

CISC 322

Software Architecture



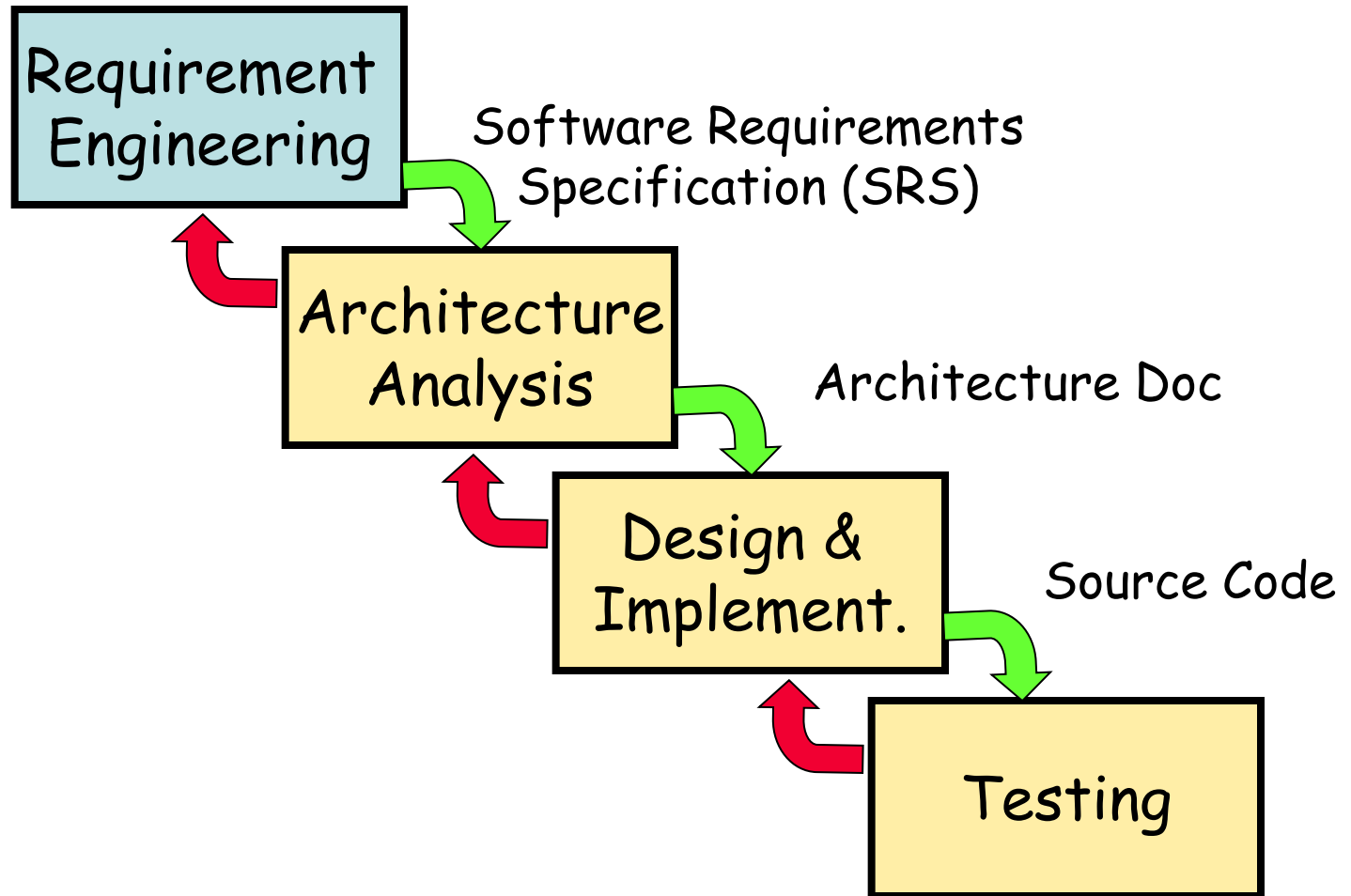
Lecture 01:

Introduction and Admin

Emad Shihab

Adapted from: Ahmed E. Hassan

Waterfall Development Process



Software Architecture (IEEE Definition)

- *Architecture is the fundamental **organization** of a **system** embodied in its **components**, their **relationships** to each other, and to the **environment**, and the principles guiding its design and evolution.
[IEEE 1471]*

What is a system? ([IEEE 1471])

- **System:** *a collection of components organized to accomplish a specific function or set of functions.*
- *A System can mean*
 - *individual applications*
 - *systems in the traditional sense*
 - *subsystems, systems of systems, etc...*
- *A system exists to fulfill one or more **missions** in its environment.*

Environments, Missions and Stakeholders ([IEEE 1471])

- **Environment:** *determines the setting and circumstances of developmental, operational, political, and other influences upon that system.*
- **Mission:** *a use or operation for which a system is intended by one or more **stakeholders** to meet some set of objectives.*
- **Stakeholder:** *an individual, team, or organization (or classes thereof) with interests in, or concerns relative to, a system.*

Course Scope

- Exposes you to the challenges in developing large and ultra large software systems
- Learn various concepts related to large scale software development
 - Architectural views
 - Architecture evaluation methods
 - Social architecture (conway's law)
 - Effort estimation techniques
 - Software evolution and software aging
 - Team leadership
- Study the architecture of a Large software system (*Mozilla Firefox*)

Course Format

- Four slots:
 - Monday 10:30AM to 11:30AM BIOSCI-1120
 - Tuesday 9:30AM to 11:30AM JEFFRY-102
 - Wednesday 9:30AM to 10:30AM BIOSCI-1120
 - Friday 8:30AM to 9:30PM BIOSCI-1120
- You **MUST** attend all scheduled slots
 - Early in the term, extra lectures will be given in these slots to ramp up on the project details
 - Later in the term, you will have more time for meetings and discussions related to your project

Course Staff and Web Page

- Lecturer:
 - Emad Shihab, 156 Barrie Street, **emads@cs.queensu.ca**
 - Office Hours: by appointment
- TA:
 - Amartya Banerjee, **banerjee@cs.queensu.ca**
- Course Webpage:
 - <http://research.cs.queensu.ca/home/emads/cisc322.html>
- Send emails from your queen's email account, otherwise likely to be flagged as spam
- Put "CISC322" in subject to go around spam filters

Course Expectations

- Read assigned readings
- Attend lectures and participate in discussions
- Bring your ideas and concerns to class
- Work effectively in a group setting (group members will evaluate each other)
- Learn how to use the tools and understand your project *very well*
- Hand in your deliverables on time

Evaluation

- Midterm (**14 Oct 2011**) **10%**
- Final **25%**
- Group Project **65%**

■ **NOTE:**

- You **HAVE** to pass the Midterm + Final to pass the course
- You **HAVE** to pass the project to pass the course

Course Project

- A0: Create webpage for Firefox
- A1: Describe the conceptual architecture
- A2: Recover the concrete architecture and compare to conceptual
- A3: Propose an enhancement and propose and compare 2 designs/implementation plans

Project Mark Breakdown

1.	Group List(4 Members per group)+Links(A0)	3%	30 Sep 2011
2.	Conceptual Architecture Presentation	7%	17 Oct 2011
3.	Conceptual Architecture (A1) [15 pgs]	10%	21 Oct 2011
4.	Concrete Architecture Presentation	7%	7 Nov 2011
5.	Concrete Architecture (A2) [15 pgs]	15%	11 Nov 2011
6.	Architecture Enhancement Presentation	7%	28 Nov 2011
7.	Architecture Enhancement (A3) [15 pgs]	16%	2 Dec 2011

Students must participate in all project presentations; missing the presentation slot for a deliverable will result in a 25% reduction in your mark for that presentation.

Website

- You need to update a group website throughout the term
- Website should be up by **30 Sep 2011**
 - Worth 3% of your mark
 - If not kept up-to-date you lose the 3%

Peer Reviews

- All members should receive same marks for project, however to account for that individual effort, we have peer reviews
 - You can assign each member (including yourself) a grade
 - You have $5 * N + 1$ marks, where N is size of group
- Peer reviews are sent 24 hours **after** each large deliverable:
 - A1 – 21 Oct 2011 + 24hrs
 - A2 – 11 Nov 2011 + 24hrs
 - A3 – 2 Dec 2011 + 24hrs
- **YOUR mark depends on the reviews being sent in on time! (25% off if delayed).**
- Reviews are submitted on Moodle with subject: “Peer Review for Group ##”

Lateness Policy for All Course Deliverables

- For all deliverables:
 - Hand hard copy at the beginning of class or earlier to instructor or TA
 - Submit online at Moodle

**NO LATE
DELIVERABLES!!**

Academic Integrity and Cheating

- Cheating, plagiarism and other forms of academic fraud are taken very seriously by the University, the Faculty, and the teaching staff.
- Examples:
 - Submitting the work of another person as your original work
 - Incorporating others work in your work and not referencing it
 - It is permitted and encouraged to discuss projects with your peers on the whiteboard but **NOT** permitted to copy their solutions as they talk to you. Both parties will be penalized

Course Text

- There is no required text book for the course
- Lecture slides, papers, online books
- Additional online readings assigned for case studies
- Midterm and final will cover assigned readings and topics covered in class

Working in Groups and Choosing a Group

- Group Size : 4-5
- Understand the work habits and goals of your group members:
 - Night person
 - Start early
 - Laid back
 - Best project ever
 - Morning person
 - Start at last minute
 - Perfectionist
 - Reasonable mark
- Identify members with good communication skills

Asking Questions

- Ask me or TA (email, office hours)
- Ask in class
- Discuss with your classmates or group members
- Ask on the CISC 322 forum on Moodle

The Software Pyramid

Software programming is the iconic job of the Information Age, but not all programmers are created equal. Here's the breakdown of software jobs and their prospects:

1 ARCHITECTS A few thousand tech visionaries sketch out entire systems to handle complex jobs. Adam Bosworth, for example, is the chief architect at BEA Systems.

PAY \$150,000 to \$250,000.

OUTLOOK Outsourcing is a nonissue.

2 RESEARCHERS They're key to innovation, which is crucial for the U.S. But there are only about 25,000 in the country, many in academia, where tenure trumps pay.

PAY \$50,000 in academia to \$195,000 in private sector.

OUTLOOK Prospects should brighten somewhat with the economy, but these jobs can move offshore, too.

3 CONSULTANTS Business-savvy consultants advise corporations about their technology needs, help them install new software, and create new applications from scratch.

PAY \$72,000 to \$200,000.

OUTLOOK Still bright for Americans. U.S. customers want face time with consultants.

4 PROJECT MANAGERS Crucial cogs in global software factories. They coordinate the work of teams in different countries and time zones and provide dependable products on schedule.

PAY \$96,000 to \$130,000.

OUTLOOK Good managers can write their own tickets. Pay has jumped 14.3% in the past two years.

5 BUSINESS ANALYSTS Go-betweens. About 100,000 analysts figure out what a business needs and turn it into a spec sheet for programmers. It's a key role now since the company and its programmers are often apart.

PAY \$52,000 to \$90,000.

OUTLOOK A relatively safe haven for programmers—if they have communications skills and a grip on business.

6 BASIC PROGRAMMERS The foot soldiers in the information economy, they write the code for applications and update and test them. Numbering about 1 million, they are one-third of all U.S. software engineers and programmers.

PAY Has tumbled 15% since 2002. Now \$52,000 to \$81,000.

OUTLOOK Watch out. Many of these jobs can be done anywhere. Forrester predicts 18% of them will be offshore within six years.

Next Class...

- Tuesday Sept 13, JEFFRY 102
- Will cover:
 - Terminology
 - Project deliverables in detail