

SUMMARY OF MODULE 6

1. Procedures are used to transform input data into processed results.
2. Procedure can be described in natural English. Such a description is often ambiguous due to impreciseness of natural English.
3. Structured English attempts to describe verbal statements made in natural English more precisely.
4. Precision is obtained by using ideas of logic and block structuring as in programming languages.
5. Decision tables are more appropriate when a large number of conditions are to be checked in arriving at a set of actions.
6. In structured English a number of key words are used for representing commonly used operations. Some important keywords are; **search, retrieve, if, then, else, do, case, while, for.**
7. The important control structures used to describe a process are: Selection structure (using **if then else** or **case**), loop structure (using **for, while** and **repeat until**).
8. Decision tables specify actions to be performed for each combination of results obtained by testing a set of conditions relevant in a problem.
9. Decision tables are used for communicating and documenting complex decision procedures.
10. In order to obtain a decision table from a word statement, we first isolate in each sentence a part which specifies the conditions and another part which specifies the actions to be performed, based on the result of testing the conditions. Conditions are then grouped in one or more table and the rules are formulated.
11. It is not advisable to have more than four or five conditions per decision table. If there are many conditions they are grouped and a set of tables are formulated and linked.
12. Limited Entry Decision Tables (LEDT) use only Y or N answers to conditions.
13. In Extended Entry Decision Tables (EEDT) conditions are formed by combining the statement in the condition stub with that in the condition entry part of the decision table. EEDTs are more concise.

14. A decision table is said to be complete if it has all possible distinct elementary rules. If any rule is missing it is incomplete.
15. If no values can be assigned to the condition variables leading to the missing rules then the decision table is said to be apparently incomplete. Otherwise it is really incomplete.
16. If an elementary rule has more than one action specified, then the decision table is said to be ambiguous. If the elementary rule is logically impossible, then the ambiguity is apparent; otherwise, it is real.
17. A decision table with real ambiguity or incompleteness has a logical error which should be corrected.
18. Incompleteness and ambiguity are easily specified by using a two-dimensional diagram onto which a decision table is mapped. The diagram is called a Karnaugh map (K-map).
19. K-maps are also useful to detect redundant rules.
20. Using basic ideas of Boolean algebra and K-maps, unnecessary conditions and unnecessary rules are eliminated. The number of conditions to be tested in each rule can also be minimized by using K-maps.
21. Pre-processors are available to automatically convert decision tables to program in a programming language.
22. Decision trees are used when sequencing of conditions is important and conditions are to be tested in order of their priority.
23. Structures English is appropriate when a problem has complex actions and many loops. Decision tables are appropriate when there are a large number of conditions to be tested and the logic is complex. Decision trees are preferred when sequencing of conditions is important.

QUESTION BANK – MODULE 6

- 6.1 A bank has the following policy on deposits: On deposits of Rs.5000 and above and for three years or above the interest is 12%. On the same deposit for a period less than 3 years it is 10%. On deposits below Rs.5000 the interest is 8% regardless of the period of deposit. Write the above process using
- Structured English
 - A decision table
- 6.2 An organization maintains an employee file in which each record has the following data:
(Employee No., employee name, employee gross pay).
It has been decided to increase the pay as per the following formula:
For pay of Rs.1000 or less increase 15%
For pay of more than Rs.1000 but up to Rs.2500 increase 10%.
For pay over Rs.2500 increase 5%.
- Write a structured English processing rule corresponding to the above policies
 - Express the policies as a decision table.
- 6.3 An offshore gas company bills its customer according to the following rate schedule:
First 500 litres Rs. 10 (flat)
Next 300 litres Rs.1.25 per 100 litres
Next 30,000 litres Rs.1.20 per 100 litres
Next 100,000 litres Rs.1.10 per 100 litres
Above this Rs.1.00 per 100 litres.
- The input record has customer identification, name and address, meter reading, past and present. Write a structured English procedure to obtain a bill for the customer.
- 6.4 A narrative of a user's requirements in an organization is given below:
"Our company receives a number of items from many vendors and they are received at the receiving office. As we receive over 1000 items a day it is now virtually impossible for the receiving office to check whether the vendor has supplied items against an order, or sent a wrong item and inform the purchase office. We are also not able to find out if there are excesses or deficiencies in delivery and whether the vendor adhered to the delivery schedule as per the order. The items received at the receiving office are sent for physical inspection. The physical inspection consists of checking whether the quantities stated in the delivery note agree with the physical count, whether the item is the correct one ordered, and a check on the quality of item. We would like to keep a record of rejections due to bad quality, incorrect items, excess/deficient supply etc.,

determined during inspection. This will enable us to assess vendors' reliability to guide us in placing orders in the future, besides keeping track of supplies. Items cleared by the inspection office are taken into the inventory by the stores office which keeps a ledger of items stocked and quantity available of each item. Customers send requisitions to the stores. The stores fulfill the requests based on availability and update the ledger. Currently we are not able to meet some of our customers' requests. We would like to incorporate automatic reordering by our purchase office if the inventory level of an item is low. We would also like to keep track of unfulfilled requests and meet them when items reach the store. Currently we are not able to pay our vendors promptly due to delays in payment order reaching our accounts office. We would like to rectify this. We would also like to bill our customers promptly and keep track of customers' payments" Develop the processing rules in structured English for the office receiving the goods specified in the user's requirements.

- 6.5 Develop the processing rules in Structured English for the inspection process of the user's requirements stated in Exercise 6.4
- 6.6 Develop the processing rules in Structured English for the purchase process of the user's requirements stated in Exercise 6.4.
- 6.7 Develop the processing rules in Structured English for the accounting process stated in Exercise 6.4
- 6.8 Develop the processing rules in Structured English for the stores process stated in Exercise 6.4
- 6.9 The policy followed by a company to process customer orders is given by the following rules:
 - (i) If the customer order \leq that in stock and his credit is OK, supply his requirement.
 - (ii) If the customer credit is not OK do not supply. Send him an intimation.
 - (iii) If the customer credit is OK but items in stock are less than his order, supply what is in stock. Enter the balance to be sent in a back-order file.Obtain a decision table for the above policy.

6.10 Obtain a decision table to decide whether on a given date an employee in an organization has completed one year's service or not.

6.11

Obtain a decision table for an automatic stamps vending machine with the following specifications:

- (i) To dispense 20, 15, 10, 5 paise stamps
- (ii) To accept 50, 25, 10, 5 paise coins
- (iii) Do not return change if it is necessary to return more than two coins of the same denomination. In such a case return the customer's coin and turn on "no change" light.

The machine should dispense a stamp, the right amount of change, no stamp available, no change available signals etc.

6.12 Obtain a decision table to be used by a person to enter the office of a manager. The conditions to be checked are:

Door open? Ring sign on? Enter sign on? Door locked?

The actions a person takes are:

Ring bell, enter, wait, leave.

After obtaining the decision table, ensure that it has no logical errors and that it is in minimal form.

6.13 A University has the following rules for a student to qualify for a degree with Physics as the main subject and Mathematics as the subsidiary subject:

- (i) he should get 50% or more marks in Physics and 40% or more marks in Mathematics.
- (ii) If he gets < 50% marks in Physics, he should get 50% or more marks in Mathematics. He should, however, get at least 40% marks in Physics.
- (iii) If he gets < 40% marks in Mathematics and 60% or more marks in Physics, he is allowed to reappear in Mathematics examination only so that he can qualify.

(a) obtain an EEDT for the rules

(b) obtain an LEDT for the rules

(c) check the logical correctness of the decision table

6.14 In instalment buying where payments are made on a weekly basis the action taken on "an account goes into arrears" is a crucial aspect of the operation. Table P6.14 illustrates a simplified arrears procedure. Answer the following questions:

- (i) Are all elementary rules logically possible?
- (ii) Is the table complete?
- (iii) Has the table any ambiguities?
- (iv) Are there logical errors in the table? If yes, point them out.

- (v) Use reasonable assumptions and correct the table.
- (vi) Remove any redundancies in the corrected table (Table 6.)

- 6.15 Obtain a decision tree for Exercise 6.9.
- 6.16 Obtain a decision tree for exercise 6.13. Is it possible to find out missing rules if any in a decision tree representation.
- 6.17 Obtain a decision tree for Exercise 6.12.
- 6.18 Explain in what types of problems you will use a decision tree approach rather than a decision table approach.
- 6.19 You want to go to Delhi from Bangalore. There are three flights per day; early morning, late morning and evening. You would like to go on 21.4.04 by early morning flight. If it is not available you will take the late morning flight. If neither is available you are willing to take any flight on 22.4.04 but prefer early and late morning flights., Obtain a decision tree for this word statement. Is decision table suitable for this problem? If not why?
- 6.20 Explain in what types of problems you will prefer Structured English process specification rather than decision tree.

Table P.6.14 A simplified Arrears Procedure

C1: This week's cash > weekly rate	Y	Y	N	N	-	-	-	-	-
C2: This week's cash > 0	-	-	Y	Y	-	-	N	N	N
C3: Any cash during last month	-	-	-	-	N	N	Y	Y	Y
C4: Arrears > 2 * weekly rate	-	-	Y	N	-	-	N	Y	-
C5: Arrears > 4 * weekly rate	N	Y	N	-	N	Y	-	N	Y
Send arrears letter A	-	X	-	-	-	-	-	-	-
Send arrears letter B	-	-	X	-	-	-	-	-	-
Send arrears letter C	-	-	-	-	X	-	-	-	-
Send arrears letter D	-	-	-	-	-	-	-	X	-
Notify accounts	X	-	-	X	-	-	X	-	-
Take special action	-	-	-	-	-	X	-	-	X
	A1	A2	A3	A1	A4	A5	A1	A6	A5

References

1. V.Rajaraman, “Analysis and Design of Information Systems”, 2nd Edition, Prentice Hall of India, New Delhi, 2002. Most of the material in this module is based on Chapter 8 and 9 of the above book. The book is perhaps the only one which has extensive discussion on error detection in Decision Tables.
2. K.E. Kendall and J.E.Kendall, “Systems Analysis and Design”, 5th Edition, Pearson Education Asia, Delhi, 2003. Has a brief discussion of structured English, Decision Tables and Decision Trees (pages 353 to 369) . Website www.prenhall.com/kendall has a lot of support material and case study for students.
3. J.A.Hoffer, J.F.George, J.S.Velacich, “Modern Systems Analysis and Design”, Third Edition, Pearson Education Asia, 2002. Chapter 7 (pages 282 to 303) cover the topics in this module. The book has a number of interesting case studies and a good problem set. The web site <http://prenhall.com/hoffer> has material to assist students who use this text book.
4. E.Yourdon “Modern Structured Analysis”, Prentice Hall of India, 1996. Chapter 11 (pages 203 to 232) describes structured English and Decision Tables. There is a larger set of exercises at the end of the chapter.