

System Analysis Design

Week-5-Lesson-1

Process Specification



Daffodil
International
University

Learning Goals

In this module we will learn:

1. How to use structured English to precisely specify processes
2. The terminology used in structured English
3. Terminology of decision tables and how it is used to specify complex logic
4. How to detect errors in decision table specifications
5. Terminology and use of decision trees
6. Comparison of structured English, decision tables and decision trees

Process Specification

- Once a DFD is obtained the next step is to precisely specify the process.
- **Structured English**, Decision tables and Decision Trees are used to describe process.
- **Decision tables** are used when the process is logically complex involving large number of conditions and alternate solutions
- **Decision Trees** are used when conditions to be tested must follow a strict time sequence.

Data Dictionary

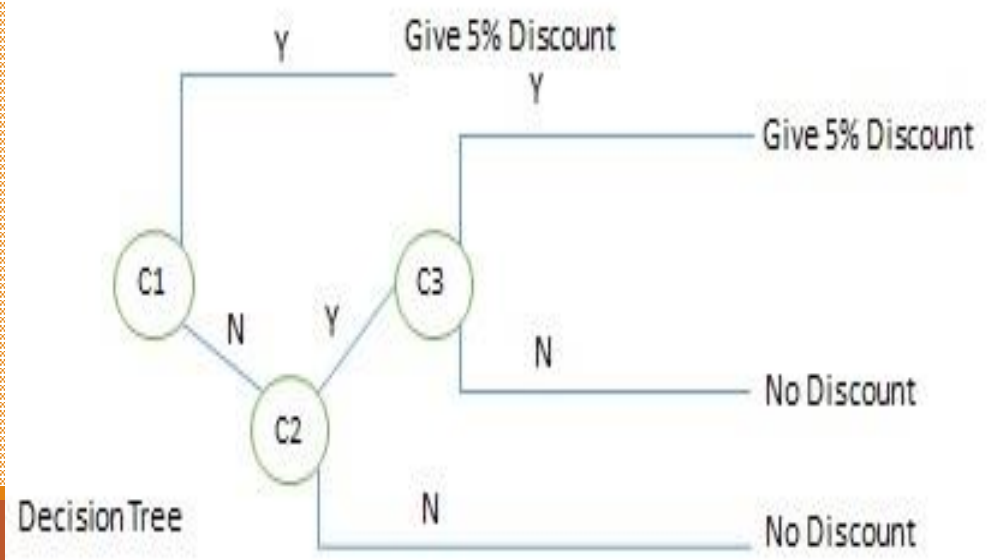
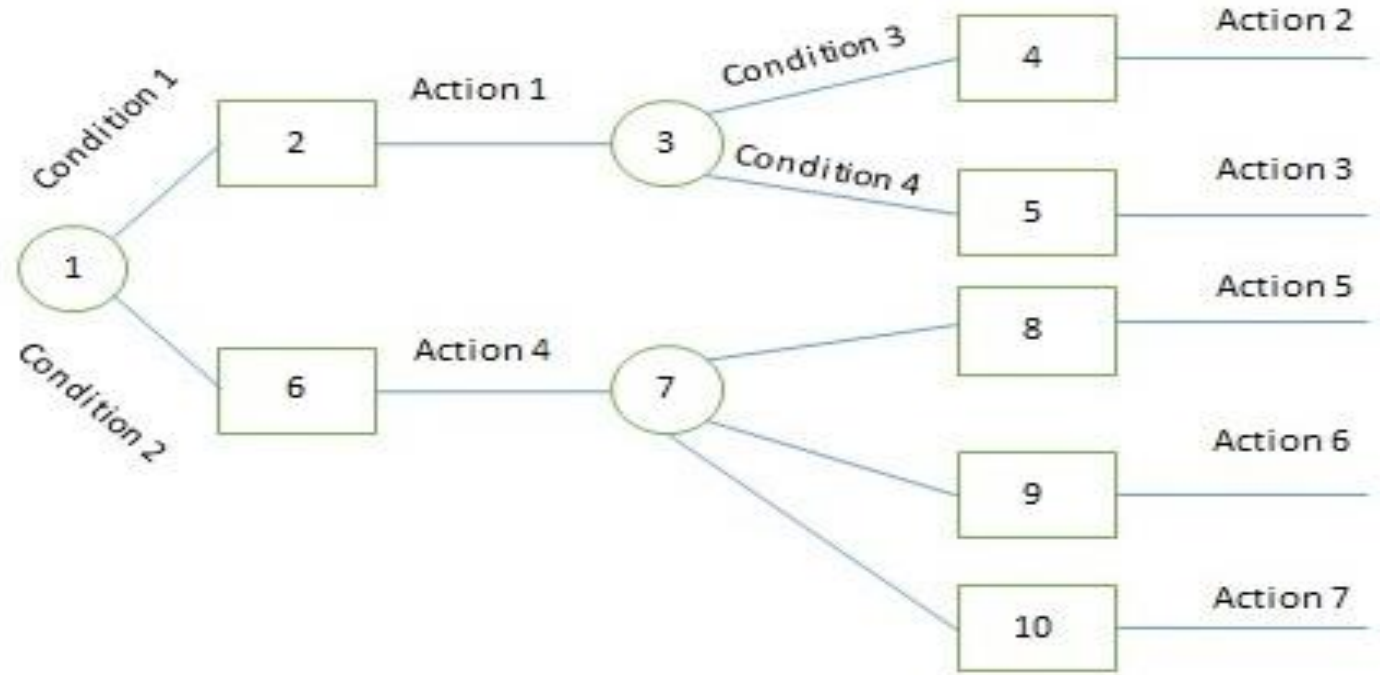
- A data dictionary is a structured repository of data elements in the system. It stores the descriptions of all DFD data elements that is, details and definitions of data flows, data stores, data stored in data stores, and the processes.

Sr.No.	Data Name	Description	No. of Characters
1	ISBN	ISBN Number	10
2	TITLE	title	60
3	SUB	Book Subjects	80
4	ANAME	Author Name	15

Decision Trees

- ❑ A decision tree is a map of the possible outcomes of a series of related choices.
- ❑ It allows an individual or organization to weigh possible actions against one another based on their costs, probabilities, and benefits.
- ❑ A decision tree typically starts with a single node, which branches into possible outcomes. Each of those outcomes leads to additional nodes, which branch off into other possibilities. This gives it a treelike shape.

Decision Trees



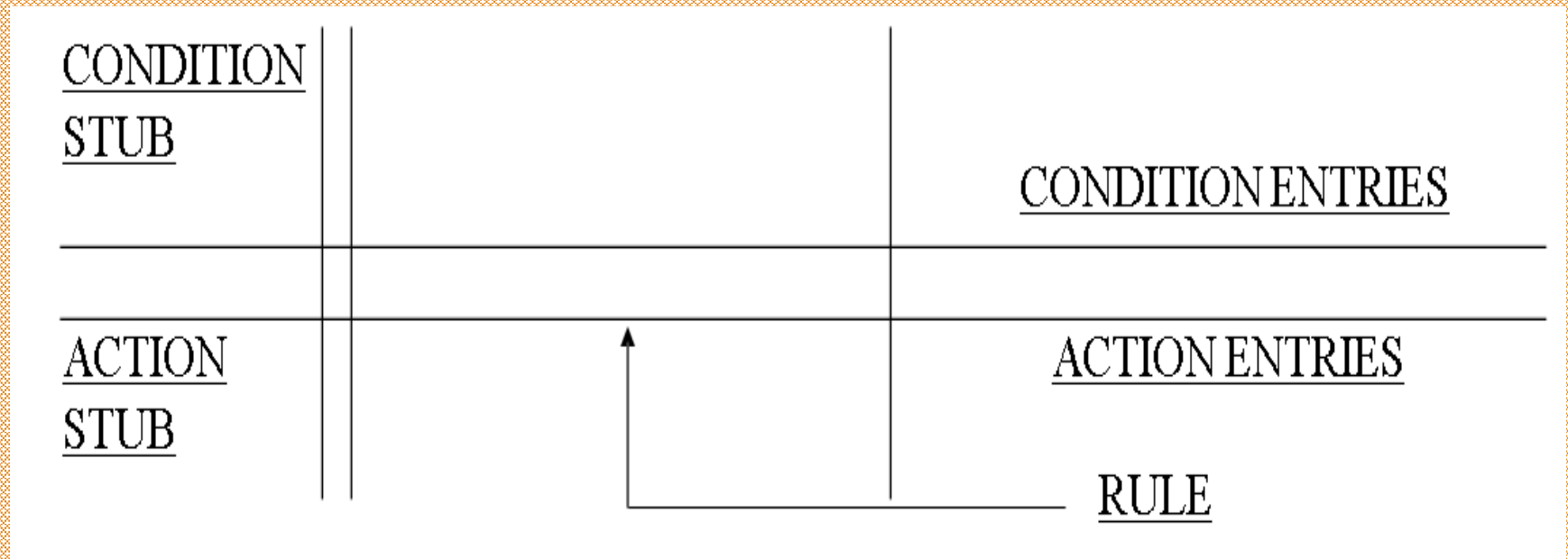
Y = Yes
 N = No
 C1 : Advance Payment Mode
 C2 : Purchase Amount >= 10,000
 C3 : Regular Customer

Decision Tree

Decision Table

- ❑ Decision tables are a method of describing the complex logical relationship in a precise manner which is easily understandable.
 - ❑ It is useful in situations where the resulting actions depend on the occurrence of one or several combinations of independent conditions.
 - ❑ It is a matrix containing row or columns for defining a problem and the actions.
- ❑ **Components of a Decision Table:**
 - **Condition Stub** – It is in the upper left quadrant which lists all the condition to be checked.
 - **Action Stub** – It is in the lower left quadrant which outlines all the action to be carried out to meet such condition.
 - **Condition Entry** – It is in upper right quadrant which provides answers to questions asked in condition stub quadrant.
 - **Action Entry** – It is in lower right quadrant which indicates the appropriate action resulting from the answers to the conditions in the condition entry quadrant.

Decision Table Notation Explained



- 4 Quadrants-demarcated by two double lines
- CONDITION STUB LISTS ALL CONDITIONS TO BE CHECKED
- ACTION STUB LISTS ALL ACTIONS TO BE CARRIED OUT

Structured English

- Structured English is similar to a programming language such as Pascal
- It does not have strict syntax rules as programming language
- Intention is to give precise description of a process
- The structured English description should be understandable to the user

Example: Structured English

```
if customer pays advance  
  then  
    Give 5% Discount else  
    if purchase amount  $\geq 10,000$   
      then  
        if the customer is a regular customer  
          then Give 5% Discount else  
            No Discount  
          end if  
        else No Discount end if  
      end if  
    end if
```

Example-1

Discount policy has following conditions for the customers.

i) If customer is Bookstores:

Get a trade discount of 25%, if orders for 6 or more copies per book title.

ii) If customer is libraries and individuals:

5% allowed on orders of 6-19 copies per book title

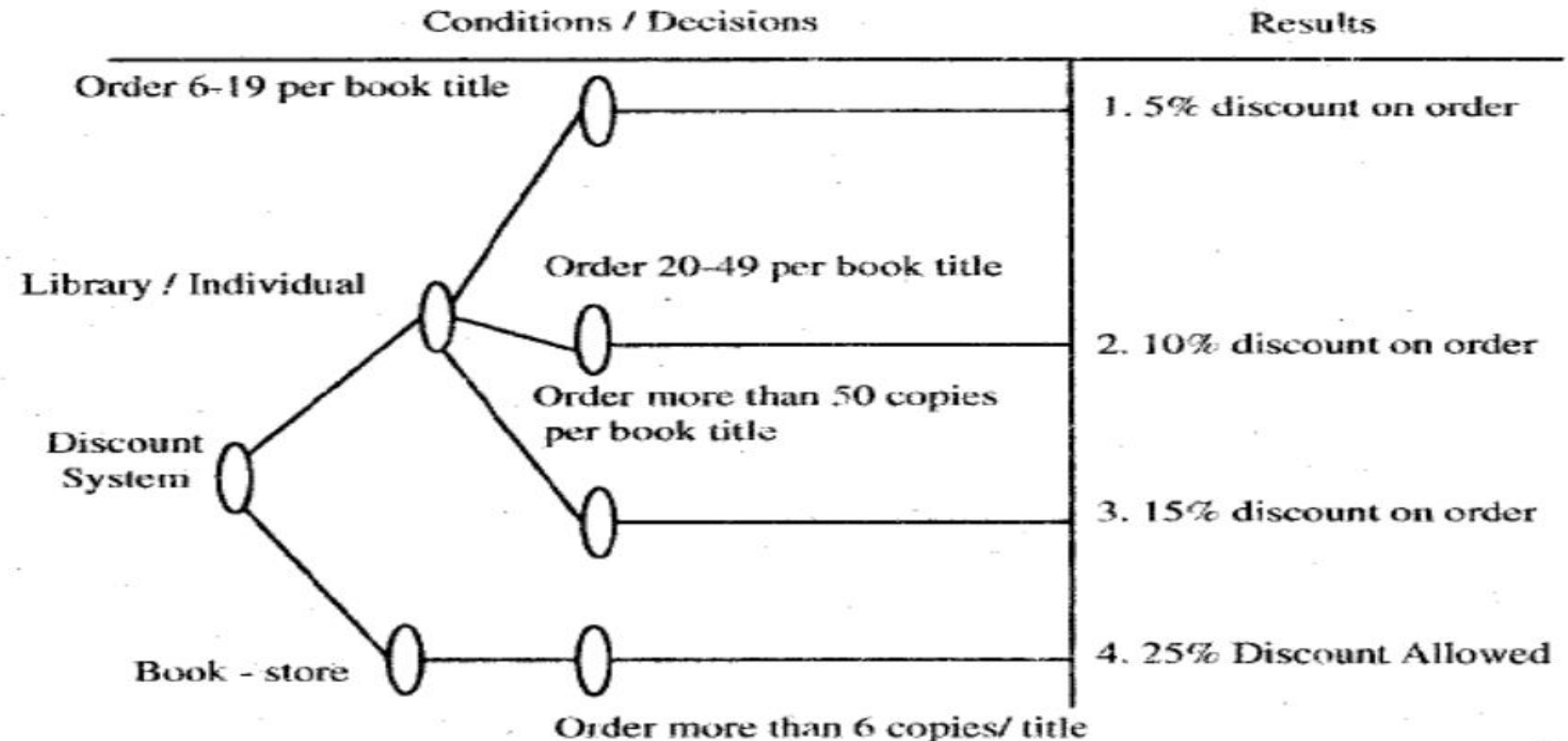
10% on orders for 20-49 copies per book title and

15% on orders for 50 copies or more per book title.

Develop a process description in

(i) Decision table (ii) Decision tree (iii) Structure English.

Decision Tree



Example-1(cont..)

Decision Table

Condition Stub SRL/NO		Conditions			
		1	2	3	4
1.	Customer is a book store	Y			
2.	Customer is a library/Individual		Y	Y	Y
3.	Order 6 or more copies / book Title	Y			
4.	6-19 copies per book title		Y		
5.	Order 20-49 copies/Book Title			Y	
6.	50 copies or more per book title				Y
	Action Stub	Action			
1.	25% Trade discount	X			
2.	5% discount allowed on order		X		
3.	10% discount on orders			X	
4.	15% on orders				X

Example-1(cont..)

Structured Language

IF customer is a book -stores and order-title > 6 copies

THEN < get a 25% trade discount>

ELSE

IF (customer is a Library or Customer is an individual)

THEN

IF order-title > 5 copies and order-title < 20 copies

THEN < get a 5% trade discount>

ELSE

IF order-title > 19 copies and order-title < 50 copies

THEN < get a 10% trade discount >

ELSE

IF order-title > 49 copies THEN < get a 15% trade discount>

Example-2:

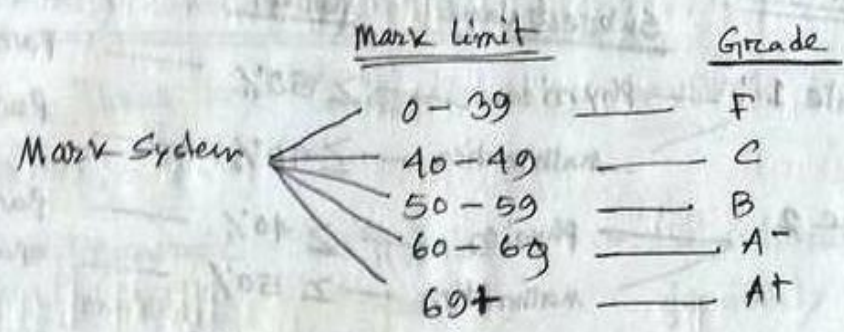
Draw a decision tree and decision table for the following text.

A university has the following grade system.

- If the obtained mark in any subject is between 0-39, it implies F;
- If the obtained mark in any subject is between 40-49, it implies C;
- If the obtained mark in any subject is between 50-59, it implies B;
- If the obtained mark in any subject is between 60-69, it implies A;
- If the obtained mark in any subject is between 69 and above, it implies A+;

However, if the present of any student is less than 60% of total class then he/she will be awarded grade F, irrespective of the mark that he obtained.

Decision Tree:



Decision Table: If Attendance less than 60% — F

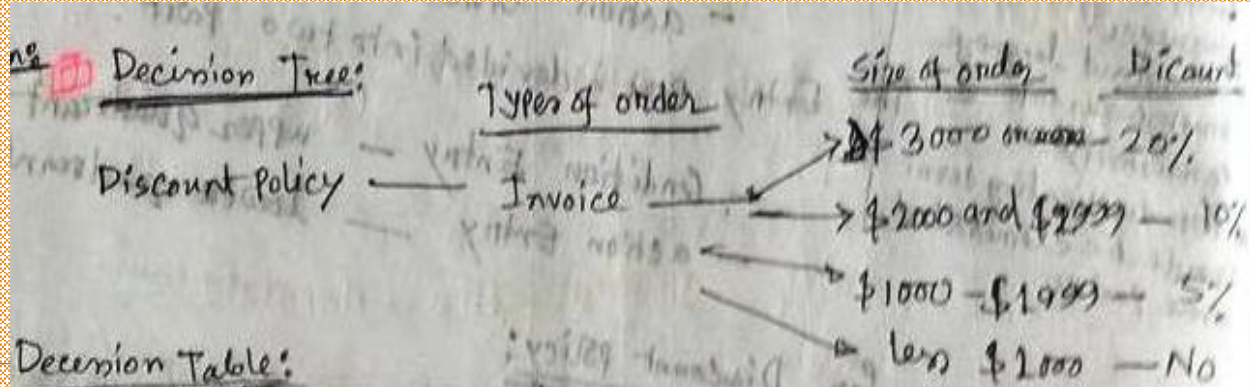
Condition Stub		Condition Entry					
		Y	N	N	N	N	N
If	Mark between 0-39	Y	N	N	N	N	N
	" " 40-49		Y	N	N	N	N
	" " 50-59			Y	N	N	N
	" " 60-69				Y	N	N
	" " 69+					Y	N
Attendance less than 60%							Y
Then	Grade F	X					
	" C		X				
	" B			X			
	" A-				X		
	" A+					X	
	" F						X

Example-3

Draw a decision tree and decision table for the following text.

A Virginia based mail order house specializes in microcomputers and supplies for various microcomputer makes. It offers discount based on the number of units ordered. Discount computed as follows:

- If invoice total \$3,000 or over discount is 20%.
- If invoice total is between \$2,000 and \$2999 discount is 10%.
- If invoice total is between \$1,000, and \$1,999, 5% discount.
- If invoice total under \$1,000, no discount.



Decision Table:

Condition Stub		Condition Entry			
		Y	N	N	N
If	Invoice \geq \$3000	Y	N	N	N
	Invoice between \$2000-\$2999		Y	N	N
	Invoice \in \$1000-\$1999			Y	N
	Invoice $<$ \$1000				Y
Then	Discount 20%	X			
	" 10%		X		
	" 5%			X	
	" No				X

Example-4

Draw a decision tree and decision table for the following text.

A university has the following rules for a student to qualify degree program.

- Marks of Physics should be ≥ 50 and Mathematics ≥ 40
- If marks of Physics is < 50 then marks of Physics should be > 40 and Mathematics ≥ 50 .
- If marks of Mathematics is < 40 and marks of Physics is ≥ 60 then Mathematics has to be repeated.
- In all other cases the students fails.

Decision Tree:

	Subject Name	Marks	Condition
Rule 1	Physics	$\geq 50\%$	Pass
	Mathematics	$\geq 40\%$	Pass
Rule 2	Physics	$\geq 40\%$	Pass
	Mathematics	$\geq 50\%$	Pass
Rule 3	Physics	$\geq 60\%$	Repeat Math
	Mathematics	$< 40\%$	Repeat Math
Rule 4	All other case		Fail

Decision Table:

Condition	Rule 1	Rule 2	Rule 3	Rule 4
Physics Marks $\geq 50\%$				
Mathematics Marks $\geq 40\%$				
<u>Action</u>				
Pass Candidate	X	X		
Repeat Math		X	X	
Fail Candidate				X

References

1. **System Analysis and Design**, by Elias M. Awad
2. **Systems Analysis and Design**, Kendall and Kendall, Fifth Edition
3. **Structured Analysis**
https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_structured.htm