Information Systems
2001
Instructions

Answer **all** questions. in the spaces provided. If you need- to change, or add to, an answer there is extra space available at the back of this book.

Read the information provided in the detachable case study insert. You will need to refer to this information throughout the paper. The case study describes an existing system and a proposal for some changes to this system.

Question 1

So that Deon, the systems analyst, can design the new system he must perform a system analysis of the current system. This involves finding out everything about the current system that is relevant to the development of the new system, including:

- the technical specifications of the hardware
- the functions of the software
- the data flow through the system.

a. Identify two relevant technical specifications of the existing fileserver hardware and explain why Deon needs to know these.

Hardware specification 1	Why Deon needs to know this
Hardware specification 2	Why Deon needs to know this

b. Identify two relevant functions of the existing fileserver software and explain why Deon needs to know these.

Software function 1	Why Deon needs to know this
Software function 2	Why Deon needs to know this

(1 + 2) + (1 + 2) 6 marks

c. Discuss two different methods Deon could use to acquire any of the data you have identified in part a. and/or part b.

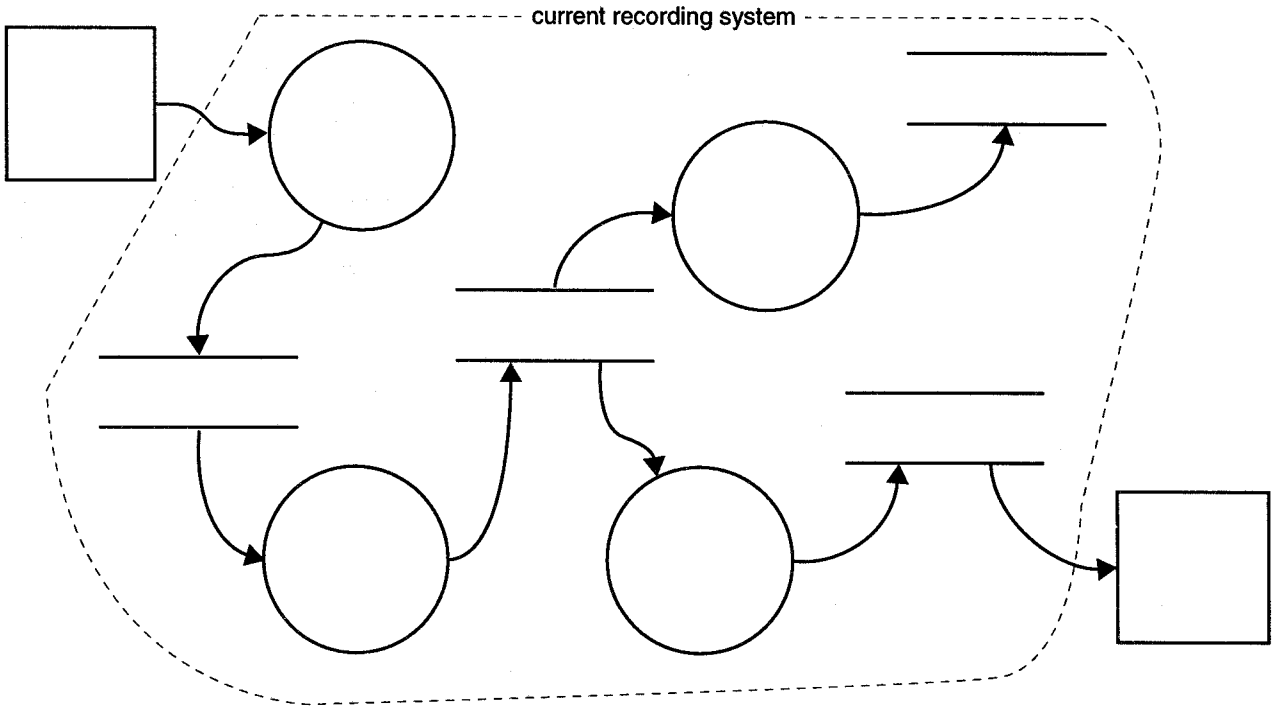
Method 1

Method 2

4 marks

Question 2

Deon chooses to document the flow of data through the current system by using a data flow diagram. Complete Deon's diagram by labelling the processes, data stores, and sources and destinations of the data.



10 marks

Question 3

While collecting data about the current system, Deon discovered that Toadstool Music have about 100 000 minutes of music stored in their tape archive. Toadstool Music said they would like all of this music to be available online. Deon has decided that they will need a separate web server in order to do this.

Refer to the sound file format table on the detachable insert for some of the sound file formats available for the storage of music data.

a. Select the sound file format that you think Deon should recommend for storing the archived music data on the web server. Give three reasons for your choice.

Sound file format

Reason 1

Reason 2

Reason 3

1 + 2 + 2 + 2 = 7 marks

b. If the sound file format you have chosen is used, approximately how many megabytes of storage space will be required on the web server?
Megabytes_____
1 mark

Three different storage media are available for the server.

- a single 36 Gb hard disk drive
- a 300 Gb hard disk array
- a 120 Gb tape drive Which storage medium should Deon choose for the web server? Explain why this choice is better than the other two options.

Storage medium

Explanation

1 + 2 = 3 marks

Question 4
The web server will be connected to the existing network and Deon must choose the most appropriate network protocol for the new system.

a. Tick the box beside the most appropriate protocol for the new system.
i. IPX/SPX ☐
ii. TCP/IP ☐
iii. MUSIC/CD ☐
iv. NETBEUI ☐
v. HTTP ☐
1 mark

b. Explain why this is the most appropriate protocol.

2 marks

Question 5

a. and James, a programmer hired by Deon, was asked to write an algorithm to download the music files calculate the price payable by the customer.

The algorithm had to follow these rules.

- Customers may download up to fifteen tracks in one session at a price of $1 per track.
- To protect their artists, if a customer downloads four tracks or more from any one artist/group, the total download price will be $20.

James has written the prototype algorithm and user interface design as shown in the detachable insert. The prototype was developed using only five artists. When the system is fully developed it will cater for the complete number of artists handled by the firm.

Unfortunately, the algorithm contains errors.

James provided two sets of data to test the algorithm.

i. Indicate the reasons why data set 1 and data set 2 were selected and state the message that will be displayed on the screen.

Test Data Set 1 Select: 4 songs of Cherie 3 songs of Seagulls 3 songs of Ah No! 3 songs of Dried Up
Reason for selection of this data set
Expected Screen Output

Test Data Set 2 Select: 3 songs of Cherie 3 songs of Seagulls 3 songs of Ah No! 3 songs of Dried Up 3 songs of Frenzied
Reason for selection of this data set
Expected Screen Output

ii. Select a third set of test data from the songs shown in the prototype user interface. This set should test another part of the algorithm.

Test Data Set 3
Reason for selection of this data
Expected Screen Output

(2+ l)+(2+ l)+(2+2+ 1)= 11 marks

CASE STUDY INSERT

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

Case Study

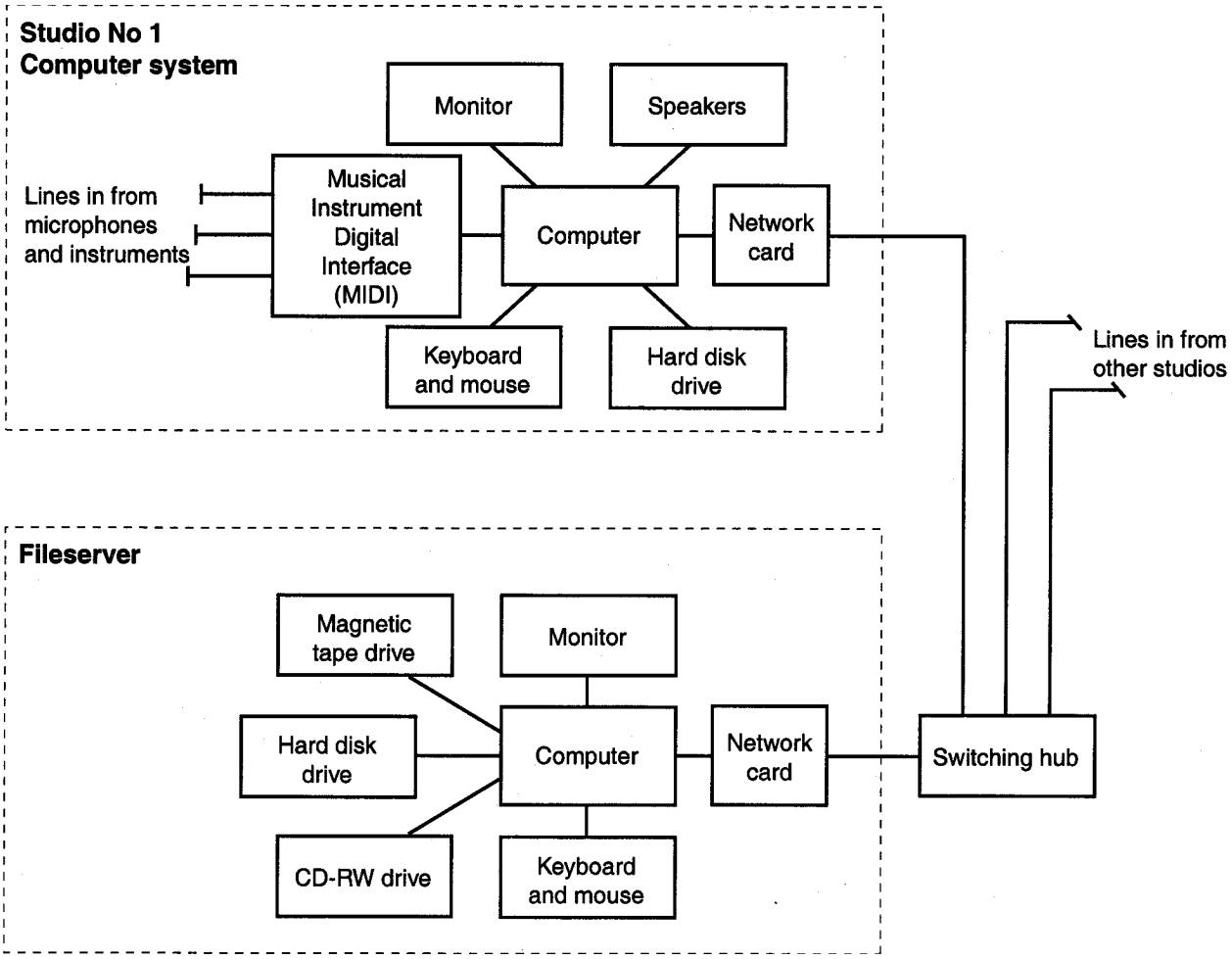
Existing system

Toadstool Music is a small music recording business that has been operating for about 15 years. It specialises in recording local bands and artists and sells its product direct to the public in a small shop. Two sales staff are employed in the shop EFTPOS sales.

A swipe card reader attached to the cash register is used to complete credit card and

There are three recording studios. Each recording studio has its own computer system. When a band wants to make a new CD it comes into a studio and plays its music. The sound is digitised directly and saved in Audio Interchange File Format (AIFF) on the studio computer's hard disk. AIFF is a standard industry sound file format. Each song is then 'mixed' and moved as an AIFF file to the fileserver where it is stored. After all the band's song files have been stored on the fileserver, they are converted to CD format and recorded onto a master CD. This CD is then sent to a factory where CDs are mass-produced for sale. Once the master CD has been produced, the AIFF files are transferred from the fileserver to digital tape. The tape is stored in a music archive. The original AIFF files are deleted from the fileserver to conserve storage space.

The following block diagram shows the hardware components of the existing system. The three studio computer systems are identical.



Proposed system
Toadstool Music would like its music to reach a bigger audience and has decided to change the way it sells its product. Toadstool Music will no longer mass-produce CDs. Instead it will

- sell individual songs over the Internet. Customers will register online and receive a Personal Identification Number (PIN). They then will select songs from an online catalogue and download them to their home computer for a fee. This fee will require payment via a credit card. Customers will be required to provide credit card details when they register. These details will be kept in a customer file for future reference.
- sell customised CDs in the shop. Customers will select the songs they want from a catalogue. The sales staff will then use a computer to select the requested songs from files stored on the hard drive and bum them onto a CD.

Toadstool Music would like all their titles to be available for both these ways of selling its CDs.

This proposal will require modification of the existing system, but will not affect the studio computer systems. Toadstool Music hired Deon, a systems analyst, to design the new information system.

Extra material for Question 3
Sound file format table

The following table shows some of the sound file formats that are available for Deon to use to store the music data for downloading.

Sound file format	Mb per minute of music	Comments
CD-DA (Compact disc - Digital Audio)	10 Mb	Format used for storing music data on CD.
MP3 (MPEG, layer 3)	1 Mb	Compressed format, loses data. When replayed sounds like CD quality music.
RA (Real Audio)	0. 14 Mb	Compressed format, loses data. When replayed sounds like FM radio quality music.
WAV (Wave)	10 Mb	Standard format on MS Windows computers.
AIFF (Audio Interchange File Format)	10 Mb	Standard industry format; originally developed by Apple for Macintosh computer now used in a variety of systems.
AAC (Advanced Audio Compression)	0.7 Mb	New compressed format that loses data – not widely used. Better compression than MT3 but at the same quality.

Extra material for Question 5 a., b., c.
Prototype algorithm and user interface design
The algorithm to download the music files and calculate the price payable by the customer is shown on the following page. The algorithm follows these rules:

- Customers may download up to fifteen tracks in one session at a price of $1 per track.
- To protect their artists, if a customer downloads four tracks or more from any one artist/group, the total download price will be $20.

The prototype algorithm and user interface design use only five artists. When the system is fully developed it will cater for the complete number of artists handled by the firm. Unfortunately, the algorithm contains errors.

Prototype USER Interface

Toadstool Music

Select up to fifteen tracks to download at any one time.
Download price is $1 per track ie. total price is $15.
If you choose four or more tracks from any one artist the total price is $20.

Cherie	Seagulls	Dried Up	Ah No!	Frenzied
❑ 1 Walkin'	❑ 6 Lionise	❑ 11 Sydney	❑ 16 Rocky	❑ 21 New Keys
❑ 2 Sole Song	❑ 7 Sweetie	❑ 12 Wishing	❑ 17 Fine	❑ 22 Drapes
❑ 3 Romance	❑ 8 Desperate	❑ 13 King Kong	❑ 18 Little One	❑ 23 My Song
❑ 4 I want	❑ 9 For Love	❑ 14 The River	❑ 19 Listen	❑ 24 Mates
❑ 5 Time Lord	❑ 10 Akin Heart	❑ 15 Darlin'	❑ 20 You know?	❑ 25 Baby Duck

```
Prototype algorithm
On Submit                          'when customer clicks Submit button to lock in choices
Begin
    Open Tempfile for output               'open file to temporarily store selected track names
    CheckSelections
    CopyFiles
    CalculatePrice
End


Procedure CheckSelections
Begin
    First ← 0 'first index in set of five tracks from each artist
    Last ← 4 'last index in set of five tracks from each artist
    CountSongs ← 0 'counts number of tracks chosen from set
    TotalSongs ← 0 'counts total number of tracks selected
    Do while Last < 25
    For Track ← First to Last
        If CheckSong(Track) is true then 'read this checkbox on user interface to see if checked
            CountSongs ← CountSongs + 1
            TotalSongs ← TotalSongs + 1
            Write SongFileNumber to Tempfile
        End if
        If CountSongs > 4 then
            SongPrice <- 20
        End if
    Next Track
    CountSongs ← 0
    First ← First + 5 'check next artist
    Last ← Last + 5
End do
End

Procedure CopyFiles 'copy files from Temp file to customer home computer
Begin
    If TotalSongs > 15 then 'check download limit not exceeded
        Display error message '76o many songs"
        Close Tempfile
        Delete Tempfile
    Else
        Do until EOF
            Read SongFileNumber
            Copy SongFile to customerfile
        End do
        Close Tempfile
    End if
End

Procedure CalculatePrice
Begin
    If SongPrice = 20 then 'calculate price for download
        TotalPrice ← 20
    End if
    Display TotalPrice
End
```

b. Find two errors in the algorithm. Explain how to correct them.

First error

Correction

Second error

Correction

4 marks

c. Explain why the Song File Numbers were written to a Temp file rather than each song being downloaded immediately after selection.

2 marks

Question 6

a. Three system changeover methods are shown below. Describe one advantage and one disadvantage of each method.

Changeover method	advantage	disadvantage
direct		
phased		
parallel		

6 marks

Deon wants to install the new system using a direct changeover method in one weekend. The manager prefers a phased changeover that is achieved over a period of two months. Rebecca, a sound engineer, has suggested parallel running the old and new systems for one month then a changeover to the new system.

b. Which method would you recommend as the best option for Toadstool Music? Give two reasons for your choice.

Preferred method
Reason 1
Reason 2

3 marks

Question 7

Freya logs on to the Toadstool Music web site for the first time. She notices that before she can download music she must register her name and provide her credit card details and email address. Discuss two concerns that Freya may have as a result of these actions.

Concern 1
Concern 2

4 marks

Question 8

After a month of operation the web technical staff want to test the following aspects of the system.

- system performance
- the disaster recovery plan

They have proposed taking the system off line during a weekend. They intend to overload the system to deliberately crash it and then attempt a data recovery. The manager is very nervous about this proposal and has described it as unnecessary because 'Everything is working just fine ... do not try to fix something that is not broken'. a. Identify one aspect of system performance that this proposal will test.

b. Explain two important aspects of the disaster recovery plan that will be tested.

Aspect 1

1 mark

Aspect 2

4 marks

c. Do you agree with the manager's comments? Justify your answer.

3 marks

Question 9

After a year of operation, the firm wants to evaluate the success of the new system. They are undecided about how to approach this so they have asked Deon for some advice. He has recommended involving management, sales staff, web technical staff and customers in the evaluation process.

a. i. Describe the data each type of person could provide.

ii. Describe how this data could be collected.

	Data provided	How data collected
Sales staff:		

Customers		
Web technical staff		
Management		

b. Select two people from the list used in part **a.** - sales staff, customers, web technical staff, management.

Discuss why the data that they provide will be useful in evaluating the success of the new system.

Selection 1

Why data useful

Selection 2

Why data useful

4 marks