CS 548 Enterprise Software Architecture and Design Syllabus

The syllabus below describes a recent offering of the course, but it may not be completely up to date. For current details about this course, please contact the course coordinator. Course coordinators are listed on the course listing for undergraduate courses and graduate courses.

This course will cover the issues in designing and engineering large enterprise software systems. Such systems are typically distributed and require increasingly complex inter-enterprise as well as intra-enterprise coordination. Technologies such as Web Services and cloud computing provide platforms for building such systems, and architectures such as service-oriented architecture, event-driven architecture and REST are idioms for structuring such systems. This course will focus on analysis and design of enterprise software systems, with particular emphasis on the architectures recommended for such systems. Some background in Web Services is also covered. The course is largely vendor-neutral, with short reviews in one or two places of technological solutions. Instead the emphasis of the course is on .design patterns. that the working software engineer for enterprise systems can use to develop DDA, SOA, ROA and EDA for enterprise computing. The course also considers workflow, both from the viewpoint of hypermedia networks as advocated by REST, and from the viewpoint of business process modeling languages such as BPEL and BPMN recommended by the SOA approach. CS 549 Distributed Systems and Cloud Computing is a useful companion course. In that course, students use a programming environment such as JEE or WCF to build distributed enterprise applications. This course focuses on the proper design patterns for engineering the architecture of such applications. Exercises involve the use of tools, particularly using the Eclipse IDE, for engineering aspects of enterprise software systems.

Text Books

Required
Dominic Duggan , *Enterprise Software Architecture and Design: Entities, Services, and Resources* , Wiley, 2012

Week-by-Week Schedule

Week	Topics Covered	Reading	Assignments
1	Enterprise information systems. Software architecture. Middleware, Web services and Cloud computing.	2.1-2, 2.4-7	
2	Data Modeling. UML and E-R models. XML Schemas.	3	Cloud
3	Data Processing. Strategies for data processing. Introduction to XQuery. JSON.	4.1-3, 4.5	XML Schema.
4	Domain-Driven Architecture. Domain-driven design (DDD). Object-relational mapping (ORM).	D 5.1-3, 5.5-6	XQuery
5	Service-oriented Architecture (SOA). Standardized service contract. Loose coupling. Service abstraction.	6.1-7	ORM
6	Service-oriented Architecture (SOA). Reusability and autonomy. Statelessness. Service discoverability.	6.8, 6.9.3, 6.10-11	DDD
7	Resource-Oriented Architecture (ROA). Plain Old XML (POX) and REST. Hypermedia networks.	7.1-6	SOA

Week	Topics Covered	Reading	Assignments
8	Message-Oriented Middleware (MOM). Asynchronous enterprise integration patterns.		REST
9	Event-Driven Architecture (EDA). Complex event processing. Semantic Data Modeling. Introduction to RDF and RDFS.		Web service clients
10	Semantic data modeling. RDFS and OWL.		MOM
11	Business Processing Modeling. Descriptive and analytic BPMN.		OWL
12	Petri Nets and Workflow. Place-transition and workflow nets.		BPMN
13	Cloud Data Stores. Relational vs. object data models. Algebras and co-algebras.		
14	Contexts and dependency injection (CDI). Transactional APIs.	6.5, 6.10.1	NoSQL