
CO4214 Service-Oriented Architectures

Credits: 15 **Convenor:** Prof. R. Heckel **Semester:** 2nd

Prerequisites: Desirable: UML, XML, Java

Assessment: Coursework: 40%

Two hour exam in May/June: 60%

Lectures: 24 hours

Surgeries: 8 hours

Laboratories: 8 hours

Private Study: 72.5 hours

Subject Knowledge

Aims The aim of this module is to give students knowledge and skills in the principles and functions of service-oriented systems and applications, as well as in their development based on Java, UML, and XML. This shall enable them to use such technologies in practice or to embark on a PhD in this area.

Learning Outcomes Students should be acquainted with the conceptual and technological foundations of Service-Oriented Architectures (SOA), i.e.

- the motivation, basic mechanisms, and open problems of SOA;
- service-oriented development and its relation to object-oriented and component-based development;
- the realisation of SOA based on XML and Web service technology.

Methods Class sessions together with course notes, labs, recommended textbooks, and worksheets.

Assessment Multiple choice and short answer tests, written examinations.

Skills

Aims The module shall provide the basic skills required to use SOA technologies in practice.

Learning Outcomes Students should be able to create and understand descriptions of services and systems using both high-level models and XML-based languages, including

- UML models of service-oriented applications at different levels of abstraction;
- their implementation in Java and Web services.

Methods Worksheets and practical programming experience.

Assessment Computer-based exercises, computer programmes.

Explanation of Prerequisites Basic knowledge of XML, UML, and Java will be helpful.

Course Description A Web service is an application component deployed on a Web accessible platform, provided by a service provider to be discovered and invoked over the Web by a service requestor. Service-oriented architectures, the underlying architectural style of Web services, combine ideas from component-based and distributed systems, adding the idea of services as loosely coupled components that may be discovered and linked at runtime. Applications range from enterprise application integration, via electronic commerce, to dynamic e-business scenarios.

The lecture shall give an introduction to the basic technologies that underly Web services and present a systematic, model-based development approach using the UML. This includes the specification of service interfaces by means of UML diagrams, the systematic (and partly automatic) generation of the corresponding XML-based descriptions, and the implementation of services in Java.

Detailed Syllabus In detail, the module will cover the following topics.

- Motivation and Concepts of SOA;
- Modelling XML Languages with UML;
- Model-Based Data Integration using XSLT;
- XML-based Messaging using SOAP;
- Describing and Publishing Web Services using WSDL and UDDI;
- Processes for Web Services based on BPEL4WS;
- Web Services and Semantic Web technology;

Reading List

- [A] Francisco Curbera, Frank Leymann, Tony Storey, Donald Ferguson, Sanjiva Weerawarana, *Web Services Platform Architecture: Soap, WSDL, WS-Policy, WS-Addressing, WS-Bpel, WS-Reliable Messaging and More*, Prentice Hall. 2005.
- [A] Tom Pender, *UML Bible*, Wiley Publishing Inc, 2003.
- [A] Martin Fowler, Kendall Scott, *UML Distilled: A Brief Guide to the Standard Object Modeling Language*, Object Technology S., 2003.

Resources Course notes, web pages, study guide, worksheets, handouts, lecture rooms with data projector/OHP.

Module Evaluation Course questionnaires, course review.