**EXERCISES**

Chapter 6 • Exercises **141 \_.\_---**

6.1 Identify and briefly describe four types of requirements that may be defined for a computer·

based system

6.2 Discuss the problems of using natural language for defining user and system requirements,

and show, using small examples, how structuring natural language into forms can help avoid

some of these difficulties.

6.3 Discover ambiguities or omissions in the following statement of requirements for part of a

Ticket issuing system.

An automated ticket issuing system sells rail tickets. Users select their destination and input

a credit card and a personal identification number. The rail ticket is issued and their credit

card account charged. When the user presses. the start button, a menu display of potential

destinations is activated, along with a message to the user to select a destination. Once a

destination has been selected, users are requested to input their credit card. Its validity is

checked and the user is then requested to input a personal identifier. When the credit

transaction has been validated, the ticket is issued.

6.4 Rewrite the above description using the structured approach described in this chapter.

Resolve the identified ambiguities in some appropriate way.

6.5 Draw a sequence diagram showing the actions performed in the ticket issuing system. You

may make any reasonable assumptions about the system. Pay particular attention to

specifying user errors.

6.6 Using the technique suggested here, where natural language is presented in a standard way,

write plausible user requirements for the following functions:

• The cash-dispensing function in a bank ATM

• The spelling check and correcting function in a word processor

• An unattended petrol (gas) pump system that includes a credit card reader. The customer

swipes the card through the reader and then specifies the amount of fuel required. The

fuel is delivered and the customer s account debited.

6.7 Describe four types of non-functional requirements that may be placed on a system. Give

examples of each of these types of requirement.

6.8 Write a set of non-functional requirements for the ticket issuing system, setting out its

expected reliability and its response time.

6.9 Suggest how an engineer responsible for drawing up a system requirements specification

might keep track of the relationships between functional and non-functional requirements.

6.10 You have taken a job with a software user who has contracted your previous employer to

develop a system for them. You discover that your company's interpretation of the

requirements is different from the interpretation taken by your previous employer. Discuss

what you should do in such a situation. You know that the costs to your current employer

will increase if the ambiguities are not resolved. You have also a responsibility of

confidentiality to your previous employer.

**EXERCISES**

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8.1 Draw a context model for a patient information system in a hospital. You may make any

reasonable assumptions about the other hospital systems that are available, but your model

must include a patient admissions system and an image storage system for X-rays, as well as

other diagnostic records.

8.2 Based on your experience with a bank ATM, draw a data-flow diagram modeling the data

processing involved when a customer withdraws cash from the machine.

8.3 Model the data processing that might take place in an e-mail system. You should model the

mail-sending and mail-receiving processing separately.

8.4 Draw state machine models of the control software for:

An automatic washing machine that has different programs for different types of clothes

The software for a DVD player

.A telephone answering system that records incoming messages and displays the number

of accepted messages on an LED. The system should allow the telephone customer to dial

in from any 10cCition, type a sequence of numbers (identified as tones) and play the

recorded messages.

8.5 A software system model may be represented as a directed graph where nodes are the

entities in the model and arcs are the relationships between these entities. Entities and

relationships in the model may be labeled with a name and other information. Each entity in

the model is typed and may be 'exploded' into a sub-model. Draw a data model that

describes the structure of a software system model.

8.6 Model the object classes that might be used in an e-mail system. If you have tried Exercise

8.3, describe the similarities and differences between the data processing model and the

object model.

8.7 Using the information about the system data shown in Figure 8.8, draw a sequence diagram

that shows a possible sequence of actions that occur when a new article is catalogued by the

LIBSYS system.

8.8 Develop an object model, including a class hierarchy diagram and an aggregation diagram

showing the principal components of a personal computer system and its system software.

8.9 Develop a sequence diagram showing the interactions involved when a student registers for a

course in a university. Courses may have limited enrolment. so the registration process must

include checks that places are available. Assume that the student accesses an electronic

course catalogue to find out about available courses.

8.10 Under what circumstances would you recommend against using structured methods for

system development?