Conclusion
Outline

• Final release, demo, exam
• A brief recap of CSE 403
• Beyond CSE 403
finish

dfinal release, demo, exam
Logistics and dates for the final release & demos

• Final release on **Tuesday, March 08, at 11pm**
  • Final version of your product!
  • SRS revision
  • Requirements & schedule postmortem

• Final product demos on **Wednesday, March 09, and Friday, March 11, in class**
  • Must include all team members who have not presented yet

• Individual reflections on **Friday, March 11, at 11pm**
Logistics and dates for the final exam

• Final exam on **Monday, March 14, at 8:30am in EEB 037**
  
  • 110 minutes.
  • Closed book, notes, laptop, phone, and neighbor.
  • Cumulative.
  • Anything discussed in Lectures 1-18 is fair game.
  • See prior years’ exams for practice.
a brief recap of CSE 403
Software lifecycle

• Determines the order for Requirements, Design, Implementation, Testing, and Maintenance.

• Goal: Perform work as early as practical
  • Costly to discover bugs or make changes late
  • Costly to make decisions too early
  • Costly to do tasks multiple times

• In CSE 403, we followed an iterative process
Requirements

• “What” not “how.”
• Reflects user rather than developer view of the system.
• A common technique for expressing requirements: use cases.
• Get feedback early (example: paper prototype).

Library patron

Check out book
Architecture

• Provides a high-level framework to build and evolve a software system.
• Modules for logical units of computation
  • Minimize coupling, maximize cohesion.
• Draw it as a UML class or sequence diagram
  • Key purpose: to communicate to others
• Interactions are part of the architecture
Design patterns

• Vocabulary of program development:
  • A known solution to a known problem.
  • Don’t reinvent the wheel!
• Many kinds of design patterns:
  • Creational
  • Structural
  • Behavioral
  • Concurrency
  • …
Focus on modularity, abstraction, and specs

• No one person can understand all of a realistic system.
• Modularity permits focusing on just one part.
• Abstraction enables ignoring detail.
• Specifications and documentation formally describe behavior.
• Modularity, abstraction, and specifications help to understand/fix errors
  • Or to avoid them in the first place!
Process

• Needed to keep your project under control:
  • Specification
  • Schedule
  • Source control
  • Automated builds and test
  • Bug database
  • Bug fixes before features
  • Hallway usability testing
Teamwork

• Organization
  • Dominion vs communion

• Decision making
  • Write it all down, be specific, prioritize

• Motivation
  • Practice positive reinforcement

• Communication
  • Face-to-face is most effective
Testing, static analysis, and symbolic execution

• Increase software quality.

• Testing techniques
  • Unit and system testing
  • Black and white box testing
  • Integration and performance testing

• Static analysis
  • Soundness vs Completeness
  • Abstract values
  • Transfer functions

• Symbolic execution
  • Symbolic values
  • Path conditions
  • Tools
Code reviews and refactoring

• Code reviews improve code quality, teamwork, knowledge, and skills.

• Code reviews can also help identify opportunities for refactoring.

• Refactoring improves software's design
  • to make it more extensible, flexible, understandable, performant, …
  • but every improvement has costs (and risks)
future

beyond CSE 403
What you have learned and will learn

• Compare your skills today to the beginning of the term
  • Bottom line: Your project would be easy for you
• Your next project can be much more ambitious
• You will continue to learn
  • Building interesting systems is never easy, like anything worth doing.
  • Practice is a good teacher
    • Requires thoughtful introspection
    • Don’t learn only by trial and error!
Tell us what you think!

• Please complete the course evaluation form
  • Useful to future students
  • Useful to course staff
  • Useful to the department
Build amazing things!

• System building is fun!
  • It’s even more fun when you build them successfully.

• Pay attention to what matters
  • Use techniques and tools of CSE 403 effectively.
  • Above all, use good taste and engineering judgement.