

Overview:

During software architecture, designers spend a great deal of time devising architectural solutions that provide the necessary components and interfaces to achieve system requirements. At the architectural level, common patterns have emerged that describe elements of the system together with their interrelationships and quality characteristics. These patterns allow designers to quickly and systematically identify structural characteristics of systems (or subsystems) and provide the means for examining interactions and the proposed quality of the system. During the past two decades, many styles and patterns for software architecture have been researched and published. Many of these patterns have been identified in pattern catalogue books; some of these are common design patterns in enterprise-level systems, while others address specific needs such as distributed systems. This module explores several well-established architectural patterns and examines the problems they are designed to address, together with their exhibited quality attributes. Identifying and designing using architectural patterns can improve the efficiency of the development process and the quality of the final system.

Module Objectives:

- *Understand the concept of architectural styles and patterns.*
- *Understand the importance and role of architectural patterns in architectural designs.*
- *Identify, understand, and apply the major types of architectural patterns.*
- *Understand the quality benefits associated with using different architectural patterns.*

Session 1: Overview and History of Styles and Patterns (20 - 30 minutes)

This session focuses on introducing the concepts of architectural styles and patterns as tool for efficient design of logical architectures. The history of styles and patterns is presented, giving insight into reasons for using these terms interchangeably in practice. A methodology for classifying styles/patterns by types of systems is presented, including: data-centered, data-flow, interactive, and hierarchical. The presentation of these types of systems serves as introduction to the rest of the material in upcoming sessions.

Slides – Chapter 4 – Session I

Session 2: Data-centered, Data-flow, and Distributed Systems (30 - 45 minutes)

This session presents an introduction to data-centered, data flow, and distributed systems, together with essential architectural patterns for these systems. The logical, process, and physical views are used to present the fundamental structure, behavior, and deployment of the following patterns: Blackboard, Pipes-and-Filters, and Client-server. These styles/patterns are

presented together with the quality attributes that they exhibit and with examples of their application to real systems.

Slides – Chapter 4 – Session II

Session 3: Interactive and Hierarchical Systems (20 - 30 minutes)

This session continues the discussion of distributed systems and presents two other types of systems: interactive and hierarchical systems. The logical, process, and physical views are used to present the fundamental structure, behavior, and deployment of the following patterns: Broker, Model-View-Controller, Main-Program-And-Subroutine, and Layered. These styles/patterns are presented together with the quality attributes that they exhibit and with examples of their application to real systems.

Slides – Chapter 4 – Session III

Homework #4

- Read chapter 4 and answer review questions 1-11. Submit your answers as a word or PDF document.

Quiz #4

See Quiz #4.