

CS3773 Software Engineering

Lecture 01
Introduction and Administration

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Course Instructor

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Welcome!

Course Meetings, Web Pages, etc.

- ∅ Course Meetings:
TR 9:30 - 10:45
in classroom UTSA-1604 HSS 3.02.18
- ∅ Office Hours:
TH 2:00 - 4:00
- ∅ Course Web Page:
<http://www.cs.utsa.edu/~niu/teaching/cs3773>

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Grading Scheme

- ∅ Midterm: 20%
- ∅ Final: 20%
- ∅ Assignments: 10%
- ∅ Projects: 45%
- ∅ Participation: 5%

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Course Textbooks

- ∅ Jim Arlow and Ila Neustadt, "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design". 2nd Edition, Addison-Wesley Professional, 2005.
- ∅ One of the following Software Engineering books
 - Ian Sommerville, "Software Engineering", 8th Edition, Addison-Wesley, 2006.
 - Pfleeger and Atlee, "Software Engineering: Theory and Practice", 3rd Edition, Prentice Hall, 2006.
 - Pressman, "Software Engineering: A Practitioner's approach", 6th Edition, McGraw Hill, 2005.

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Course Topics

- ∅ Software Development Process and Project Management
- ∅ Requirements Analysis
- ∅ Unified Modeling Language (UML) and Other Specification Notations
- ∅ Software Architecture Design
- ∅ Testing Techniques

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What Is Software

- ∅ Software is a collection of artifacts
 - Computer programs
 - Data
 - Documents
- ∅ Characteristics of software
 - Software is either customized product or generic product
 - Software is a logical system
 - Software evolves

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What Is Software

- ∅ Attribute of good software
 - Dependability
availability, reliability, security, and safety
 - Efficiency
processing time, memory utilization, responsiveness,
 - Usability
appropriate user interface and adequate documentation
 - Maintainability
ease of change

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What Is Software Engineering

- ∅ [Software engineering is] the establishment and use of sound engineering principles in order to obtain economically software that is reliable and works efficiently on real machines
 - by Prof. Fritz Bauer at the 1968 NATO conference on software technology, in Garmisch, Germany.*
- ∅ In short, software engineering is about developing quality software in a predictable way.
- ∅ Key phrases: engineering discipline, all aspects of software production

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What Is Software Engineering

- ∅ Software engineering is a discipline that integrates
 - Process
provides a framework for software development
 - Methods
provide "how to's" for building software
 - Tools
provide automated or semi-automated support for the process and the methods

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Software Process

- ∅ Software process is a set of activities used for the development of software systems
 - Communication
 - Planning
 - Modeling
 - Construction
 - Deployment

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Software Process

- ∅ Each activity is accomplished by a collection of tasks, such as specification, analysis, and validation
- ∅ A number of umbrella activities
 - Software project tracking and control
 - Risk management
 - Software quality assurance
 - Formal technical reviews
 - Measurement
 - Software configuration management
 - Reusability management
 - Work product preparation and production

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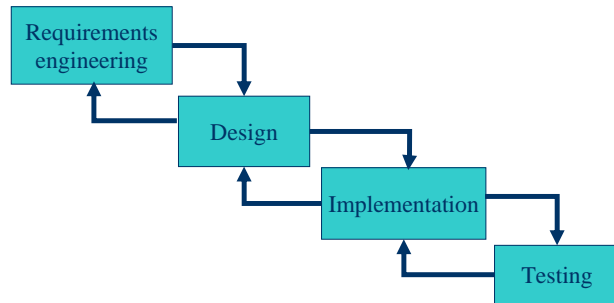
Software Process Models

- ∅ A process model describes:
 - What steps you go through
 - Which development artifacts are produced, and when
 - How activities are coordinated
- ∅ Different process models
 - The waterfall model
 - The prototyping model
 - The iterative model
 - The incremental model
 - Others: RUP, agile methods, component-based SE, and ...

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The Waterfall Model



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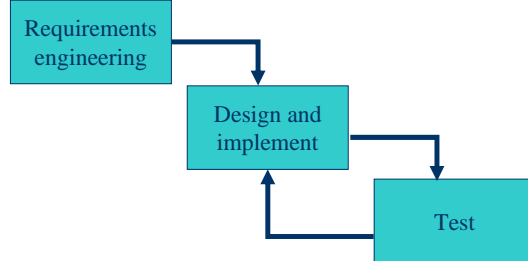
The Waterfall Model

- ∅ The classic lifecycle
- ∅ Sequential: each stage completed before the next started
- ∅ Mainly used by large companies
- ∅ Problems
 - But real projects are rarely sequential
 - Customer has to wait for product until the end
 - Hard to state requirements up-front
 - Heavy documentation

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The Incremental Model



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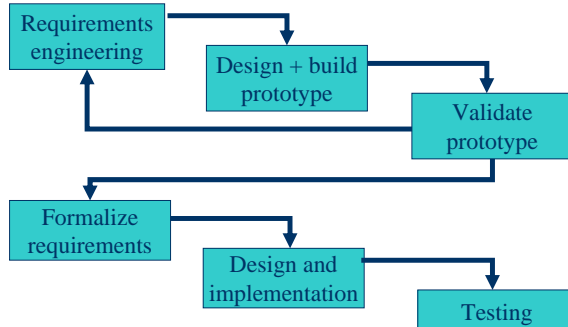
The Incremental Model

- ∅ Development done in defined cycles
- ∅ All requirements analysis is done in one phase
- ∅ Each increment produces deliverable
- ∅ Still has the problem of having to elicit all the requirements up front

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The Prototype Model



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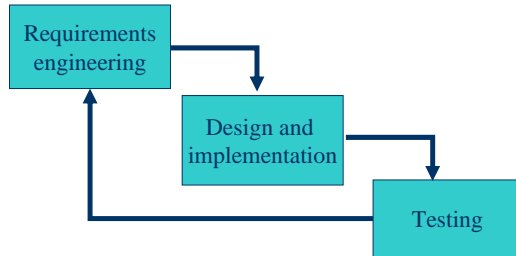
The Prototype Model

- ∅ Using prototype for discovering requirements
- ∅ Particularly good for user interfaces
- ∅ Problems
 - Customer doesn't like to have to "rebuild" (have to agree to discard it)
 - Make implementation decisions that you stick with

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The Iterative Model



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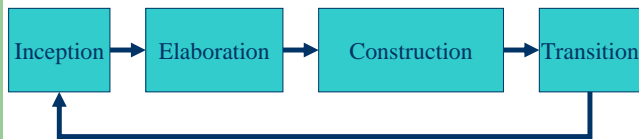
Iterative Model

- ∅ Multiple mini-waterfall-like cycles
- ∅ A working implementation in each iteration as incremental; no throwaways as in prototype
- ∅ Requirements gathering spreading out over the iterations
- ∅ Usually with less non-essential artifacts produced
- ∅ Rational Unified Process (RUP): an example of the iterative model specifically for UML

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The Rational Unified Process Model



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The Rational Unified Process Model

- ∅ Inception: business case establishment
 - Vision
 - Scope
 - Project feasibility
- ∅ Elaboration: problem understanding
 - Requirements model
 - Architecture design
 - Risk identification and resolution
- ∅ Construction: implementation
- ∅ Transition: deployment

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The Rational Unified Process Model

- ∅ It is a hybrid process model
 - Elements from different models
 - Iteration in each phase and in the whole process
- ∅ It supports multiple views
 - Dynamic view
 - Static view
 - Practice view
- ∅ Requirements gathering spreading out over the iterations

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Software Process Models

- ∅ Every software development group has its own process model(s)
- ∅ They vary along several dimensions:
 - Formal vs. ad hoc
 - Sequential vs. concurrent
 - Lots vs. little documentation
 - ...

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Reading Assignments

- ∅ Sommerville's Book
 - Chapter 1, "Introduction"
 - Chapter 4, "Software Process"

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