

University of South Florida
College of Business Administration
Information Systems and Decision Sciences
ISM 6125 - Software Architecture
Spring Semester 2000 - Syllabus

Instructor:

Professor Alan R. Hevner

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Office Hours: MW 5:00 - 6:00, and by appointment

Course Objectives:

Software architecture has emerged as an explicit field of study for software engineering practitioners and researchers. In this course, we will investigate the growing literature on software architecture and understand the application of software architecture concepts to the development of information systems. Upon completion of this course, students will be able to:

- Recognize major architectural styles in software systems.
- Generate reasonable architectural alternatives for a problem and choose among them.
- Understand and be able to use existing definitions and tools to construct a high-level system-level architecture.

The course will utilize a combination of lectures, discussions, guest speakers, student presentations, individual projects, and group projects to explore the field of software architecture.

Course Readings:

Required Readings:

- Len Bass, Paul Clements, and Rick Kazman, **Software Architecture in Practice**, Addison-Wesley, Inc., 1998.
- Course Readings and Notes - Required readings are listed in the attached bibliography. These readings are available at Pro-Copy.
- Downloads from the web as additional required readings.

Recommended Reading:

Mary Shaw and David Garlan, **Software Architecture: Perspectives on an Emerging Discipline**, Prentice-Hall, Inc., 1996.

Course Outline: (SAP – Software Architecture in Practice, DL – Download)

Date	Topic	Readings
Jan. 10 Study Sheet 1	Introduction to Software Architecture The Architecture Business Cycle	SAP 1-2 DL 1
Jan. 24 Study Sheet 2	Foundations of Software Architecture Architectural Styles Christopher Alexander (Videotape)	SAP 4-5 Reading 1 DL 2-3
Jan. 31 – Feb. 7 Study Sheet 3	Architecture Case Studies Procedural Architectures Data Flow Architectures Repository Architectures Event Architectures Mediator and Intelligent Agent Architectures	SAP 3, 6 Readings 2-7
Feb. 14 Study Sheet 4	Component-Based Architectures Object-Oriented Patterns and Reuse	Readings 8-10
Feb. 21 Study Sheet 5	Architecture Analysis and Review Software Architecture Analysis Method Architecture Tradeoff Analysis	SAP 9-11 DL 4
Feb. 28 Study Sheet 6	Middleware Architectures CORBA DCOM and COM+	SAP 8 DL 5-6
Mar. 6 Study Sheet 7	Software Architecture for Survivable Systems Guest Speaker: Rick Linger – SEI	Reading 11
Mar. 13	Spring Break	
Mar. 20 – Mar. 27 Study Sheet 8	Group Presentations and Discussions Group 1 – Internet Intelligent Agents Group 2 – Reuse Issues and Commercial Off-The-Shelf (COTS) System Architectures Group 3 – Social and Organizational Issues of SW Architectures Group 4 – Recovery and Reengineering of Architectures Group 5 – Product Lines based on Architectures Group 6 – Languages and Environments for Architecture Design	See Group Study Sheets for Suggested Readings
Apr. 3 Study Sheet 9	Industry Software Architecture Case Studies Guest Speakers: GTEDS and CommerceQuest	
Apr. 10 Study Sheet 10	The Future of Software Architecture Open Systems and Standards	SAP 17, 19
Apr. 17 Study Sheet 11	The Software Architecture Function in Organizations Guest Speaker: John Birch – Industry Consultant	
Apr. 24 Study Sheet 12	Presentation and Discussion of Student Projects	

Grading Policy:

Class Participation	20%
Project #1 - Architectural Styles (Individual)	25%
Project #2 - Research Presentation and Critique (Group)	25%
Project #3 - Architectural System Analysis (Individual)	30%

Incompletes:

Only in **rare cases**, such as serious illness, will an Incomplete be given. An Incomplete must be requested in writing giving the reason for the request and all appropriate documentation.

Reading Assignments:

Readings are to be completed by class time on the date assigned. The following readings are listed in the course outline and are available as a packet at Pro-Copy:

1. C. Alexander, "The Origins of Pattern Theory: The Future of the Theory, and the Generation of a Living World," **IEEE Software**, Vol. 16, No. 5, Sept./Oct. 1999.
2. D. Garlan, G. Kaiser, and D. Notkin, "Using Tool Abstraction to Compose Systems," **IEEE Computer**, Vol. 25, No. 6, June 1992.
3. H. Mills, "Stepwise Refinement and Verification in Box-Structured Systems," **IEEE Computer**, Vol. 21, No. 6, June 1988.
4. D. Barrett, L. Clarke, P. Tarr, and A. Wise, "A Framework for Event-Based Software Integration," **ACM Transactions on Software Engineering and Methodology**, Vol. 5, No. 4, October 1996.
5. G. Wiederhold, "Mediators in the Architecture of Future Information Systems," **IEEE Computer**, Vol. 25, No. 3, March 1992.
6. H. Wang and D. Wang, "Intelligent Agents in the Nuclear Industry," **IEEE Computer**, Vol. 30, No. 11, November 1997.
7. S. Stolper, "Streamlined Design Approach Lands the Mars Pathfinder," **IEEE Software**, Vol. 16, No. 5, Sept./Oct. 1999.
8. A. Brown and K. Wallnau, "The Current State of CBSE," **IEEE Software**, Vol. 15, No. 5, Sept./Oct. 1998.

9. R. Monroe, A. Kompanek, R. Melton, and D. Garlan, "Architectural Styles, Design Patterns, and Objects," **IEEE Software**, Vol. 14, No. 1, January 1997.
10. D. Garlan, R. Allen, and J. Ockerbloom, "Architectural Mismatch or Why It's Hard to Build Systems Out of Existing Parts," **Proceedings of the International Conference on Software Engineering**, Seattle, 1995.
11. R. Ellison, R. Linger, T. Longstaff, and N. Mead, "Survivable Network System Analysis: A Case Study," **IEEE Software**, Vol. 16, No. 4, July/Aug. 1999.

Downloads:

1. Explore the following sites for software architecture study:
Software Architecture website at <http://www-ast.tds-gn.lmco.com/arch/>
SEI Architecture website at http://www.sei.cmu.edu/ata/ata_init.html.
2. P. Denning and P. Dargan, "A Discipline of Software Architecture," **ACM Interactions**, Vol. 1, No. 1, January 1994. Download from Peter Denning's website at <http://cne.gmu.edu/pjd/PUBS/>
3. D. Lea, "Christopher Alexander: An Introduction for Object-Oriented Designers," **ACM Software Engineering Notes**, January 1994. Download from Doug Lea's website at <http://gee.cs.oswego.edu/dl/ca/ca/ca.html>
4. R. Kazman, M. Barbacci, M. Klein, S. Carrierre, and S. Woods, "Experience with Performing Architecture Tradeoff Analysis," 21st International Conference on Software Engineering, Los Angeles, May 1999. Download from the SEI website at http://www.sei.cmu.edu/ata/ata_publications.html
5. Explore the OMG website on its CORBA technologies - <http://www.corba.org/>
6. Explore the Microsoft website on its COM and DCOM technologies – <http://www.microsoft.com/com/>