



Session 10

Data Flow Diagrams





Objectives

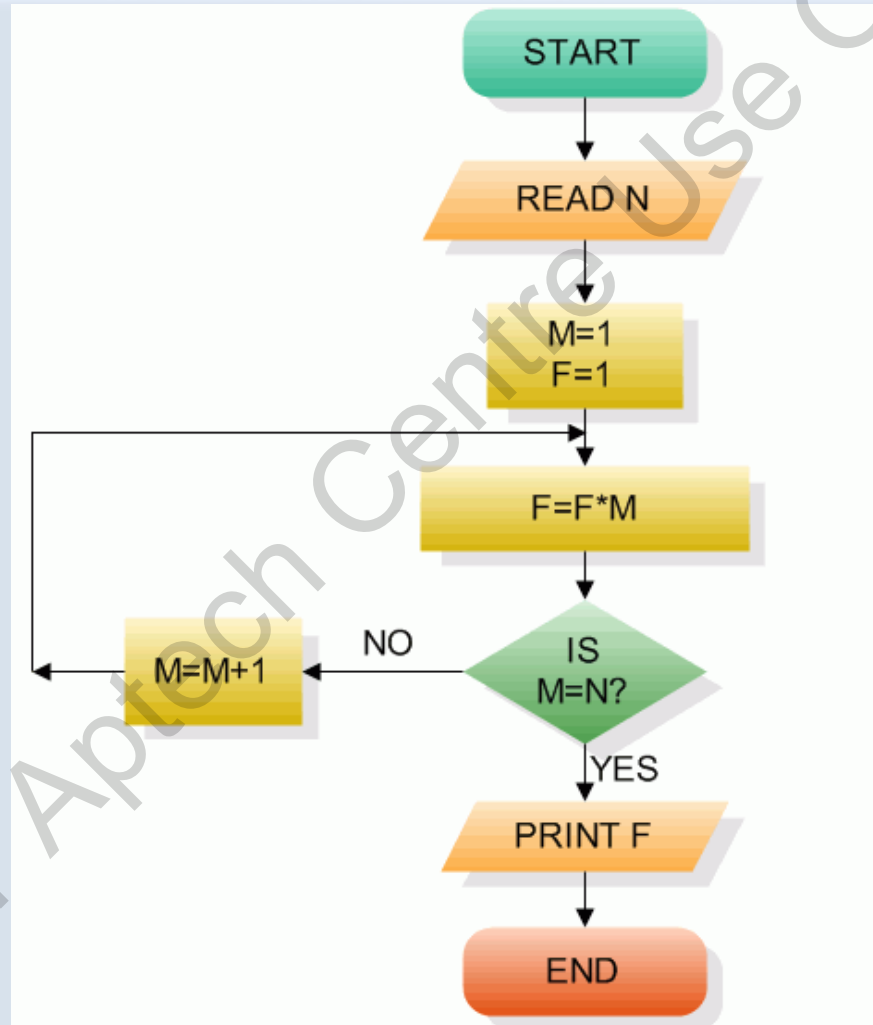
- ☐ Describe system flowcharts
- ☐ Explain DFDs
- ☐ Explain decision tables
- ☐ Describe Hierarchy Plus Input-Process-Output (HIPO) charts

System Flowchart 1-2

□ System flowchart:

- Is a way of visually presenting flow of data through an information processing system, the operations executed within the system, and the order in which they are performed
- Is usually drawn in the early stages of developing computer solutions
- Plays a vital role in the identification of a problem
- Is helpful in understanding the logic of difficult and lengthy programs

System Flowchart 2-2



Types of Flowchart 1-4

□ There are three types of flowcharts as follows:

High-Level Flowchart

- A high-level also called first-level or top-down flowchart depicts the most important steps in a process.

Deployment or Matrix Flowchart

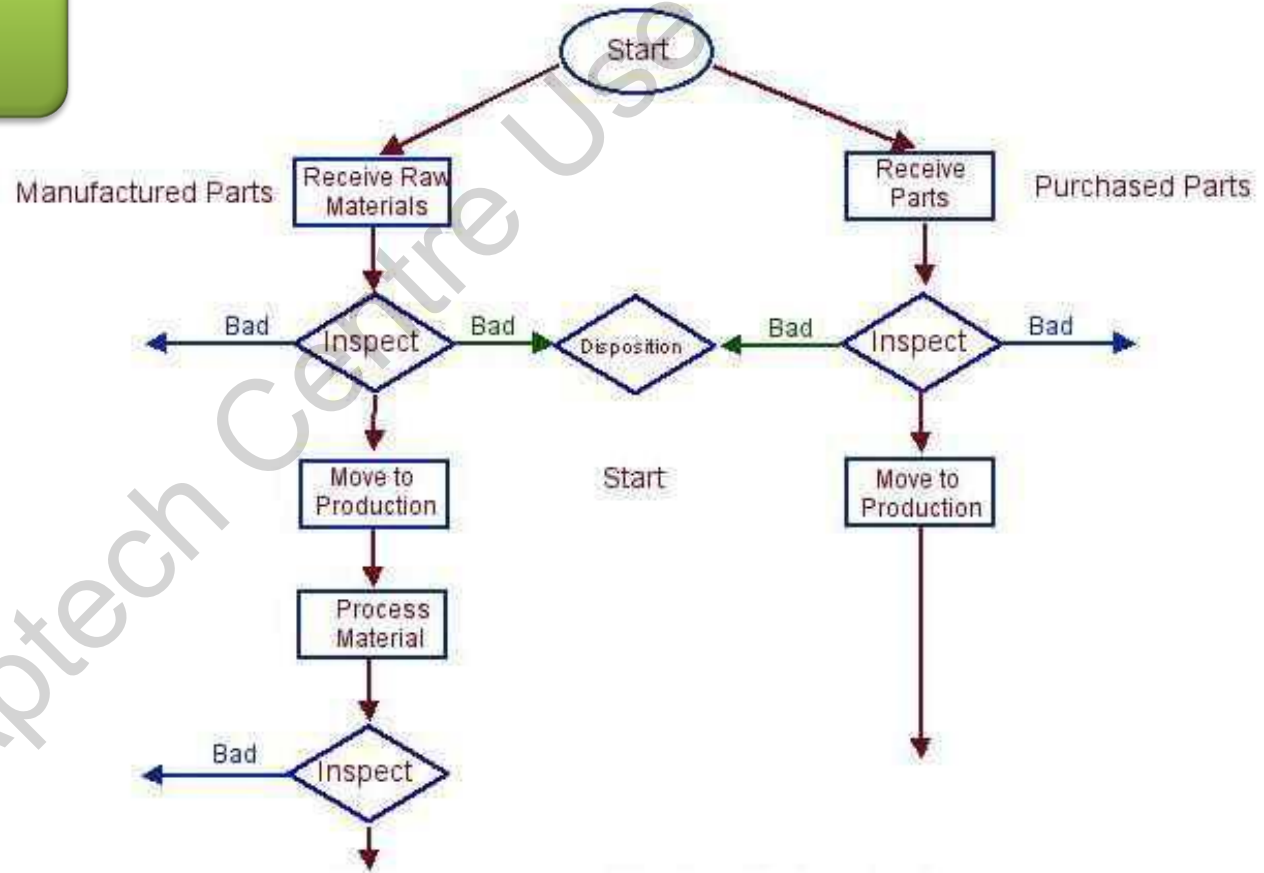
- A deployment flowchart depicts the process in terms of who is doing the steps.
- It is in the form of a matrix, illustrating various members in a team and the flow of steps among these members.

Detailed Flowchart

- The detailed flowchart provides a detailed depiction of a process by mapping all the steps and activities that appear in the process.
- The detailed flowchart specifies the steps or activities of a process and also comprises decision points, waiting periods, reworks, and feedback loops.

Types of Flowchart 2-4

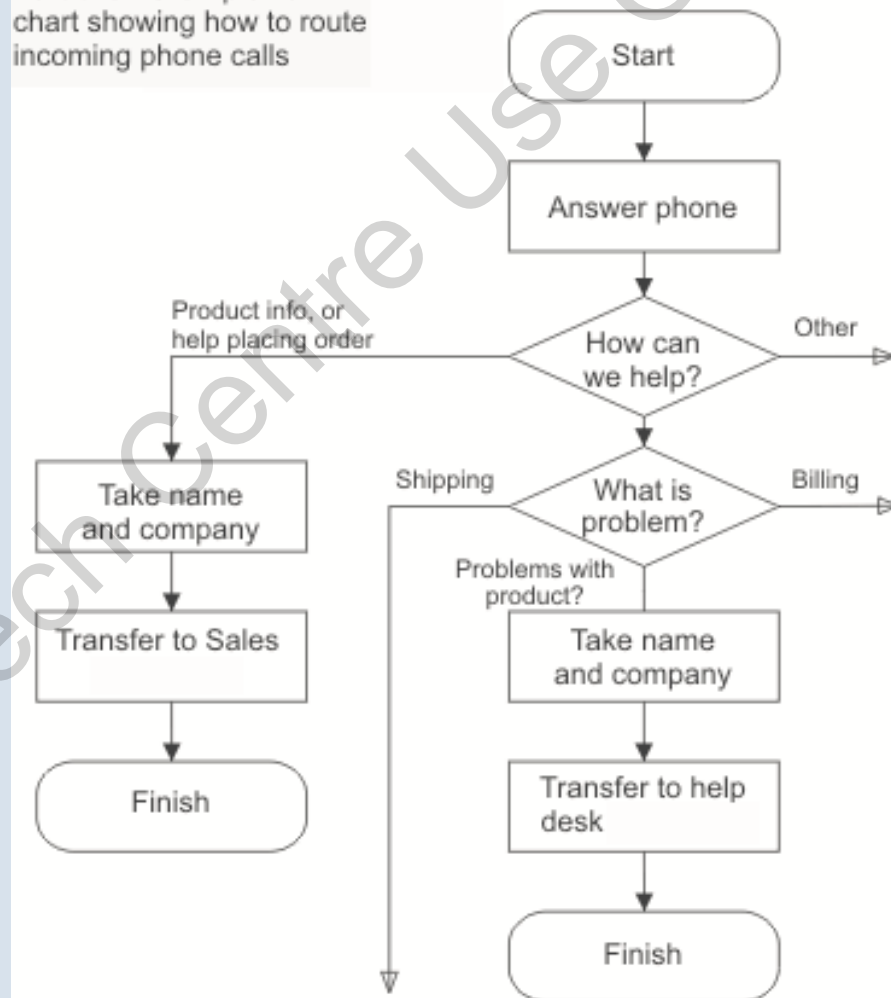
High-Level Flowchart



Types of Flowchart 3-4

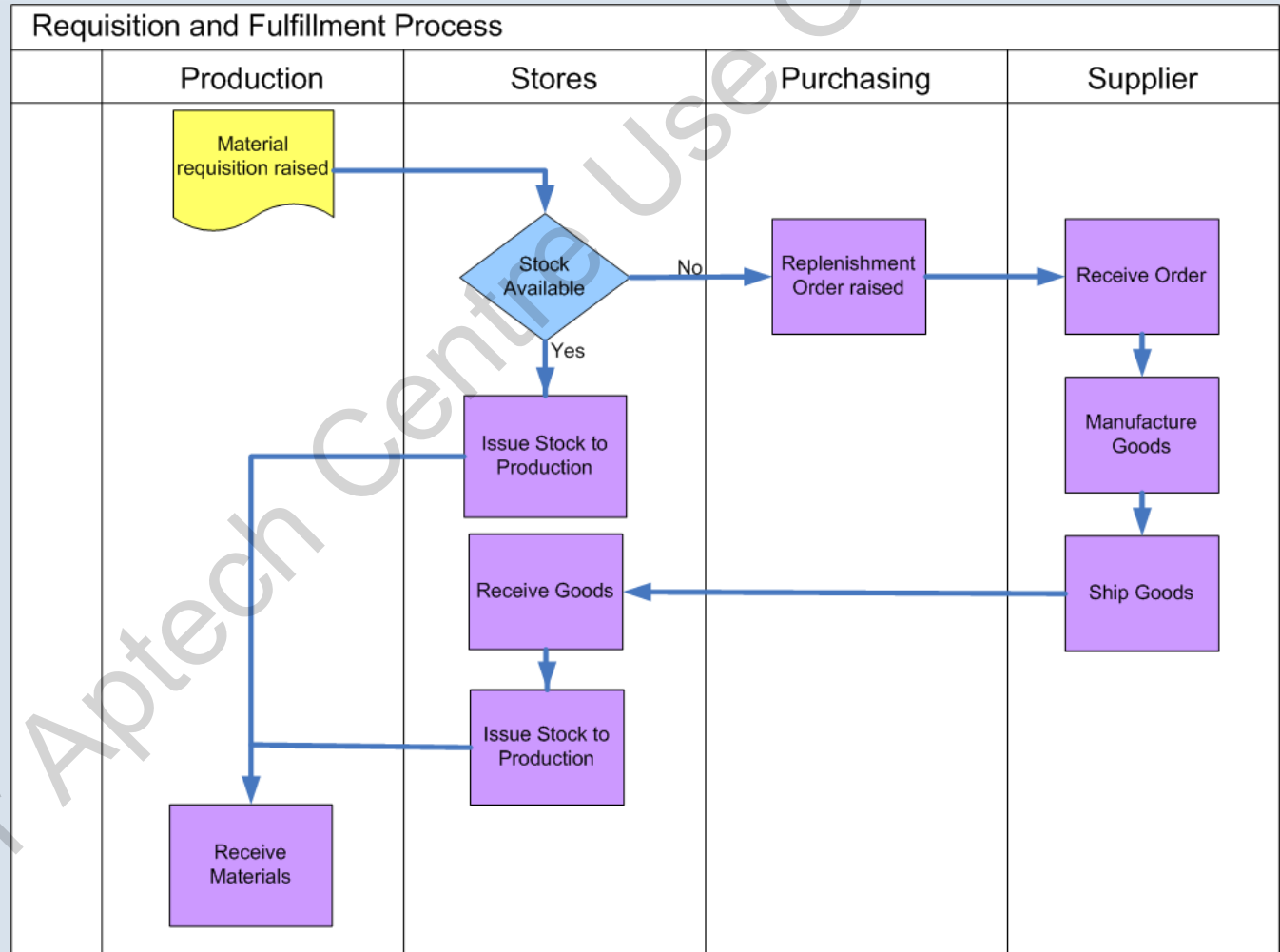
Deployment or Matrix Flowchart

Part of an example flowchart showing how to route incoming phone calls



Types of Flowchart 4-4

Detailed Flowchart



Flowchart Symbols 1-3

- ❑ Few of the standard symbols applicable in most flowcharts are as follows:

Rounded box

- This symbol is used to represent events that appears automatically.

Rectangle or box

- This symbol is used to represent an event that is controlled within the process.

Diamond

- This symbol is used to represent a decision point in the process.

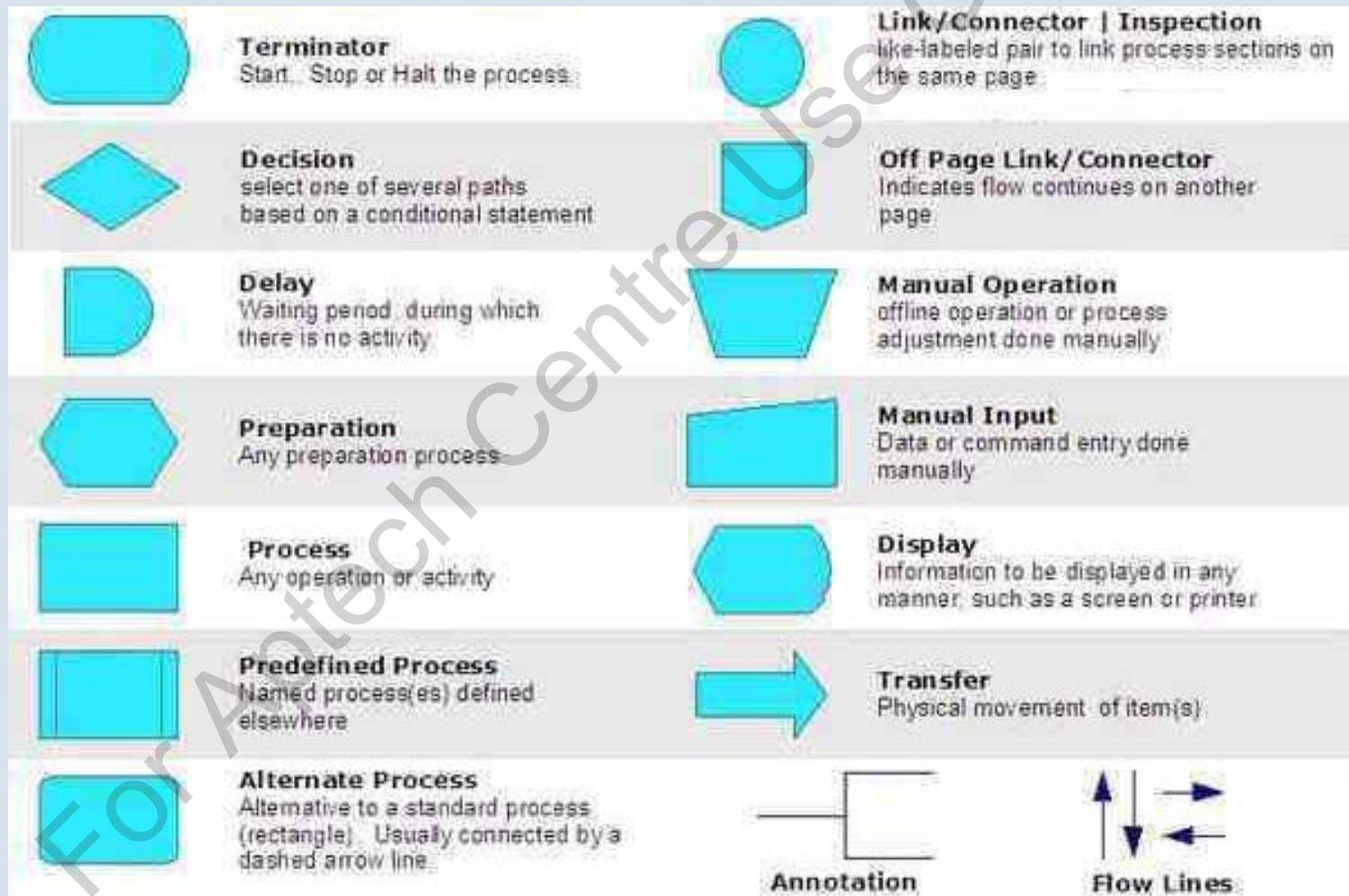
Parallelogram

- This symbol is used to denote input or output of information.

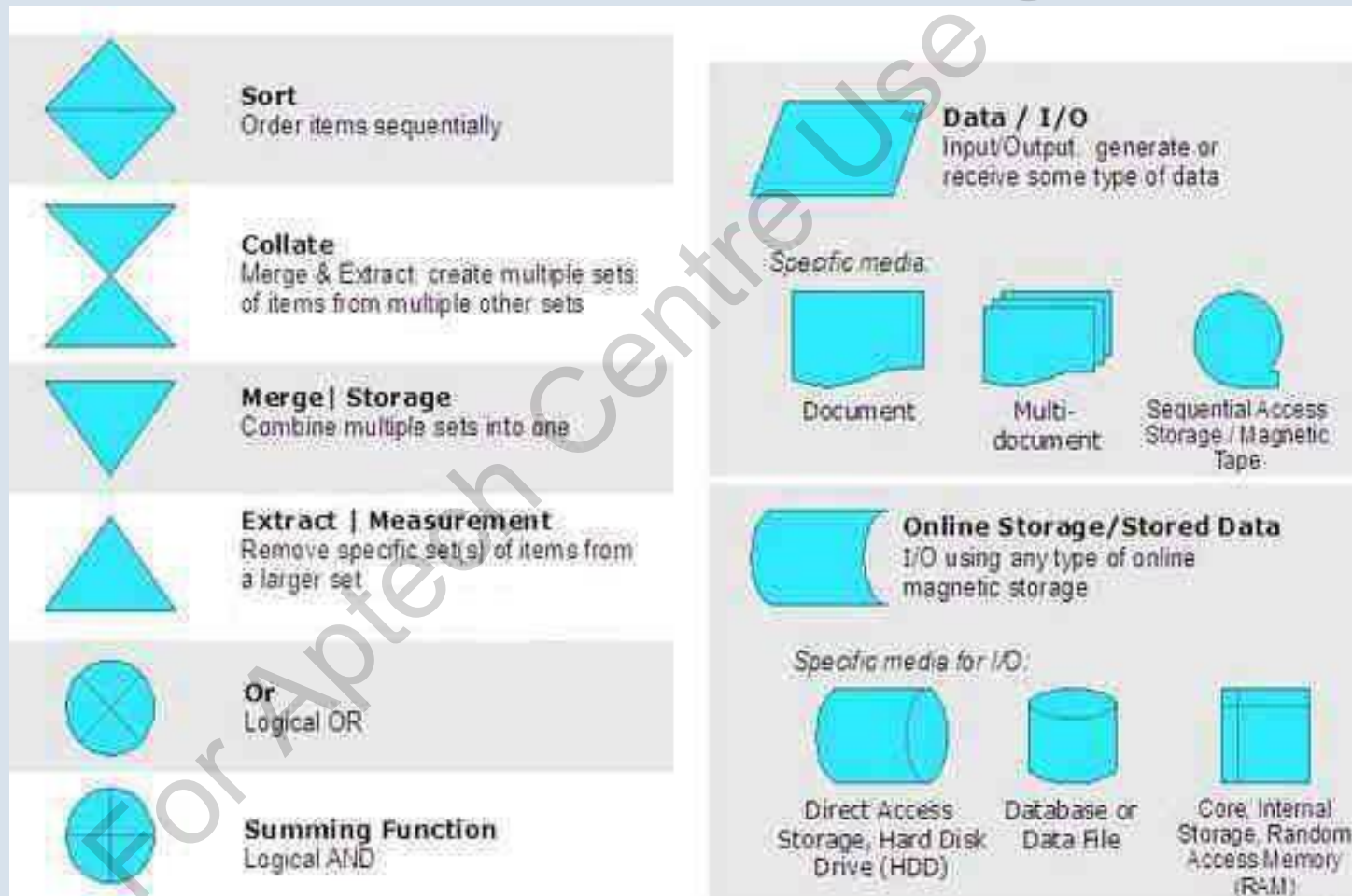
Circle

- This symbol is used to represent a point at which the flowchart connects with another process.

Flowchart Symbols 2-3



Flowchart Symbols 3-3



Data Flow Diagram 1-9

□ Data Flow Diagrams (DFDs):

- Were introduced and popularized for structured analysis and design by Gane and Sarson in 1979.
- Depict the flow of data from external entities into the system.
- Are an excellent communication tool for analysts to model processes and functional requirements.
- Are still considered one of the best modeling techniques for extracting and representing the processing requirements of a system.

Data Flow Diagram 2-9

□ A DFD:

- Is a modeling technique for examining and building information processes.
- Signifies as an illustration that explains the course or flow of information in a process.
- Shows the flow of information in a process based on the inputs and outputs.
- Represents technical or business processes with the assistance of external data stored, the data flow from one process to another, and the results.

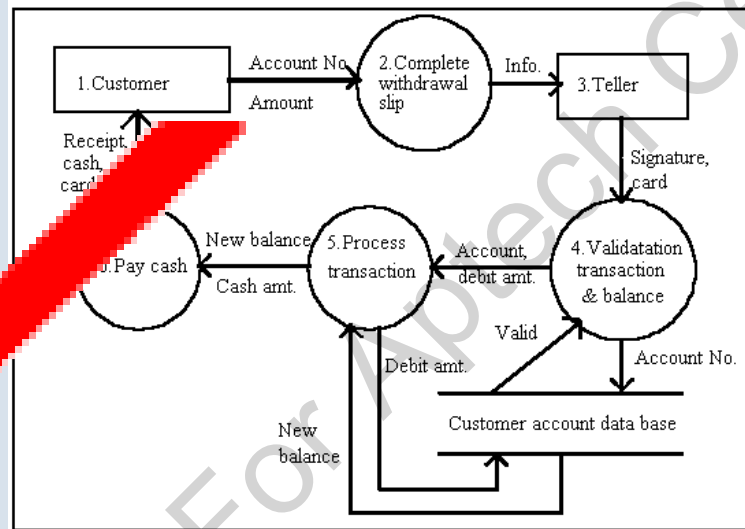
Data Flow Diagram 3-9

- DFDs consists of four major components:



Data Flow Diagram 4-9

- DFDs are **preferred** over technical descriptions to communicate how information data flows through system and how data is transformed in the process.



Cash Withdrawal Process:

1. Customer Account Number and Other details are supplied on a cash withdrawal slip to the teller
2. The details are then validated and account balance is checked.
3. ...
4. ...

Data Flow Diagram 5-9

- There are three principal reasons for using DFDs as follows:
 1. Easily comprehended by technical and non-technical audiences.
 2. Offer a high level system overview, such as entire boundaries and connections to other systems.
 3. Provide a detailed illustration of system components.



Data Flow Diagram 6-9

□ A DFD illustrates the following:

The sending and receiving of data in external devices

Changes in data specific to a process

If data is flowing by itself

Data storage locations in the process

Data Flow Diagram 7-9

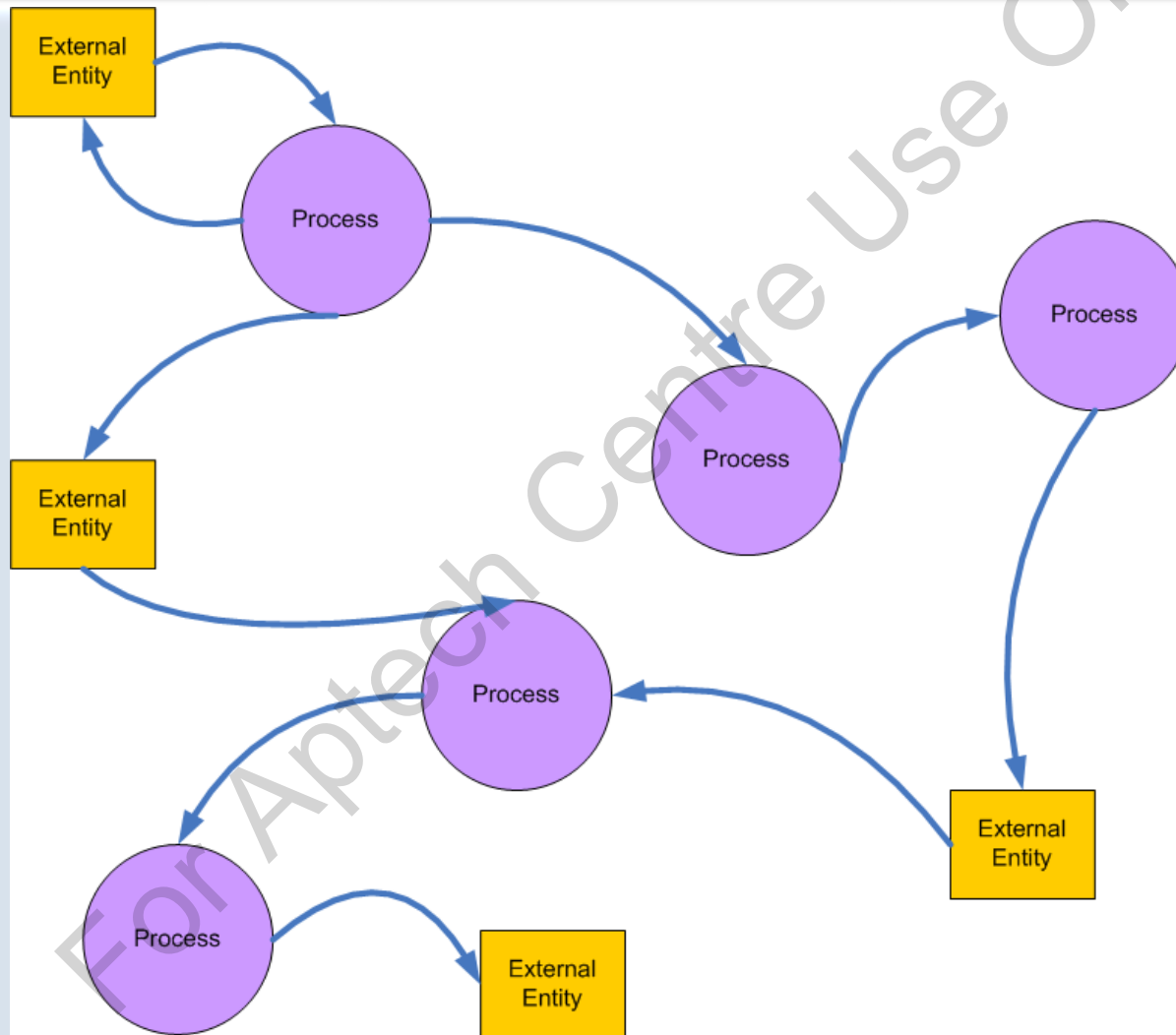
- ❑ DFDs are the preferred tool for showing program design, thus replacing flowcharts and pseudocode.
- ❑ A DFD illustrates those functions that have to be performed in a program as well as the data that the function requires.

Data Flow Diagram 8-9

- DFD depends on four symbols to state program design which are shown as follows:

DFD Components	DFD Symbols
External Entities	Rectangular box
Data Flow	Arrow headed lines
Process	Bubble (Circle or round corner square)
Data Store	Narrow opened rectangle

Data Flow Diagram 9-9



Decision Tables

- ❑ A decision table is a table composed of rows and columns, separated into four separate quadrants:
 - The upper left quadrant includes the conditions.
 - The upper right quadrant includes the condition rules of alternatives.
 - The lower left quadrant includes the actions to be taken and the lower right quadrant includes the action rules.

Conditions	Condition Alternatives
Actions	Action Entries



HIPO Chart 1-6

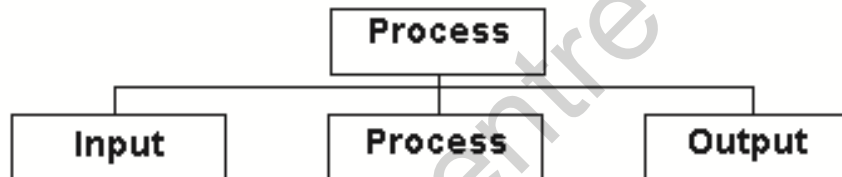
- ❑ The HIPO chart is a tool used to analyze a problem and visualize a solution using the top down design approach.
- ❑ Starting at the global (macro) level, the chart is decomposed repeatedly at ever-greater levels of detail until the logical building blocks (functions) are identified.

HIPO Chart 2-6

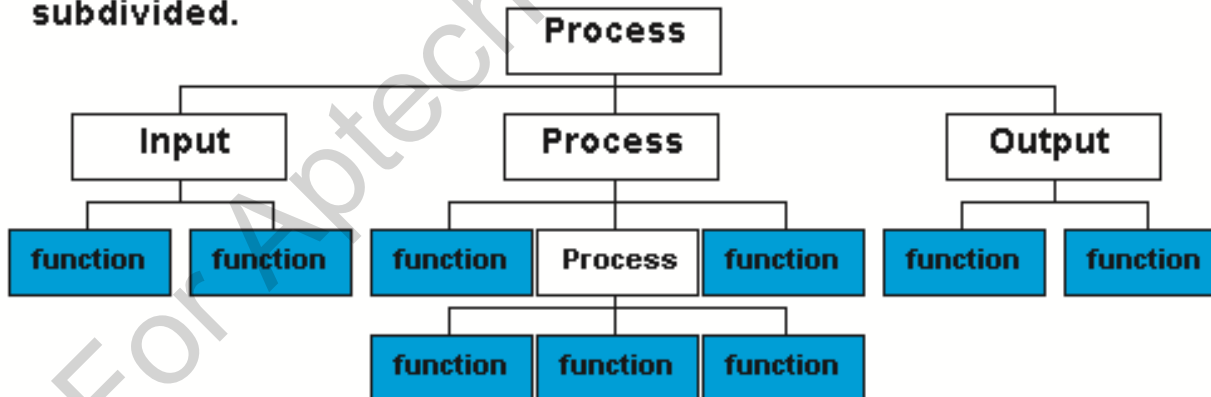
1. Identify the process.



2. Decompose the process into its component parts.



3. Continue the decomposition process within each branch of the hierarchy as necessary until it results in functions that cannot logically be further subdivided.





HIPO Chart 3-6

- ❑ HIPO is a form driven technique that uses standard forms for documenting the information.
- ❑ It consists of a hierarchy chart and an associated set of input, process, and output charts.
- ❑ HIPO follows the top-down decomposition method. It describes the data input and output from processes and defines the data flow composition.



HIPO Chart 4-6

- ❑ It was developed by IBM as a design aid and implementation technique with the following objectives:
 - Provide a structure by which the functions of a system can be realized.
 - State the functions to be performed by the program.
 - Provide a visual description of the input used and the output produced for each level of the diagram.

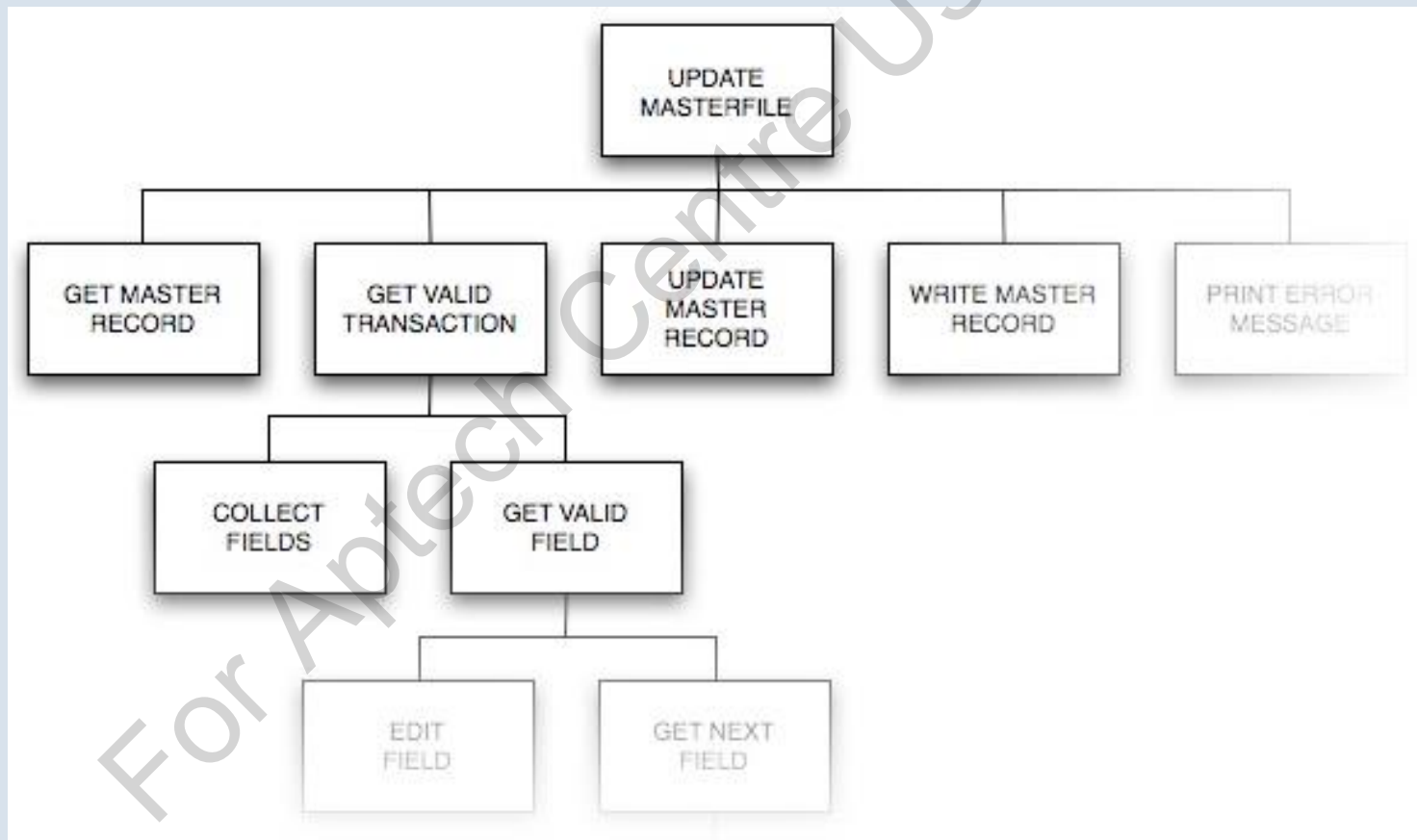


HIPO Chart 5-6

- ❑ The procedure for generating HIPO diagrams are as follows:
 - Start at the highest level of abstraction and define the inputs to the system and the outputs from it in aggregate terms.
 - Processing steps can be identified by those that convert input to output.
 - Document each element using HIPO diagram notation and the associated tree like structure.
 - Identify sub processes with their inputs and outputs. Continue decomposition until the processes cannot be decomposed any further.

HIPO Chart 6-6

□ A part of a sample HIPO chart is shown as follows:





Summary

- ❑ The system flowchart is a way of visually presenting the flow of data through an information processing system, the operations executed within the system, and the order in which they are performed.
- ❑ A flowchart is the graphical representation of how a process works and depicts the sequence of steps.
- ❑ A Data Flow Diagram is a modeling technique for examining and building information processes.
- ❑ A decision table is a table composed of rows and columns, separated into four separate quadrants.
- ❑ The HIPO chart is a tool used to analyze a problem and visualize a solution using the top down design approach.
- ❑ HIPO is a form driven technique that uses standard forms for documenting the information.