**Victorian Certificate of Education
2005**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

Figures

Words

INFORMATION SYSTEMS
Written examination

Friday 11 November 2005

**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	14	14	25
B	17	17	75
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, an approved graphics calculator (memory cleared) and/or 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 B in the centrefold.

Instructions
- Remove the insert containing the case study during reading time.
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

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

SECTION A – Short-answer questions

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Instructions for Section A

Answer all questions in the spaces provided.
```

Question 1

Select the correct term (bits per second, bytes per second, hertz, gigs) to complete the following sentence.

The clock speed of a CPU is measured in _____.

1 mark

Question 2

To protect an organisation from an external hacker, every packet of data sent between the organisation's intranet

and the Internet should pass through a _____.

1 mark

Question 3

The process of converting a message into meaningless text for security is called _____.

1 mark

Question 4

Consider this list of terms.
- system support documentation
- parallel conversion
- cost
- usability
- project management
- testing techniques

For each of the following statements select the correct term from the list above.

  i. This could be tested when evaluating the performance of a system.

  _____

  ii. This is used to monitor tasks and assign resources.

  _____

  iii. This is a method used when implementing a new system.

  _____

1 + 1 + 1 = 3 marks

Question 5

A company located in a large Victorian regional town wants to set up a global online purchasing website. A local Internet service provider (ISP) can host this website for $40 per month. Another ISP, located in India, is offering a similar service for $30 per month.

Outline **three** factors that should be considered before an ISP is selected.

Factor 1 _____

_____

Factor 2 _____

_____

Factor 3 _____

_____

3 marks

Question 6

Once installed, a new system undergoes acceptance testing.

State the main purpose of acceptance testing.

_____

_____

1 mark

Question 7

A travel agency intends sending a one page newsletter every 2 months to its international customers. To save costs, the agency is considering sending the newsletter via email rather than printing and mailing it. Apart from the cost, **describe two** possible factors that will need investigation before this plan is put into practice.

Factor 1 _____

_____

_____

Factor 2 _____

_____

_____

2 marks

Question 8

A company has employed a systems analyst to analyse its current system.

Briefly describe what the company would expect to receive at the end of this analysis.

2 marks

Question 9

Briefly explain what is meant by the term 'bandwidth'.

1 mark

Question 10

A network operating system can provide administrators with the ability to control levels of access to the file server. Outline why an administrator would make use of this capability.

1 mark

Question 11

The team leader of a programming project has created a PERT chart to help manage the project. A section of the chart is shown below.
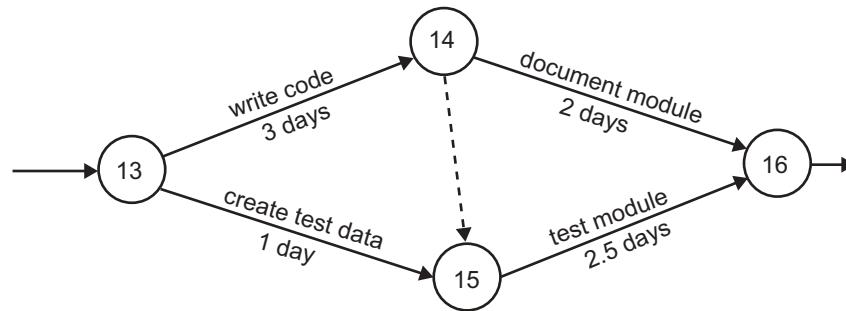
Use this chart to answer the following.

a. Identify **two** tasks that can be performed at the same time.

_____

_____

1 mark

b. List **all** the tasks that lie on the critical path in this section.

_____

_____

1 mark

c. What is the minimum number of days that this section of the project can be completed in?

_____

1 mark

Question 12

To successfully network computers a protocol must be used. What is meant by the term 'protocol'?

_____

_____

_____

1 mark

Question 13

For the algorithm below, state the values of Total and Number that would be printed.

Start

      Number ← 2

      Total ← Number

      While Number ≤ Total

            Total ← Total + Number

            Number ← Number * Number

      End While

      Print Total, Number

End

Total _____

Number _____

<div align="right">2 marks</div>

Question 14

Read the following extract.

> **Are banks safe?**
>
> Bank robbers using guns and masks are now a thing of the past. They are far more likely to use a computer to steal money. Using a computer to access bank systems means they leave no fingerprints or physical proof of the robbery. The first warning could be when a careful customer discovers there is less money in a bank account than was expected.

Outline a strategy that banks should use to reduce the possibility of electronic theft.

_____

_____

_____

_____

_____

_____

_____

_____

<div align="right">3 marks</div>

<div align="right">Total 25 marks</div>

<div align="right">**END OF SECTION A**</div>

SECTION B – Case study

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                    Instructions for Section B

    Answer all questions in the spaces provided.
    Remove the case study insert and read all the information provided before you answer these questions.
    All answers must refer to the case study.
```

Question 1

Some of the concerns that the hotel management have about the existing system are listed below.

Identify each concern as an economic, social or technical factor prompting change.

Concern	Factor
People do not like to line up and wait to book in.	
The hotel often has desk staff waiting with little to do until a rush comes.	
The current system has been known to cause double bookings and reject bookings when space is available.	
Many hours need to be spent each day processing bookings and admissions.	

4 marks

Question 2

Manuel, the systems analyst, has been interviewing staff about the existing Reservation and Billing System. To get a complete understanding of the current system he has started creating a context diagram, a data flow diagram, and a data dictionary, although none are complete. They are shown in the case study insert.

a. Identify the process that produces the data flow 'Guest'.

_____

1 mark

b. Identify the data flow that contains the data element 'Room_type'.

_____

1 mark

c. Identify the data store from which the process 'Register Guest' obtains the room number.

_____

1 mark

d. Two data flows appear in the data flow diagram that should also be shown in the context diagram. Identify **one** of these data flows and state to which entity it should be connected.

Data flow _____

Entity _____

2 marks

Question 3

The automated reservation section is being designed for the proposed new system. This will allow guests to access the hotel's website and make a reservation from anywhere in the world. Guests will then get immediate confirmation of their reservation.

The existing file server will host all applications including the website which means it will have to be upgraded. The system designer, Basil, has chosen to keep the current 32-bit operating system and is now considering which of the following hardware components should be upgraded.

A.   main memory from 512 MB to 1024 MB

B.   processor from 32-bit to 64-bit

C.   video card from standard to 3-D

Which choice (**A.**, **B.** or **C.**) will have the **most** impact on the server's overall performance? Justify your answer by comparing the three choices.

Choice _____

Justification _____

_____

_____

_____

_____

_____

_____

_____

4 marks

Question 4

People will access the hotel's new online reservation system using the Internet. Therefore Basil has decided that the system should have the best available firewall. Because this firewall will be very expensive, he has chosen to save money by not purchasing anti-virus software.

Explain why this is **not** a good decision.

_____

_____

_____

_____

_____

2 marks

SECTION B – continued

Question 5

The proposed new system (see floor plan in case study insert) will also have registration booths located in the hotel's foyer. Manuel has suggested that two registration booths will be needed. Guests will be able to use these booths by themselves to

- register their arrival at the hotel
- select a room
- collect an electronic room key
- pay for the room with a credit card.

Each registration booth will have its own computer that will need to be connected to the hotel's file server.

Which method of communication – **cable** or **wireless** networking – would you recommend? Justify your choice by comparing **two technical characteristics** of each method.

Method of communication _____

Technical characteristic 1 _____

Comparison _____

_____

_____

_____

_____

_____

_____

Technical characteristic 2 _____

Comparison _____

_____

_____

_____

_____

_____

_____

4 marks

Question 6

Manuel has employed a programmer, Polly, to write the registration program. The program will require the guests to follow these steps.

- Select the language to use, for example: English, Chinese, German.
- Indicate whether they have already made a booking.
- Enter their name. If they already have a booking, it will be retrieved from the database.
- Select the type of room they wish to use from the choice of 1, 2 or 3.
- Indicate how many nights they wish to stay in the hotel.
- Pay the amount calculated by inserting a credit card after which they will receive a printed receipt, a room number and an electronic key with a map of where the room is situated.

The program will then close.

Manuel has asked Polly to provide some samples of the user interfaces for the registration program.

She has been asked to allow for a number of different types of input devices.

a.   Here is the opening screen of a program that could be used with a **touch screen**.

Welcome to Hotel Torquay

Choose a language:

| English | Chinese | German |

Manuel is satisfied with the look of the screen, but it has a major design fault.

   i.   Identify the major fault.

_____

_____

   ii. Suggest how this fault could be corrected.

_____

_____

_____

_____

<div align="right">1 + 1 = 2 marks</div>

b. Assuming the user has selected English as the preferred language, the following is a sample of the next screen that could be used with a **keyboard**.

Please enter your name

Press enter to continue

Manuel is also satisfied with the look of this screen, but it too has a major design fault.

i. Identify this fault.

_____

_____

ii. Suggest how this fault could be corrected.

_____

_____

_____

_____

_____

1 + 1 = 2 marks

c. On a third screen the user is asked to enter a room type. Only an entry of 1, 2 or 3 is acceptable. If any other data is entered, this error message appears.

    i. Identify the major fault with this error message screen.

_____

_____

    ii. Suggest how this fault could be corrected.

_____

_____

_____

_____

<div align="right">1 + 1 = 2 marks</div>

Question 7

The Hotel Manager, Sybil, suggests that some type of user guide is required to assist guests when using the registration booths. Manuel has the following two choices.

• a small poster on the wall next to the booths
• a help option with online instructions as a part of the registration program

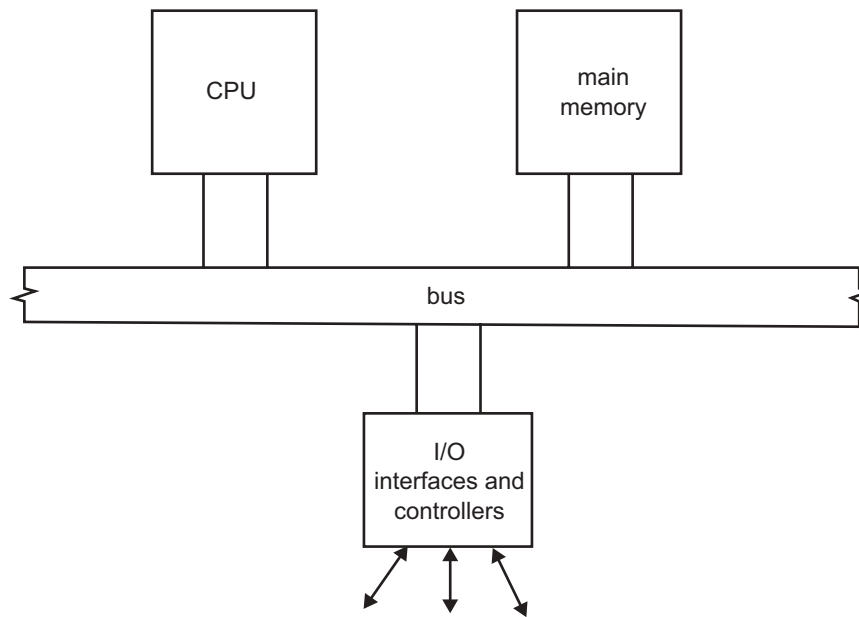**a.** Describe **one** advantage of using the poster on the wall.

_____

_____

<div align="right">1 mark</div>

b. Describe **one** advantage of providing the online help option.

_____

_____

<div align="right">1 mark</div>

Question 8

The diagram below shows the basic architecture of the computer system to be used in the registration booths.

a.   State the main purpose of the bus in this system.

_____

_____

_____

1 mark

b.   State one of the main functions of the CPU in this system.

_____

_____

_____

1 mark

Question 9

The form of storage in the registration booths is to be decided. Basil is considering storing the small registration program on a ROM-based system, eliminating the need for a hard drive. All the guest data input and selections can be communicated directly to the hotel's main database.

Describe **two** advantages of ROM compared with a hard drive for the storage of this program.

Advantage 1 _____

_____

_____

Advantage 2 _____

_____

_____

4 marks

Question 10

Three input devices are being considered for the registration booth: **keyboard**, **mouse** or **touch screen**.
Which input device would you recommend for the registration booth?

_____

Apart from cost, give **three** reasons to support your choice.

Reason 1 _____

_____

_____

Reason 2 _____

_____

_____

Reason 3 _____

_____

_____

3 marks

Question 11

Manuel has drawn up a list of criteria to evaluate the new registration software. From the list below select one term to match the criteria given in the table. Terms listed can be used more than once.

- effectiveness
- efficiency
- reliability
- usability
- maintainability

Criteria descriptions	Term
The hotel staff must be able to add extra room categories and change pricing.	
The system must not cause a wait of more than 3 seconds to answer any request from the booths.	
Each booth must not be unusable for more than 3 hours per month.	
95% of all guests must be able to use the booth without help.	
The speed of a guest booking into the hotel must be reduced by 30% on average.	

5 marks

Question 12
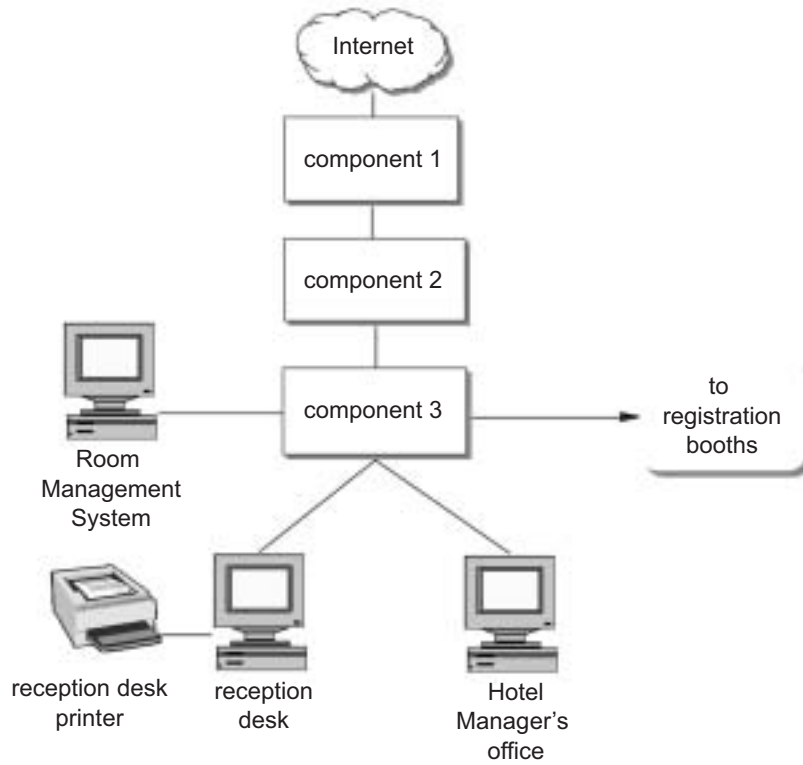
The network diagram above shows a layout of the proposed new system. Three components in the diagram are not identified. From the list below select the most suitable component for each and describe its function.

- LAN
- modem
- network card
- router
- server
- switch
- WAN
- workstation

Component 1 _____

Function _____

_____

_____

Component 2 _____

Function _____

_____

_____

Component 3 _____

Function _____

_____

_____

6 marks

SECTION B – continued

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Question 13

New software for the proposed new system is being developed. One module will calculate the cost of a room. It will follow these rules.

- The basic charge is based on the room type and is stored in a table listing the costs for each type of room for a single night.
- The price is for two people. Each extra person in the room is charged an additional 10%.
- If it is off-peak season a 10% discount is given.

The following algorithm has been developed to calculate the cost of a stay, and print out the total cost.

Start

    Get Arrival_Date

    Get Departure_Date

    Get Room_Type

    Get Season

    Total_Cost ← 0

    Cust_Date ← Arrival_Date

    Repeat

        Get No_In_Room

        People_Charge ← 0

        If No_In_Room>2 **Then**

            People_Charge ← Room_Cost[Room_Type] * (No_In_Room – 2) *10%

        End If

        Total_Cost ← Total_Cost + Room_Cost[Room_Type] + People_Charge

        Cust_Date ← Cust_Date + 1 {This increases the date by 1}

    Until Cust_Date > Departure_Date

    If Season="Off Peak"   **Then**

      Total_Cost ← Total_Cost *90%

      Print Total_Cost

    End If

End

To test this algorithm you are to use the following data for room costs.

Room type	Cost per night
1 standard	100
2 deluxe	200
3 luxury suite	400

a. Test the algorithm and complete the following test table by determining what will appear in the 'Expected printout' and 'What is printed' columns.

Test	Room type	Arrival date	Departure date	Number of people	Season	Expected printout	What is printed
1	1	21/01/2005	22/01/2005	4	Normal		
2	2	14/01/2005	16/01/2005	2	Off Peak		

4 marks

b. One line in the algorithm contains a logic error.

   i. Identify that line by writing it out in full.

_____

   ii. Explain how this error can be corrected.

_____

_____

_____

_____

1 + 1 = 2 marks

c.   **i.** Identify and explain a second logic error in the algorithm.

_____

_____

_____

   ii. Explain how this error can be corrected.

_____

_____

_____

1 + 1 = 2 marks

d. From the algorithm, complete the following table.

Variable name	Type of variable
Total_Cost	
Arrival_Date	
Room_Cost	
Season	

4 marks

Question 14

Hotel Torquay wants to prevent other hotels from using their new system. Polly has agreed to sell all rights of the software to the hotel. She is not concerned about losing her rights to the software. She thinks that as the programmer she can just change a couple of lines of code and it will become a new program that she can sell again. Hotel Torquay has advice that this is wrong.

Discuss this conflict of opinion.

_____

_____

_____

_____

_____

_____

_____

_____

3 marks

Question 15

Manuel is thinking of automating the proposed new system further by contracting the backup procedure out to an Internet-based backup and archiving company. The hotel would send a copy of all its data files over the Internet to this company for backup storage. Manuel has been given the names of two highly professional companies that offer this service.

Apart from the cost of this service, discuss **two** important factors that Manuel should investigate before signing a contract with either company.

Factor 1 _____

_____

_____

Factor 2 _____

_____

_____

4 marks

Question 16

When guests have problems with the new system they will report these to the hotel front desk. Identify, from the following list, the person who is responsible for **correcting** each of the problems given below. Give a reason for your answer.

- programmer (Polly)
- systems analyst (Manuel)
- technicians
- system designer (Basil)
- hotel manager (Sybil)

  i. Customers' accounts contain the correct room details and costs, but have incorrect totals.

  Employee _____

  Reason _____

  _____

  _____

  _____

  ii. After two months the registration booths stopped issuing room keys to guests.

  Employee _____

  Reason _____

  _____

  _____

  _____

  iii. Whenever both registration booths are used at the same time the file server crashes.

  Employee _____

  Reason _____

  _____

  _____

  _____

6 marks

Question 17

At the end of the registration procedure the registration booths supply each guest with an electronic card that will act as a room key. Every time a room is booked the room card is issued with a different code as a security measure. The room will only unlock from the outside if the room card has the current code. If the hotel system fails, guests will not be able to enter their rooms. As a result the hotel has insisted on a system down time (time system is not working) of less than 60 seconds.

Describe a strategy that could be used to evaluate whether the system meets the down time requirement of 60 seconds.

_____

_____

_____

_____

_____

_____

_____

3 marks

Total 75 marks

END OF QUESTION AND ANSWER BOOK

┌───┐
│   **CASE STUDY INSERT**   │
│   Please remove from the centre of this book during reading time.│
└───┘

Existing system

The Hotel Torquay is a busy international hotel. It has three types of room available for its guests.

Type 1: standard

Type 2: deluxe

Type 3: luxury suite

The hotel uses two separate information systems to manage its business.

Reservation and Billing System

This system takes requests from people wishing to stay at the Torquay, reserves a room for them, and then produces their account for payment. The Torquay's guests can make room reservations at the hotel's reception, over the phone or from anywhere in the world by email. Reception and phone requests are dealt with manually, at the time the request is made, by hotel staff using the computer system. Email requests are dealt with in two stages.

- When the system's email server receives an email it automatically sends a reply to acknowledge receipt of the email.

- The email is placed into an 'email reservations' mailbox; the mailbox is checked by hotel staff once a day and they make the appropriate reservations and send confirmation emails.

Room Management System

The functions of the Room Management System include managing guests' use of the minibar (a small fridge stocked with food and drink for use by guests at a cost) and the creation of room keys for guests. Room keys are plastic cards with the room number magnetically encoded on them. Guests enter their room by swiping the card through a card reader which is located beside the door of the room. The card reader is manually programmed to recognise its own room number and is not attached to any other computer. Data from the Room Management System is manually transferred to the Reservation and Billing System when required.

Problems with the existing system

Recently there have been an increasing number of problems developing at the front desk. At busy times, such as immediately after the arrival of an international flight, there have been long queues keeping newly arrived guests waiting to register. Many guests have complained about staff making errors in allocating room keys. Rooms have been double booked; and reservations have been lost from the email reservations mailbox.

Proposed new system

Management have investigated the problems and believe that it is not economical to increase the number of staff on duty for these short times. They have decided to investigate setting up a fully automated Reservation, Registration and Roomkey System (RRRS).

This new system will provide the following services.

• Guests can make their own reservations via the Internet.

• Guests can make phone reservations.

• Guests can register and pay at the front desk.

• Guests can register and pay using the new registration booths.

• Electronic room keys are personalised to increase security for guests.
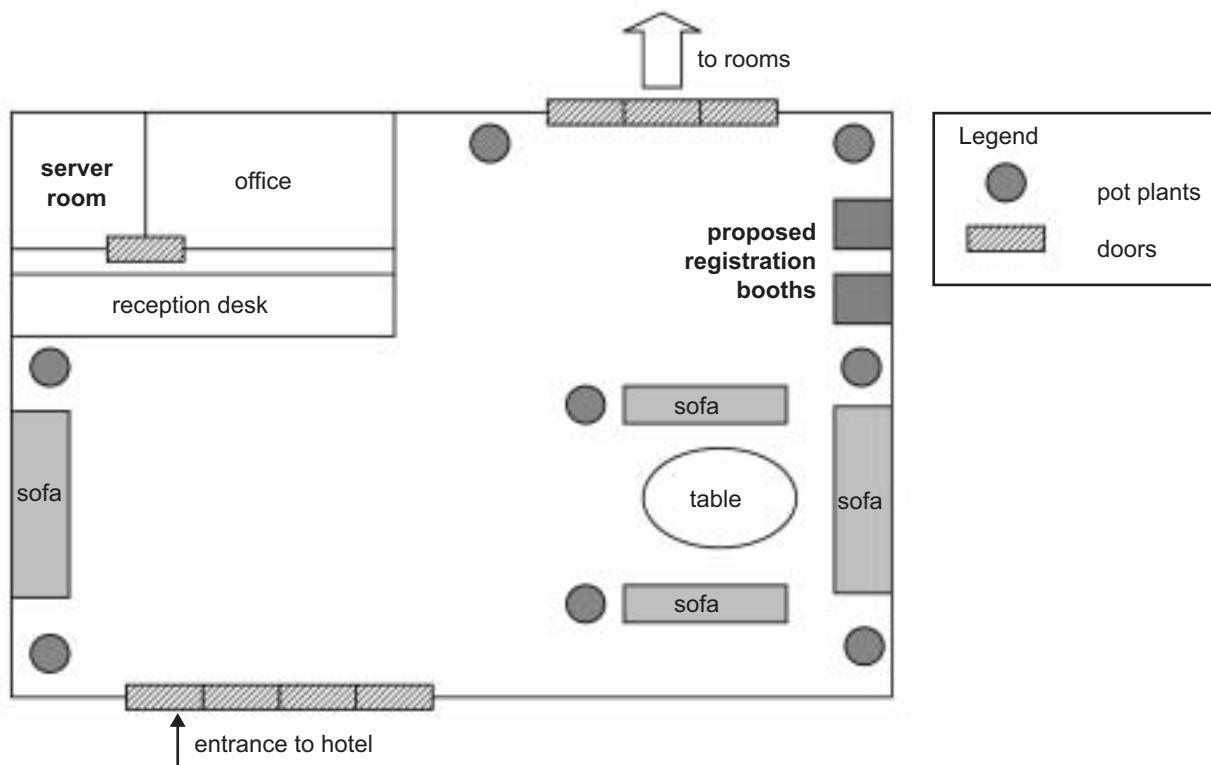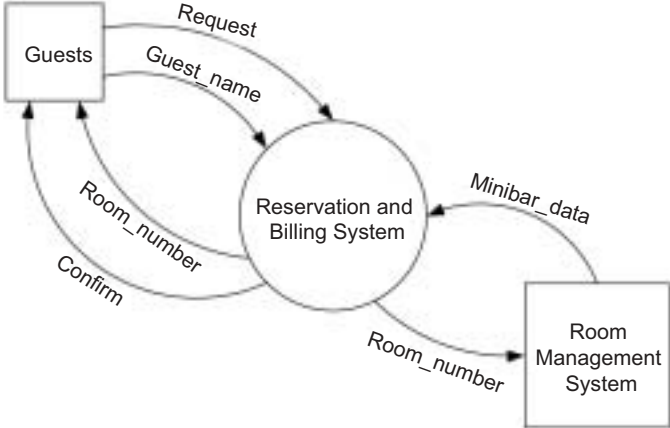
A diagram showing the RRRS has been drawn below.
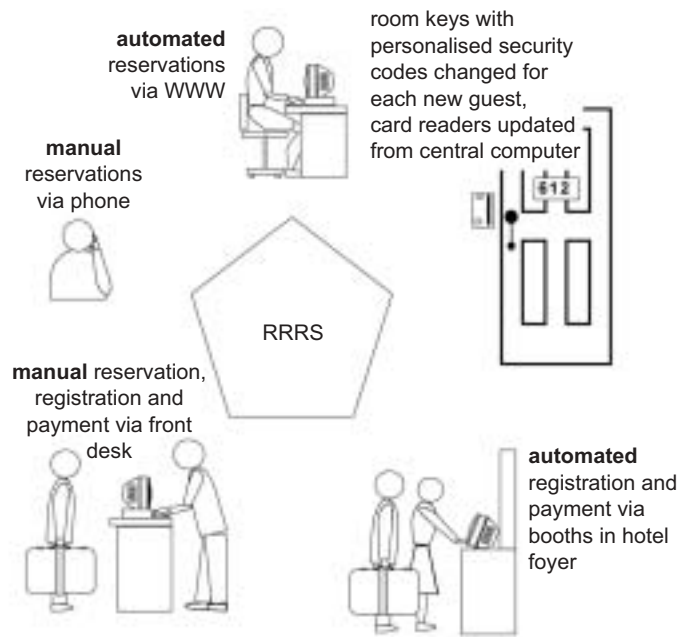
Diagram of the layout of the foyer of the hotel showing the new registration booths in the proposed new system

Additional information for Question 2
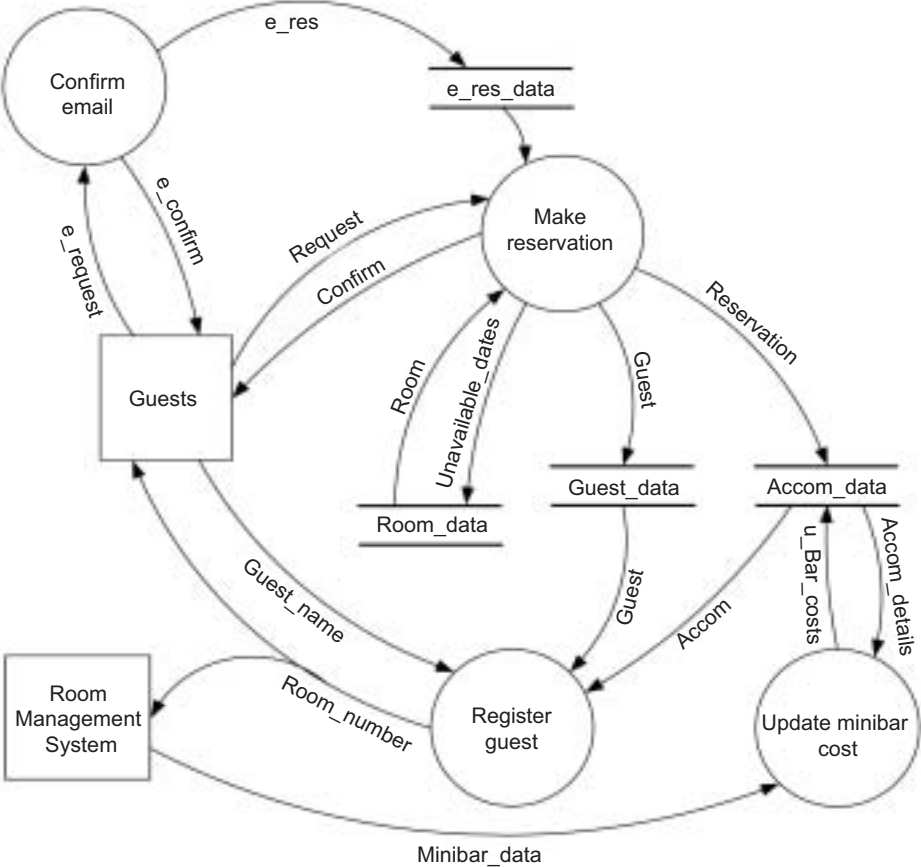
context diagram

data flow diagram

Data dictionary

Data flow	Definition
Accom	Guest_id + Room_number + Arrival_date + Departure_date + Request_date + Services_used + Bar_costs
Confirm	Reservation_request + Yes_No + (Cost)
Guest	Guest_id + Guest_name + Guest_contact_details
Minibar_data	Room_number + Bar_costs
Request	Guest_name + Guest_contact_details + Arrival_date + Number_of_nights
Reservation	Guest_id + Room_number + Arrival_date + Departure_date + Request_date
Room	Room_number + Room_name + Room_type + Number_of_beds + Unavailable_dates

END OF CASE STUDY INSERT