

ADE800 : Architectural Design Patterns

Code :

ADE800

Duration :

2 days

Category :

Analysis and Design

Audience :

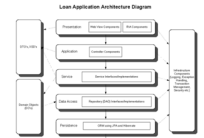
This course is aimed at experienced developers and software architects who want to apply design patterns for the architecture of systems.

Prerequisites :

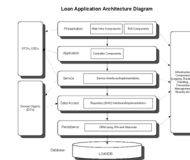
Knowledge of an object-oriented programming language like C++, C# or Java and experience with object oriented analysis and design with UML is desired.

Realization :

This course has a hands-on character. The theory is covered on the basis of presentation slides and is illustrated with demos of architectural patterns. There are exercises in design problems where architectural patterns can be applied. The course material is in English.



Architectural Design Patterns



Contents :

This course will discuss the importance and principles of Architectural Modeling and the application of Architectural Design Patterns. Architectural Design patterns refer to the large scale organization of systems and the cooperation of their components and layers and not to the internal architecture of the individual software components. After a review of the basics of software design patterns and their terminology, attention is paid to the role of design patterns in the architecture of software systems. The major architectural pattern categories are discussed. Attention is for instance paid to Call en Return Patterns like the Layers pattern, to Data Flow Patterns like the Pipes and Filter pattern, to Shared Memory patterns like the Blackboard pattern and to Distributed Systems patterns like the Proxy and Broker patterns. For each pattern the benefits and drawbacks are discussed. Students will exercise and discuss the application of patterns for practical problems in software architecture. Next advanced patterns that involve concurrency and multiple threads are discussed and finally some patterns that do not belong to a specific category are discussed.

Software Architecture

- What is Architecture?
- Software Architecture
- Layered Architecture
- Software Difficulties
- Software Characteristics
- Analogy to Building
- Role of Architect
- Software Architecture Elements
- Informal Architectures
- Architecture Context
- Architectural Viewpoints
- Viewpoints
- Logical Architecture
- Non Functional Requirements
- Physical Architecture
- Early Load Testing

Architectural Design Patterns

- Architectural Modeling
- Model Characteristics
- Architectural Viewpoints
- What are Design Patterns?
- Pattern Terminology
- Design Patterns Identified
- Gang of Four Design Patterns
- Architectural Patterns
- Typical Architectural Patterns
- Architectural Pattern Categories
- Batch Sequential Pattern
- Pipe and Filter Pattern
- Blackboard Pattern
- Publish and Subscribe Pattern
- Peer to Peer Pattern
- Model View Controller Pattern
- Architectural Pattern Comparison
- Drawbacks of Patterns

Call and Return Patterns

- Object Oriented Pattern
- OO Benefits and Drawbacks
- Object Oriented Architecture
- Layers Pattern
- Layers Context
- Layers Problem
- Layers Forces
- Layers Solution
- Network Architecture
- Layers Benefits and Drawbacks
- Known Uses Layers
- Layers Pattern Variant
- Client Server Pattern
- Client Server Architecture
- CS Benefits and Drawbacks
- Three Tier Pattern
- Three Tier Architecture

Data Flow Patterns

- Data Flow Patterns
- Data Flow Architecture
- Batch Sequential Pattern
- Data Flow Pattern Problems
- Batch Sequential
- Pipes and Filter Pattern
- Pipes and Filter Examples
- Pipes and Filter Forces
- Pipes and Filter Patterns
- Servlet Filters
- Web Service Handlers
- Call Chain of Handlers
- Benefits and Drawbacks
- Known Uses
- Pipes and Filter Variants

Shared Memory Patterns

- Data Centered View
- Shared Repository Pattern
- Shared Repository Architecture
- Active Repository Pattern
- BlackBoard Pattern
- BlackBoard Architecture
- BlackBoard Context
- Speech Recognition
- BlackBoard Solution
- BlackBoard Variants
- BlackBoard Know Uses
- Benefits and Drawbacks

Distributed Systems Patterns

- Proxy Pattern
- Proxy Structure
- Types of Proxies
- Copy on Write Proxy
- Remote Proxy
- RMI Proxy Architecture
- Broker Pattern
- Broker Context
- Broker Problem
- Broker Forces
- Broker Solution
- Server Component
- Client Component
- Client and Server Proxies
- Bridge Component
- Broker Variations
- Known Uses Broker
- Benefits and Drawbacks
- Broker Class Diagram

Interactive Systems Patterns

- MVC Pattern
- MVC Architecture
- MVC Model
- MVC View
- MVC Controller
- Multiple Views Same Data
- Known Uses MVC
- Benefits and Drawbacks
- PAC Pattern
- PAC Structure
- PAC Solution
- PAC Examples
- PAC Benefits and Drawbacks
- PAC Known Uses

Implicit Invocation Patterns

- Communication Patterns
- RPC Pattern
- Publish Subscribe Pattern
- Queue versus Publish Subscribe
- Topics and Queues
- Data Distribution Pattern
- Request Reply Pattern
- Request Reply Correlation
- Multiple Replies
- Scalable Request Reply
- Guaranteed Delivery Scenario
- Guaranteed Delivery

Concurrency Patterns

- Reactor Pattern
- Reactor Pattern Context
- Server Socket Loop
- Reactor Pattern Forces
- Event Driven Design
- Single Threaded Reactor
- Non Blocking IO
- Thread Pool Reactor
- Reactor Known Uses
- Reactor Benefits and Drawbacks
- Active Object Pattern
- Active Object Sequence Diagram
- Active Object Method Scheduling
- Active Object Method Dispatch

Other Patterns

MicroKernel Pattern
Microkernel Structure
State Machine Pattern
State Machine Structure
Reflection Pattern
Reflection Structure
Process Control Pattern
Process Control Structure
Master and Slave Pattern
Master and Slave Structure