Session 7

Structured Programming

Objectives

- Define structured programming
- Describe the benefits of structured programs
- Identify the modeling tool used for structured programming
- Explain the top-down structured technique used in program designing
- Explain the elements of structured programs

Introduction

- Structured programming:
  - Is also called as modular programming
  - Is a programming approach
  - Applies a logical structure on a program to make it efficient and easier to understand and modify
  - Regularly uses a top-down design model, in which developers plan the whole program structure, and then divide it into subsections

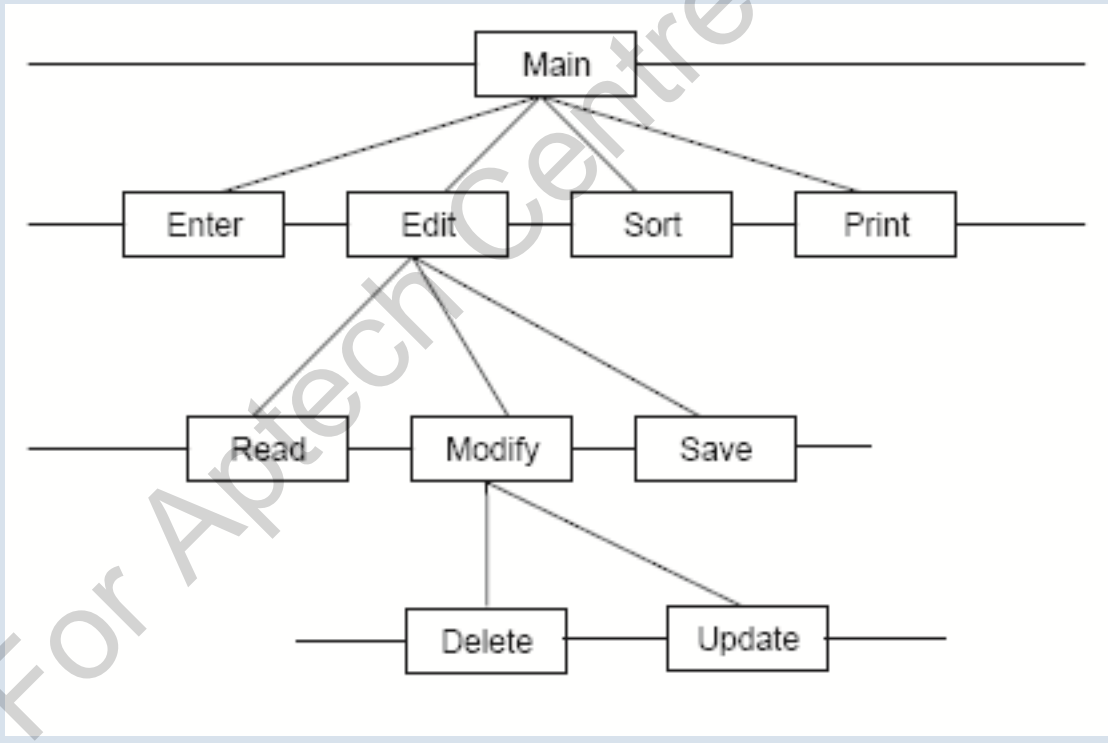
Benefits of Structured Programming 1-2

- The advantages of structured programming are described as follows:

Code reuse	• Modules can be used multiple times. This reduces complexity, saves time, and increases reliability
Modularity	• This equips programmers to confront problems logically. By splitting a large problem solution into smaller portions
Better flow	• Structured programming promotes better flow as each operation or task is properly segmented or separated
Increased productivity	• Structured programming increases productivity as time taken for error detection and error handling is reduced
Easier debugging and maintenance	• It is also easier to update or fix issues in the program by replacing individual modules rather than modifying or fixing larger amounts of code

Benefits of Structured Programming 2-2

- Structured programming method results in a hierarchical or layered program structure

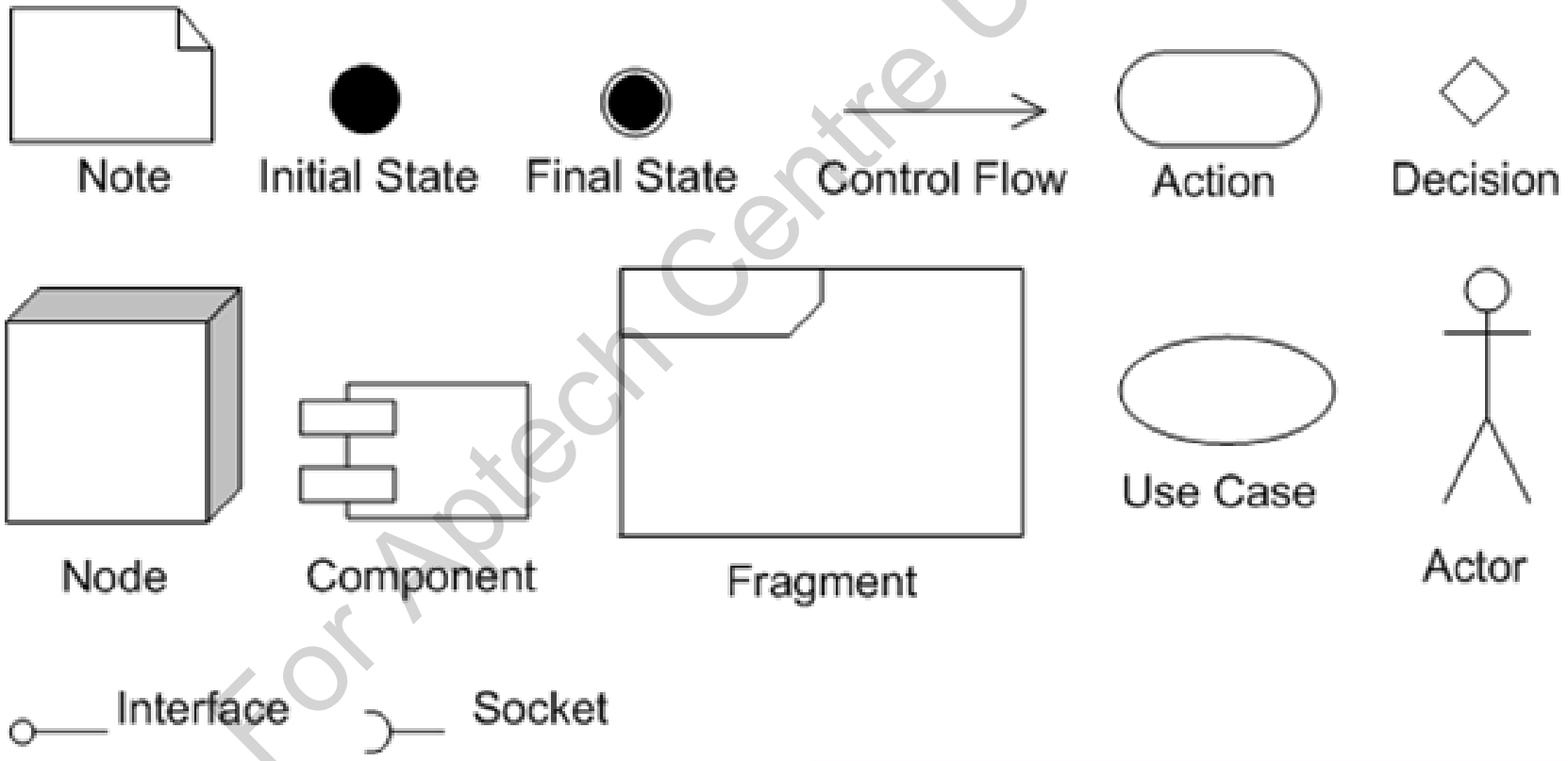


Unified Modeling Language (UML) 1-3

- UML:
  - Is a popular, standardized modeling tool used in structured programming and OOP systems
  - Is used to specify, visualize, modify, construct, and document the requirements and specifications of a software system under development
  - Helps designers and developers to read and circulate system structures
  - Provides the formalization and visualization, which make the requirements clear and concise

Unified Modeling Language (UML) 2-3

- Basic UML legends that are used in different kinds of UML diagrams are as follows:



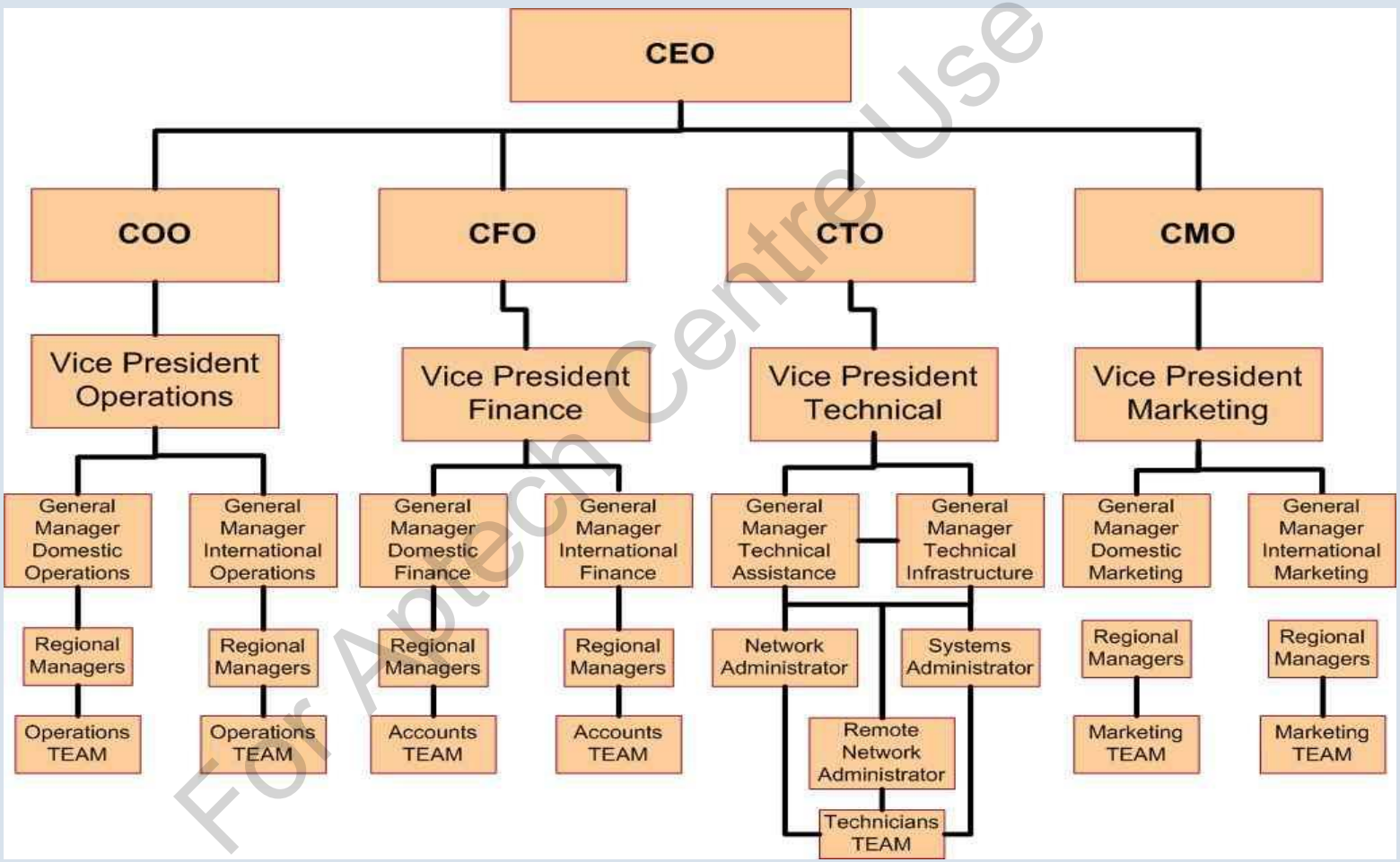
Unified Modeling Language (UML) 3-3

- Modeling views offered by UML are as follows:
  - Sequence Diagrams
  - Collaboration Diagrams
  - Activity Diagrams
  - State Chart Diagrams
  - Class Diagrams
  - Component Diagrams
  - Deployment Diagrams

Structure Charts 1-2

- A structure chart is a graphic representation of the decomposition of a problem
- It is a tool to assist in software designing
- It is particularly helpful while solving large problems
- A structure chart is not a flowchart; it has no logical sequence of tasks

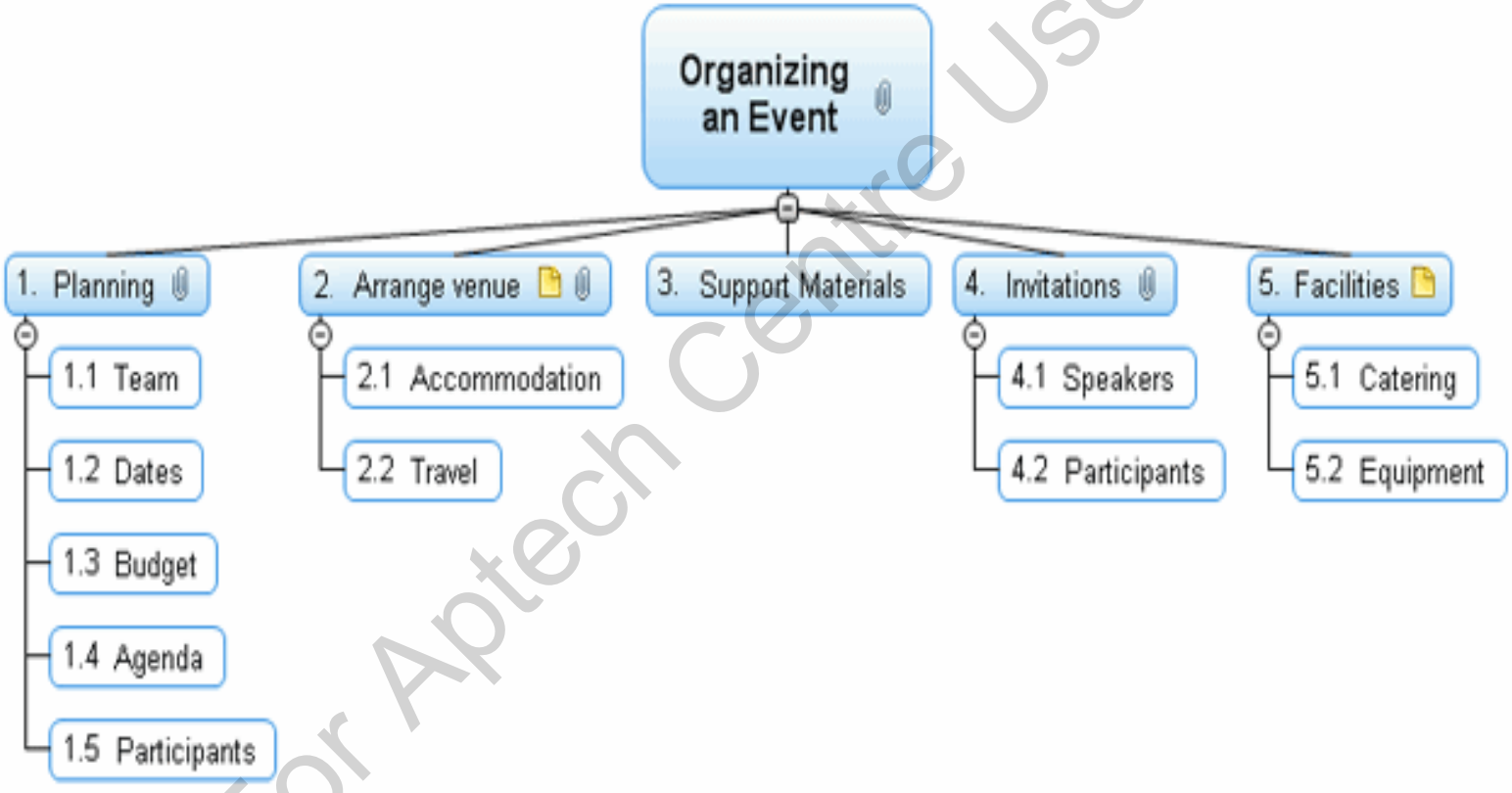
Structure Charts 2-2



Top-Down Structured Technique 1-2

- Is the process of dividing the overall task into smaller components
- Signifies breaking a difficult task down and solving pieces independently until every step can easily be implemented
- Emphasizes planning and a complete understanding of the system
- Is implemented by attaching the stubs in place of the modules

Top-Down Structured Technique 2-2



Elements of Structured Programs 1-2

Variables

- Variables represent the data
- The data can range from something very simple, such as the age of a person, to something very complex

Loops

- Loops allow carrying out execution of a group of commands a certain number of times

Conditionals

- Conditionals specify execution of a group of statements depending on whether or not some condition is satisfied

Elements of Structured Programs 2-2

Input/output	• This will allow interaction of the program with external entities
Subroutines and functions	• This will allow putting frequently used snippets of code into one location, which can then be used repeatedly

Summary

- Structured programming is a programming approach that implements a logical structure on a program to make it competent and easier to comprehend and modify
- UML is a popular modeling language used to specify, visualize, modify, construct, and document the requirements and specification of an object-oriented software system
- A structure chart is a graphical representation of the decomposition of a problem. It is a tool to assist in software designing
- Top-down structured technique is the process of dividing the overall task into smaller components