Course outline

- Lecture Monday-Wednesday 12:30-2
- Recitations Thursday 10-11am, 11-12am, Friday 10-11am
  - Discussion of readings, hands-on with software
  - Section assigned by registrar; email TA to request change
  - No recitations this week; they start next week
- Staff:
  - George Kocur
  - Bharath Krishnan
  - Raghunathan Sudarshan
- No prerequisite; familiarity with PCs, Windows, Word assumed
- Grading: 10 homeworks (50%), midterm (20%), final exam (30%)
- Bring your laptop to class when announced: exercises
Topics

• Software development: rapid development methods
  – Develop, configure or manage software
• Data modeling and databases
  – Ensure correctness of data; allow sharing, flexibility
• Web development
  – Html, XML, http, Java, .NET, security. Integration, sharing
• Middleware
  – System interfaces, connections between databases and
    applications: XML, EDI, WSDL, UDDI, SOAP, ...
• Security
  – Encryption, certificates, SSL, implementation
• Hardware overview
  – Virtual storage hierarchy, benchmarks, configuration
• Communications networks and hardware
  – Technologies, protocols, standards: data, video, voice

Homework (project)

• Work in teams of two (1 and 3 allowed by exception)
  – Choose your partner this week. Ask TA to match you if
    you don’t find a partner.
• Build a set of systems for a chemical distributor
  – First cycle of ‘spiral model’ of software development
  – Take 3 months to specify, design, prototype and assess
    • And learn about all these technologies
  – After this first cycle, you could then build an operational
    system
    • Even your prototype would almost be ok for a very small
      scale operation
Homeworks

1. Software process case studies (individual)
2. Requirements
3. Data and UML models (MS Visio)
4. Database (MS SQL Server)
5. Web site design (MS FrontPage)
6. Web middleware (XML, SOAP, WSDL, UDDI) (individual)
7. Database and Web integration
8. Security (individual)
9. Network/hardware design and capacity
10. Software process retrospective

Readings

• Set of 4 primary books used in the class (McConnell Rapid Development, Fowler UML Distilled, Bowman SQL Handbook, Green Handbook of Telecom)
  – Each member of team can buy 2 (available online)
  – Use short-term loan copies or share with other teams for the remaining books, which are references (SQL Svr, Web, FrontPage)

• Readings are intended to introduce you to each area and to be a reference for future work
  – Skim many of the assigned readings, rather than read in depth
  – Many of the chapters are reference materials
    • Read as necessary to do the homework and learn the basic concepts

• Software development relies on making no major mistakes!
  – You don’t have to do anything perfectly or optimally but you can’t make any major mistakes. We cover many topics, to make sure you’ve seen each topic at least once
Readings

- *Rapid Development*. Standard reference for software development
- *UML Distilled*. Standard reference for UML modeling
- *SQL for SQL Server*. Detailed, practical guide
- *FrontPage2003 Complete Reference*. Homework only.
- *Practical Cryptography*. Good security reference, some math
- Online readings for Web topics

Computer systems

- MLog room
  - MLog students
- MEng room
  - MEng students
- CEE clusters
  - MST, MEng, MLog students
- All client software is on all machines
- You may use your own PC or laptop but you must obtain the MS software licenses yourself
  - MS SQL Server desktop edition (MSDE) is free
  - MS Visio, FrontPage have student pricing at MIT
Course computers

• You will have access to 1.264 course material, which will have:
  – Lecture notes, posted after lecture (PowerPoint slides)
  – Homeworks and online readings
  – Announcements

• Course computers will have:
  – MS Visio 2002
  – MS FrontPage 2003
  – MS SQL Server client software (Enterprise Manager, Query Analyzer)

• Two Web servers (MS IIS) will be used for the Web sites
  – Web servers will also have MS SQL Server

Course requirements

• Homeworks are 50% of grade
  – Late homeworks lose 20% up to 2 days late; 100% otherwise
  – We will adjust homework due date if it conflicts with other MLog, MEng, MST crisis points, or if we have computer problems

• Midterm exam is 20% of grade
• Final exam is 30% of grade

• One focus of class is hands-on learning through the homeworks
  – Homeworks must have reasonable organization, grammar, spelling
  – Perform limited test on the database, Web site
    • TA may run your database queries or Web site against slightly different data to check it
    • No need for error checking, input validity checking, etc.

• Second focus is reading, and discussion in recitation
Chemical manufacturer

• Distributor places order for chemicals via Internet
  – You must check if items are in stock
  – Calculate total price, including tax, shipping
  – Accept payment information
  – Update inventory level
  – Select freight carrier to ship order to distributor

• Products have alternate names, emergency handling instructions, classifications

• Prices, inventory levels are random numbers in database

• Chemicals are almost real; carriers are real data
Internal process

• Web application for internal use
  – Enter orders manually that are phoned in
  – Update chemicals, inventory levels, prices
  – Update carriers
  – Update customers
  – Other management and operations functions

Additional Web features

• Marketing information
• Search
• Feedback
• Product catalog
• Carrier data
• Order inquiry
Homework 2

• Requirements for the Web system
  – What should the system do?
  – Specify a minimal set of features that would allow this
distribution/transportation business to operate

• Formats for requirements
  – 10 pages maximum
  – Options for requirement document
    • Text requirements
    • User manual
    • Scenarios
  – See McConnell text for brief definitions

• Resource estimation covered in Monday’s lecture

A quick quiz

• What percentage of large projects have excess schedule
  pressure?
  – 25%  50%  75%  100%
• What percentage of small projects have excess schedule
  pressure?
  – 25%  50%  75%  100%
• What percentage of large projects deliver on time and on budget?
  – 25%  50%  75%  100%
• What percentage of large projects are cancelled or fail to deliver at
  all?
  – 25%  50%  75%  100%
• What staff increase is necessary to speed up a schedule by 25%?
  – 25%  50%  75%  100%
• How much are resource needs reduced by cutting project scope in
  half?
  – 25%  50%  75%  100%
• How much have companies reduced time to market through better
  software practices?
  – 25%  50%  75%  100%
Answers to a quick quiz

• What percentage of large projects have excess schedule pressure?
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Software development process

• Software development is often more demanding than consulting or analysis
  – Software process has applications and lessons for project management more generally
  – Software cannot be built the night before, like reports
  – Software can’t be downscoped at the last minute, with chapters or analyses simply left out, or done very simply
• Case studies in McConnell (Rapid Development) will be our focus
  – Software development process is otherwise a very boring topic
• Please bring McConnell book to next two classes
  – Please read and prepare to discuss case studies in class:
    – Monday: case studies 2-1, 2-2, 3-1, 4-1, 5-1, 5-2, 7-1, 7-2
    – Wednesday: case studies 8-1, 8-2 (and leftovers from Monday)
  – Recitation next week will cover case studies not done in class