

## Service Oriented Architecture and Web Services

### Course Summary

#### Description

This course provides a high level overview of Service Oriented Architecture (SOA) and Web Services with an introduction to some of the related popular emerging technologies like microservices and cloud computing. The class focuses on the concepts, the technical case and the business case for moving to SOA, as well as a critical look at the issues and problems that have been encountered by some organizations as they have tried to deploy their own SOA implementations. These business and technical concepts are illustrated through the presentation and analysis of case studies.

The course also looks at the sorts of tools and implementation technologies that are used in developing SOA based environments including web services from both the more tradition SOAP model and from the more current RESTful model. A variety of current methodologies and related topics are introduced, such as domain driven design, cloud computing and DevOps for example, with the emphasis of the course being how they support, integrate and relate to an SOA development initiative.

The course introduces students to some of the current emerging trends in SOA covering topics like microservices, cloud based services, security, reliability, performance and monitoring issues and protocols. This section also includes brief overview of the currently popular tools in use in the SOA development community.

This is not a hands-on course where students will be doing any programming work, but there will be case studies, examples, class discussions on various topics and conceptual exercises to assist in learning the material. The course concludes with a review of a "path to SOA" to help students plan their next steps.

#### Topics

- Business case for SOA and using a service based approach
- SOA Architecture, principles and concepts
- Implementing SOA with web services
- Classic web services protocols: SOAP, WSDL, etc
- RESTful web services
- Microservices and cloud computing
- Designing services and domain driven design
- SOA security, monitoring, and other issues
- Developing services in and Agile and DevOps environment
- Current popular tools: eg. Spring Boot
- Current best practices and standards, pitfalls, and problems

#### Audience

This course is designed for managers, architects, designers, developers or any other IT professionals who need a general introduction to the terms and concepts used in SOA, web services, and microservices.

#### Prerequisites

There are no prerequisites for this course.

#### Duration

Two days

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### Course Outline

- I. Introduction**
  - A. SOA versus traditional application development
  - B. State of the art: SOA track record
  - C. Implementing SOA
  - D. The concept of a "service"
  - E. Case Studies
- II. The SOA Business Case**
  - A. Responding to change
  - B. Innovation and marketplace agility
  - C. Economic considerations
  - D. Challenges when moving to SOA
  - E. Retooling and retraining
  - F. Costbenefit analysis
  - G. Case studies: Success and failures
- III. SOA Design Principles**
  - A. Loose coupling
  - B. Location transparency
  - C. Interoperability
  - D. Robustness and reliability
  - E. Continuous delivery of enhancements
  - F. The architectural patterns of SOA
  - G. Best practices and SOA patterns
- IV. Services**
  - A. Understanding services
  - B. Transactional services
  - C. Service discovery
  - D. Designing services
  - E. Domain driven design
  - F. Business processes as services
  - G. Business and Technical services
  - H. Best practices is service design
- V. Web Services**
  - A. Implementing SOA as a web service
  - B. The two models: SOAP versus RESTful
  - C. Basic concepts of how each model works
  - D. Comparison and contrast between models
- VI. SOAP and Related Protocols**
  - A. SOAP and XML
  - B. WSDL
  - C. UUDI
  - D. Message envelopes, handlers and encoding
  - E. Implementing a service with SOAP
- VII. RESTful and JSON**
  - A. Concept of a RESTful service
  - B. HTTP methods and encoding
  - C. Data encoding with JSON
- VIII. MicroServices**
  - A. The microservice architecture
  - B. Services in the cloud
  - C. Implementing SOA with microservices
  - D. Migrating to microservices from legacy applications
  - E. Advantages and disadvantages of microservices
- IX. Current tools and environments**
  - A. SOA and the Agile development environment
  - B. SOA and DevOps
  - C. Amazon Web Services (AWS) and similar frameworks
  - D. Open source tools: foundries, Spring, etc
  - E. Survey of the common tools used
- X. SOA Concerns**
  - A. Security issues with SOA
  - B. Reliability, robustness, scalability, etc.
  - C. Management and oversight
  - D. Monitoring and change management
  - E. Current legal, political and organizational concerns
  - F. Case studies
- XI. Planning SOA**
  - A. Requirements and needs analysis
  - B. Integration with enterprise architecture
  - C. Transaction management
  - D. Managing data concerns
  - E. Organizational culture
  - F. Market place analysis
- XII. SOA Roadmap**
  - A. Planning a pilot project
  - B. Identifying obstacles
  - C. Technical and cultural concerns
  - D. Modeling the enterprise as it is now
  - E. Modeling the services
  - F. Developing the plan
  - G. Review of topics
  - H. Other topics as requested