

Course Description

A Service-Oriented Architecture (SOA) is a design model for linking computational resources, data and applications to perform services and deliver results to service consumers. Web Service (WS) standard provides a platform-independent method for messaging-based interaction of applications. In this course we will study the basic concepts, technologies that support SOA, and the design and implementation of a SOA using web services. Topics covered include:

- SOA concepts: loose coupling of systems, communication through messaging, enterprise service bus, composition of complex services, workflow design, events and notification, policies and service-level agreements, process engineering and system design.
- Web services: service definition, web services definition language (WSDL), publication and discovery, service encapsulation, meta-data specification, and consumption of a web service by an application.
- Technologies: XML, SOAP, REST, programming language support for WS (C# and Java), mash up of services, Web 2.0 and rich client designs.
- WS-standards: Some of the standard WS specifications developed by WC3 consortium will be studied: WS-Addressing, WS-Policy, WS-Choreography, WS-Resource, WS-BPEL, WS-Security and WS-Trust.

Concepts studied will be illustrated using real case studies and practical assignments. On completion of this course students will be able to understand the SOA model and be able to the design and implement a WS-based service-oriented system.

Course Information

Website:	http://www.cse.buffalo.edu/~bina/cse507/fall2007
Instructor:	Bina Ramamurthy (bina@cse.buffalo.edu)
Lecture Time:	M: 2.00-4.40PM
Lecture Location:	Jacobs 106
Office:	127 Bell Hall
Office Hours:	WF: 10.00AM – 11.30AM

Textbook and other material

The primary textbook for this course is:

1. Enterprise SOA: Service-oriented Architecture Best Practices, D. Krafzig, K. Banke and D. Slama, Prentice-Hall Inc., ny 2007.
2. SOA using Java Web Services, M.D. Hansen, Prentice-Hall Inc., 2007. This book is Safari-enabled; you may be able to access it online through UB libraries.

Other online references and links of interest will be made available on course web site.

Pre-requisites

Graduate standing is required. Familiarity with information system analysis and design and working knowledge of a programming language such as Java is recommended.

Grading Distribution

Grades will consist of the following components:

Component (Quantity)	Percentage
Assignments (6)	30%
Term project (1)	20%
Midterm (1)	25%
Final (1)	25%

Point distribution guideline will be as follows:

Point Range	Letter Grade
95.00-100	A
90.00-94.99	A-
85.00-89.99	B+
80.00-84.99	B
75.00-79.99	B-
70.00-74.99	C+
65.00-69.99	C
60.00-64.99	C-
55.00-59.99	D+
50.00-54.99	D
0-49.99	F

I reserve the right to alter component weighting or provide a “curve” on an assignment as warranted.

Assignments

The course covers a wide range of topics related to SOA and web services. There will be reading assignments at the end of every class. Take home work will be assigned that encourages students to research the concepts discussed during lecture. Sample assignments include analyzing the requirements of an enterprise SOA, design of a workflow, design of a service, design of simple SOA, comparison of alternatives for SOA implementation (ex: REST vs WS). While these assignments allows students to explore and understand SOA concepts, the term project gives them experience in implementing (design, code and deploy) an SOA.

Exams

There will be a midterm that will be administered and graded before the resign date. Midterm material will cover all lecture and reading assignments before the exam, as well as concepts from the assignments. The final is a comprehensive exam, covering all lecture, project, and homework areas.

Attendance Policy

You are responsible for the contents of all lectures and recitations (your assigned section). If you know that you are going to miss a lecture or a recitation, have a reliable friend take notes for you. Of course, there is no excuse for missing due dates or exam days. We do, however, reserve the right to take attendance in both lecture and recitation. We may use this information to determine how to resolve borderline grades at the end of the course, especially if we see a lack of attendance and participation during lecture sessions. During lectures, we will be covering material from the textbook. We will also work out several of the problems from the text. You will be given a reading assignment at the end of each lecture to prepare for the next lecture.

Office Hour Policy

If you cannot meet during these hours, you will have to communicate with us via Email. Office hours are intended to resolve questions about the material that could not be answered in lecture. Come to office hours prepared.

Grading Policy

All assignments will be graded and returned in a timely manner. When an assignment is returned, you will have a period of one week to contest any portion of the grade. The TA who graded your assignment will be the first person to resolve a grading conflict. If the conflict cannot be resolved, the instructor will mediate the dispute. The judgment of the instructor will be final in all such cases. When contesting a grade, you must be able to demonstrate how your particular solution is correct. Also, when contesting a grade, the instructor or TA reserves the right to re-evaluate the entire lab or exam, not just the portion in dispute.

Incomplete Policy

We only grant incompletes in this course under the direst of circumstances. By definition, an incomplete is warranted if the student is capable of completing the course satisfactorily, but some traumatic event has interfered with their capability to finish within the timeframe of the semester. Incompletes are not designed as stalling tactic to defer a poor performance in a class.

Academic Integrity Policy

UB's definition of Academic Integrity in part is, "Students are responsible for the honest completion and representation of their work". It is required as part of this course that you read and understand the departmental academic integrity policy located at the following URL:

http://www.cse.buffalo.edu/academics-academic_integrity.shtml

There is a very fine line separating conversation pertaining to concepts and academic dishonesty. You are allowed to converse about general concepts, but in no way are you allowed to share code or have one person do the work for others. You must abide by the UB and Departmental Academic Integrity policy at all times. Remember that items taken from the Internet are also covered by the academic integrity policy! If you are unsure if a particular action violates the academic integrity policy, assume that it does until you receive clarification from the instructor. If you are caught violating the academic integrity policy, you will minimally receive a ZERO in the course.

Web Site

The CSE507 website should be checked frequently for important news. Course assignments, slides, grade reporting, and general hints and tips will be posted on the website. The same material will be available through ublearns blackboard.

Students with Disabilities

If you have special needs due to a disability, you must be registered with the Office of Disability Services(ODS). If you are registered with ODS please let your instructors know about this so that they can make special arrangements for you.

Tentative Lecture Schedule		
Week of	Topics Covered	Reading Material
8/27	Introduction to enterprise systems, service-oriented architecture (SOA); requirements of an enterprise system; Evolution of the service concept; services science;	Book1: Ch.1; Ch.2; Ref.1
9/3	No class : Labor day	-
9/10	Fundamental concepts in distributed computing and communications: RPC, interface, payload semantics; transaction monitors, application servers, synchronous vs. asynchronous operation; tight vs. loose coupling. Web services demo.	Book1: Ch.3
9/17	Definition of system architecture; Elements of a service-oriented architecture: service, service repository, application frontend and service bus; Services as building blocks; types of services: basic services, intermediary services, data centric services, process centric services, vertical and horizontal utility) services.	Book1: Ch.4; Ch. 5; Ref. 2
9/24	Development of a enterprise SOA: An architectural roadmap: fundamental SOA; networked SOA; and process-enabled SOA. Business process management (BPM) and BPMS; Business process execution language for WS (BPEL4WS)	Book1: Ch. 6, Ch.7; Ref 3
10/1	Managing process integrity: technical and business exceptions; logging and tracing; ACID properties; problems with 2PC and tightly coupled ACID transactions; transaction chains and compensation; Case study on transactions and concurrency control in SOA.	Book1: Ch. 8
10/8	Introduction to web services, web services definition language (WSDL), publication, discovery, service encapsulation, meta-data specification, SOA using Java Web Services	Book2: Ch.2
10/15	Role of WSDL, SOAP and Java/XML mapping in SOA	Book2: Ch 4
10/15	SOA using REST (Representational State Transfer)	Book2: Ch. 3
10/22	Design and implementation: demos; term project discussion	Book2: Ch. 9
10/29	Software and services buses: logging, monitoring, scalability and availability using web services; Securing an SOA: trust domains;	Book1: Ch.9
11/5	Design an SOA: building web application, enterprise application integration, B2B enabling, rich clients , interfacing to small devices (handheld, phones etc.), multichannel application	Book1: Ch. 10
11/12	SOA: Organizational issues (time permits)	Book1: Ch.11-13
11/19	Case Study 1: Deutsche Post AG (European mail service provider)	Book1: Ch.14
11/26	Case Study 2: Credit Suisse (global financial company)	Book1: Ch.16
12/3	Project demos/presentations	
Books	Book1: D. Krafzig, K. Banke, D. Slama. Enterprise SOA, Prentice-Hall Inc.	
	Book2: M.D. Hansen. SOA using Java Web Services	
References		
1	H. Chesbrough and J. Spoherr. A research manifesto for services science. CACM July 2006, Volume 49, Number 7, Special Issue on Services Science	
2	O. Zimmerman, P. Krogdal, C. Gee. Elements of service-oriented analysis and design. An Inter-disciplinary modeling approach for SOA projects. http://www.ibm.com/developerworks/webservices/library/ws-soad1/ , June 2004	
3	http://www-106.ibm.com/developerworks/library/ws-bpel	