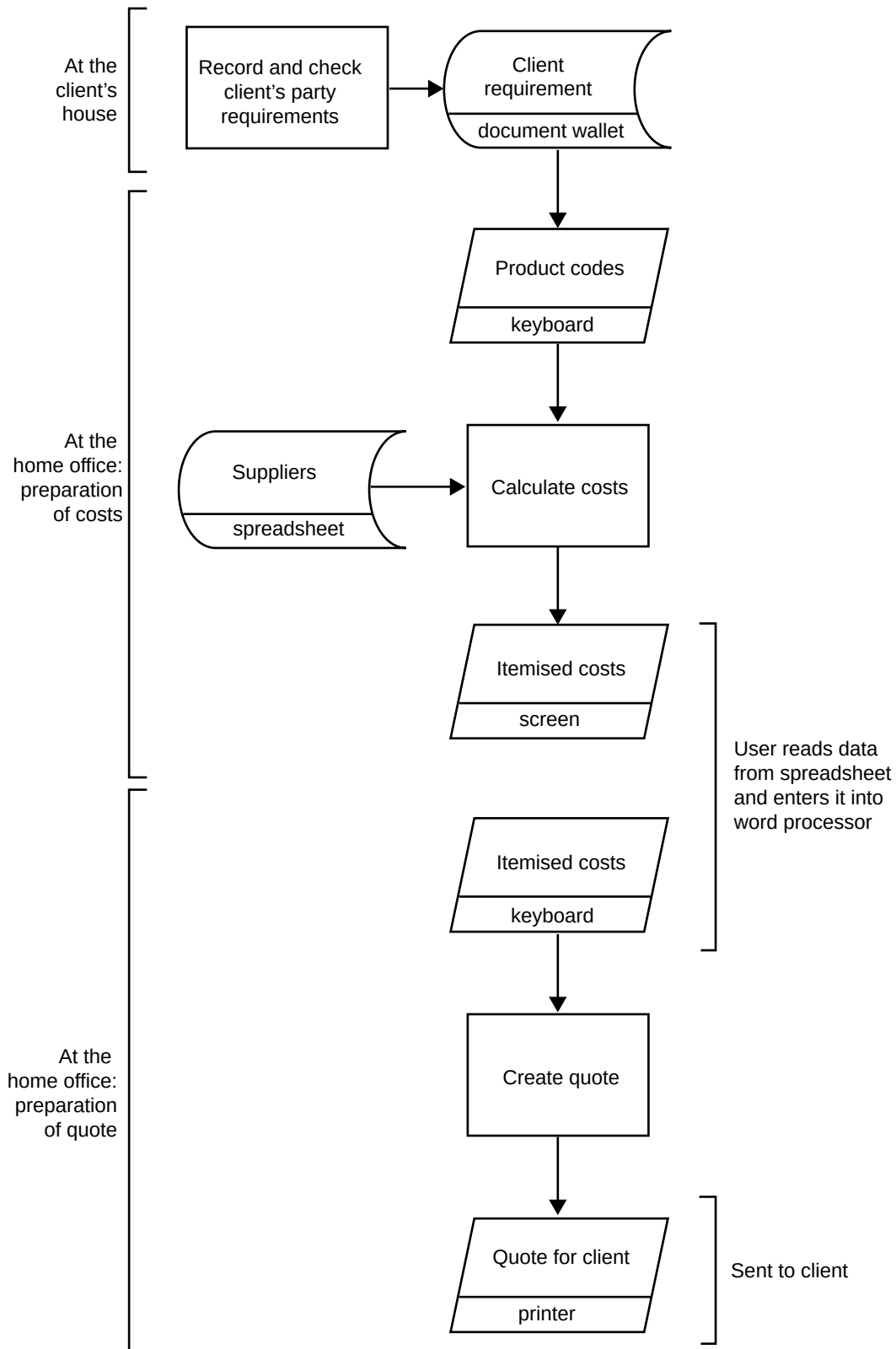
1. Long delays in preparing and sending out an up-to-date suppliers spreadsheet. This has resulted in a loss of income for Pattie's Parties either because the new job is underquoted (out-of-date data), or because the job is lost (the client is not prepared to wait).
2. Occasional double-booking of event coordinators and some specialist equipment, because the three people organising events are not fully aware of all other events.

Proposed system

Lucy, a systems analyst who Pattie hired to look into her business difficulties, has suggested the following.

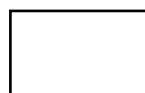
1. Pattie's Parties set up a central database that includes information about suppliers, products, staffing and client bookings. The supplier and product information should be kept up to date by electronic transfer of information between the suppliers and Pattie's Parties.
2. The central database be hosted by an ISP.
3. Pattie and her staff are each issued with a mobile computing device that allows the user to
 - use information obtained from the central database
 - show the client images (stills and video clips) of products and past parties so that the client can make decisions more easily
 - enter all party requirements and a detailed description of the party venue
 - print a quote to give to the client before leaving the client's home
 - upload bookings into the central database
 - perform all other activities related to the business.

Quote preparation in the current system

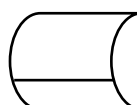


Client: Pattie's Parties
Drawn by: Lucy P
Date: 21 August 2008
Page: 1 of 4

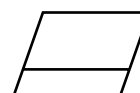
Key to symbols



Any process
(manual or
computer-based)



Any data storage



Any input to or
output from a
computer