Requirements & Modeling
Administrative stuff

• TA office hours
  • Thursday 4:00—6:00 @ CSIL 3
  • Friday 3:30—5:30 @ CSIL 3

• Warm-up project
  • Will be out today or tomorrow
  • Due on Jan. 26th

• Project proposal
  • Due on Jan. 17th

• Quiz
Project Proposal

• You are required to work on this in a 2-person or 3-person group.
• You will brainstorm with your group members to propose a software project that a 6-8 person group, including you, will work on for the remainder of this quarter.

• What to submit:
  • The whole group will submit one copy of the proposal document.
  • This document needs to include the following items:
    • 1. What programming language you plan to use;
    • 2. What programming IDE you plan to use, if you plan to use any;
    • 3. A brief overview of what you are proposing (be brief here)
    • 4. A complete use-case diagram of the proposed project
    • 5. Choose one of the following two options to describe every use case
      • option 1: activity diagram, following the format we will discuss in lecture
      • option 2: use case text description, following the format we will discuss in lecture
    • 6. Optional: tell us whatever you think can help convince us to accept your proposal
Outline

• Definitions
  • Requirement, requirement engineering

• Why?

• How to write the requirement document?

• How to find out and model the requirements?
Definitions & Motivations
What are requirements?
What are requirements?

• The services the software should provide
  +
• The constraints the software should follow

• Functional requirements
  +
• Non-functional requirements
What is requirement engineering (RE)?

• The process of
  • Finding out
  • Analyzing
  • Documenting
  • Checking
these desired services and constraints
is Requirement Engineering.
Who will read requirement document & why?

- Users
- Design team
- Developers
- Testing team
What to put in a requirement document?
What are the requirements?

- Functional requirement
  - Specify functionality
  - Input, output, ...

- Non-functional requirement
  - Performance
    - Time complexity, space complexity, scalability, throughput, latency, space
  - Security
  - Usability
  - Power & energy
  - Legal, ethical
  - Dependability
    - Security
    - Availability = available time / (service available time + service down time)
    - Reliability = how likely the service will go town at time T
Non-functional requirements

- Product requirements
  - Efficiency requirements
  - Reliability requirements
  - Portability requirements
- Organizational requirements
- External requirements
  - Interoperability requirements
  - Ethical requirements
- Usability requirements
- Delivery requirements
- Implementation requirements
- Standards requirements
- Legislative requirements
- Performance requirements
- Space requirements
- Privacy requirements
- Safety requirements
Non-functional requirements

• Try to use quantitatively measurable metrics to describe them
• Examples
Requirement document format

- IEEE standard
How to find out & represent the requirements
System modeling
Use case diagrams

• A diagram includes
  • Actors
  • Use cases
  • Associations
  • System boundary
How to describe use case?
Use case text

• Use case name

• Main scenario
  • Steps

• Extensions
  • Extension condition; steps
Use case text

• Use case name
• Main scenario
  • Steps
• Extensions
  • Extension condition; steps

• Specify what to do, not how to do
• Do not specify user interface
• Optional: priority, trigger, precondition, postcondition (guarantees), sub-usecase
Example
How to map it to eXtreme Programming?
Activity diagrams

• An activity --- multiple actions
  • Can be used to describe a use case
  • Can represent parallel relationship
Activity diagram components

- Components
  - Start
  - Actions
  - Fork/Join
  - Decision/Merge
  - Flow
  - Final
Example
What else?

• State diagram
• Class diagram
• Sequence diagram