

## Service-Oriented Modeling & Architecture (SOMA)

### Course Summary

#### Description

This course will utilize interactive lecture and case study scenarios to illustrate the concepts of SOA systems, development of Service-Oriented applications, how SOMA design techniques are implemented and the integration of enterprise components. Additionally, we illustrate the differences techniques used vs. OOAD processes, SOA requirements gathering, identifying services and processes, development of process modeling using BPM and BPEL, depict the four stages of SOAD, depict the SOA patterns, depict integration of BPM and Use Cases, identify services, define service implementation, service design, locate Classes and relationships from Use Cases, integrating UML class notation, usage of interface and data mapping, illustrate BPEL modeling concepts (Partners, variables, scope, etc), integrate advanced BPEL concepts, use of integration patterns. This course utilizes intricate sets of various case studies to demonstrate the capabilities of design diagrams and various testing strategies.

#### Objectives

At the end of this course, students will be able to:

- Understand the SOA Architecture
- Depict the role of Web services and corresponding client interaction
- Define the four major stages of SOAD
- Compare SOA to OOAD processes
- Define SOA patterns
- Depict SOA requirements gathering
- Define process modeling using BPM and BPEL
- Integrate Use Cases and BPM
- Illustrate service implementations
- Depict service design methodology
- Develop classes and relationships from Use Cases
- Integrate UML class notation
- Depict interface and data mapping
- Define BPEL modeling components
- Demonstrate advanced BPEL and WS concepts (State, Human interaction, etc)
- Use of integration patterns

#### Topics

- Introduction to SOA
- SOA Fundamentals
- Service-Oriented Analysis & Design (SOAD) Introduction
- SOMA Approach
- Business Modeling and Use Cases
- Service Identification
- Service Design and Implementation
- Business Process Implementation
- SOMA Modeling
- Advanced Process Modeling
- Modeling Integration Patterns

#### Audience

This course is designed for application architects, application developers, project managers and other professionals that will be designing SOA applications.

#### Prerequisites

Students should have a basic understanding of application development either as a developer, project manager or end client.

#### Duration

Five days

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## Service-Oriented Modeling & Architecture (SOMA)

### Course Outline

#### I. Introduction to SOA

- A. Service Oriented Architecture
  - 1. UDDI Registries
  - 2. Service Requestor
  - 3. Web Service
- B. B2C vs B2B
- C. Defining XML
- D. Defining SOAP
  - 1. Architecture
  - 2. Messages
- E. Web Services Descriptive Language (WSDL)
  - 1. Definition
  - 2. Usage

#### II. SOA Fundamentals

- A. Illustrate rise of SOA applications
- B. Depict the role of Web services in SOA environment
- C. Define components of SOA architecture
- D. Understand roles of individuals and products
- E. Depict the role of modeling in SOA
- F. Discuss physical components
  - 1. Web Services
  - 2. Enterprise Service Bus
  - 3. Process Server
- G. SOA Layers
  - 1. Operational
  - 2. Enterprise
  - 3. Services
  - 4. Choreography
  - 5. Presentation

#### III. Service-Oriented Analysis & Design (SOAD)

##### Introduction

- A. How OOAD principles apply to SOAD
- B. Applying OOAD Principles
  - 1. Abstraction
  - 2. Abstraction in SOAD
  - 3. Encapsulation
  - 4. Encapsulation in SOAD
  - 5. Modularity
  - 6. Modularity in SOAD
  - 7. Hierarchy

#### C. Hierarchy in SOAD

- D. Define SOAD principles
  - 1. Services are reusable
  - 2. Adherence to contracts
  - 3. Loose coupling with consumers
  - 4. Hiding external logic and data structure
  - 5. Service autonomy
  - 6. Stateless services
  - 7. Composable services in a business process
  - 8. Services are discoverable and dynamically bindable
- E. The SOAD Methodology Steps
  - 1. Stage 1 - Process Modeling
  - 2. Stage 2 – Service Identification
  - 3. Stage 3 – Service Design & Implementation
  - 4. Stage 4 - Process Implementation

#### IV. SOMA Approach

- A. Top-Down
- B. Business driven
- C. Goal-Service Modeling
- D. Evolution of EAI

#### V. Business Modeling and Use Cases

- A. How OOAD principles apply to SOAD
- B. Define SOAD principles
- C. Defining BPM
- D. Benefits of BPM
- E. Integrating SOA into BPM
  - 1. Notation specification
  - 2. Behavior modeling
  - 3. Process activity sequencing
- F. Illustrating Use Cases
- G. Discovering Actors
  - 1. Identity
  - 2. Issues
- H. Uncover cases
  - 1. Scenario driven
  - 2. Actor/Responsibility
  - 3. Aggregation
  - 4. Decomposition

## Service-Oriented Modeling & Architecture (SOMA)

### Course Outline (cont'd)

- I. Prioritization
- J. Templates
- K. Refactoring
- L. Use Case Relationships
  - 1. Uses
  - 2. Extends
  - 3. UML usage
- M. Use Case and Business Processes

#### VI. Service Identification

- A. Identifying Services
- B. Produce Service Specification
- C. Functional Areas of The Business (Subsystems)
- D. Define Services belonging to Functional areas
- E. Functionalities of these Services
- F. Documenting Service hierarchy
- G. Role of WSDL files

#### VII. Service Design and Implementation

- A. Service Design basics
  - 1. XML schema
  - 2. WSDL
    - a. Ports
    - b. Port types
    - c. Bindings
    - d. Messages
    - e. Types
  - 3. SOAP
    - a. Header
    - b. Body
    - c. Attachments
- B. Stage design goals
- C. Service development
- D. Top-down design
- E. Finding classes from Use Cases
- F. Finding relationships form Use Cases
- G. Class Diagram
- H. Class Notation in UML
- I. Top Down Summary
- J. Bottom Up Development
  - 1. Legacy system adapters
  - 2. Creating a service based on adapters
- K. Data Mapping
- L. Interface Mapping

#### VIII. Business Process Implementation

- A. Business Process diagrams
- B. Integration with business process management
- C. Business process standards
- D. BPEL concepts
  - 1. Partners
  - 2. Endpoints
  - 3. Activities
  - 4. Variables
  - 5. Data handling
  - 6. Correlation

#### IX. SOMA Modeling

- A. Consumer View
  - 1. Service Identification
  - 2. Categorization
  - 3. Exposure
  - 4. Choreography
  - 5. QoS
- B. Provider View
  - 1. Component Identification
  - 2. Specification
  - 3. Realization
  - 4. Management
  - 5. Standards/Governance
- C. SOMA Methodology
  - 1. Identification
    - a. Domain decomposition
    - b. Goal-service modeling
    - c. Existing system analysis
  - 2. Specification
    - a. Component flow
    - b. Data
    - c. Rules
    - d. Services
    - e. Variations
  - 3. Information specification
  - 4. Service Specification
    - a. Service flow
    - b. Message flow

## **Service-Oriented Modeling & Architecture (SOMA)**

### **Course Outline (cont'd)**

5. Realization
  - a. Service allocation to component
  - b. Mediators
  - c. Façade
  - d. Rule objects
  - e. Factories
  - f. Component layer

#### **X. Advanced Process Modeling**

- A. Error Handling
- B. Modeling Faults
- C. Compensation
- D. Transaction Management
- E. Sub-process modeling'
- F. Human interaction

#### **XI. Modeling Integration Patterns**

- A. Defining eBusiness Integration Patterns
  1. Business
  2. Integration
  3. Application
  4. Runtime
- B. Business patterns
  1. Self Service
  2. Collaboration
  3. Information aggregation
  4. Extended Enterprise
- C. Integration Patterns
  1. Process
  2. Application