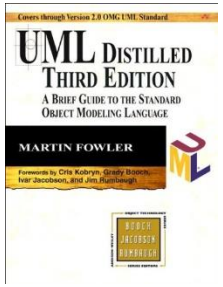
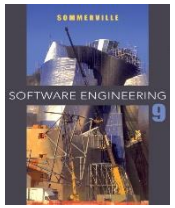
Requirements & Modeling

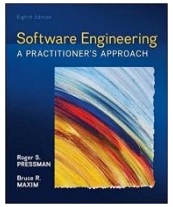


Chapter 2 p29—p31, Chapter 9, Chapter 11 p117--p120



Chapter 4.0—4.5

Chapter 8.1, 8.2.5, 8.4, 9.2, 9.3.1



Administrative stuff

- TA office hours
  - Tu/Th 4:00—6:00 @ CSIL 1 (Yuxi)

- Warm-up project
  - Due on 15th
- Project proposal
  - Due on 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 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

A few project example

- Proposal examples
  - …
- Repository examples
  - https://github.com/catherinemoresco/PDFProject
  - https://github.com/courageousillumination/deckr
  - https://github.com/dyxh/cs220
  - https://github.com/marlonliu/DivAssist

Course Project Grading

- Group performance
  - 75%
- Individual performance
  - Commit log
  - Self-evaluation + peer-evaluation
    - After milestone 3.b
    - After milestone 5

Outline

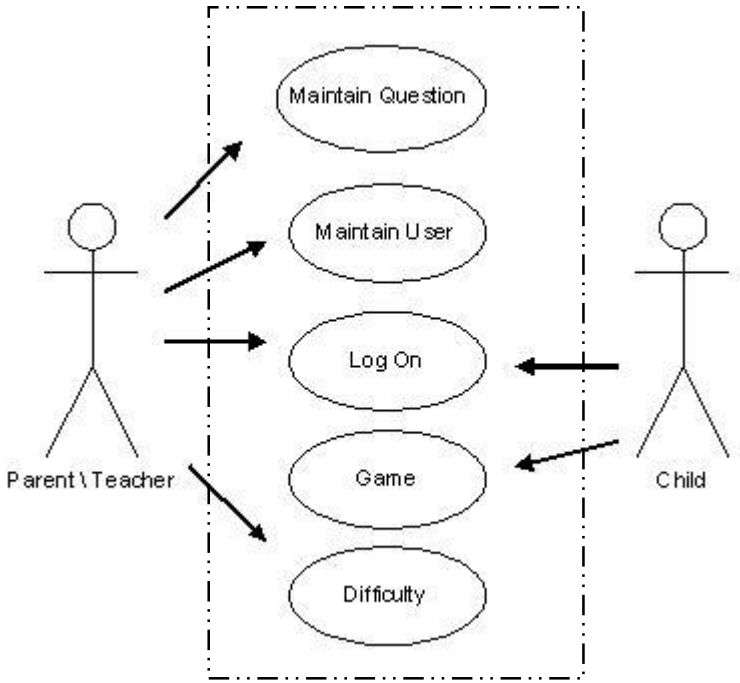
- Definitions
  - Requirement, requirement engineering
- Why?
- How to write the requirement document?
- How to find out and model the requirements?

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
    - Each step clearly shows who (actor/system) is carrying out what action
- Extensions
  - Extension condition; steps
    - Think about what could go wrong or go differently

- *Specify what to do, not how to do*
- *Do not specify user interface*
- *Optional: priority, trigger, precondition, postcondition (guarantees), sub-usecase*

Example template

[use case name]

Main success scenario:

1. X does s
2. X does t
3. …
4. …

Extensions:

2.a [extension condition]

.1 xxx

.2 xxx, return to MSS at step 4

3.a [extension condition]

.1 xxx

.2 X may xxx or cancel

Example

Game

Main success scenario:

1. User chooses a puzzle
2. User works on a puzzle
3. User submits the puzzle result
4. System grades the result
5. System displays the result

Extensions:

2.a User decides to give up on the puzzle

.1 User aborts the current puzzle, return to MSS step 1

5.a Top 10 grade

.1 System displays the result and a congratulation message

.2 System updates the top result record

How to map it to eXtreme Programming?

- Use case or sub-usecase is similar with the user story

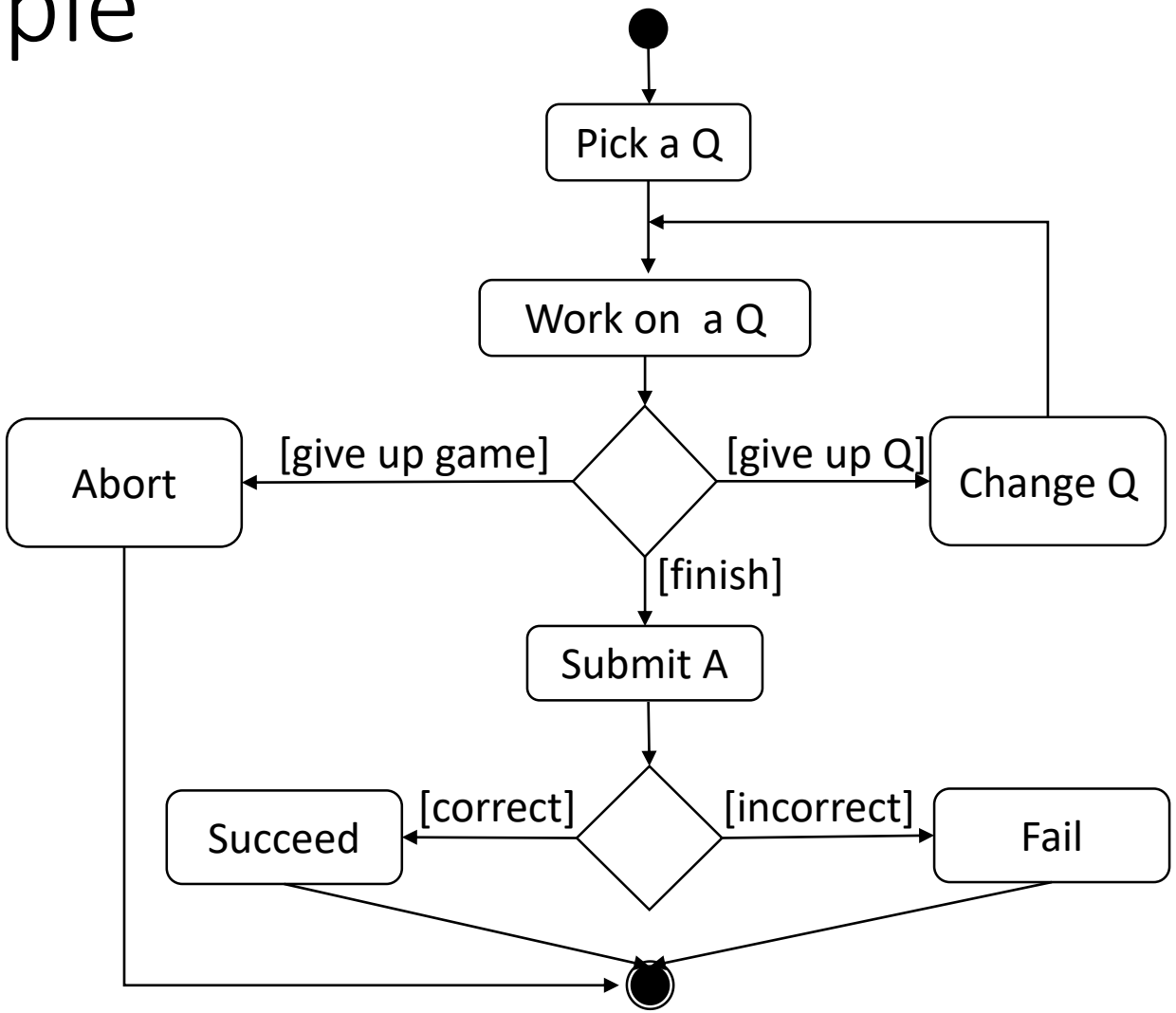
Activity diagrams

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

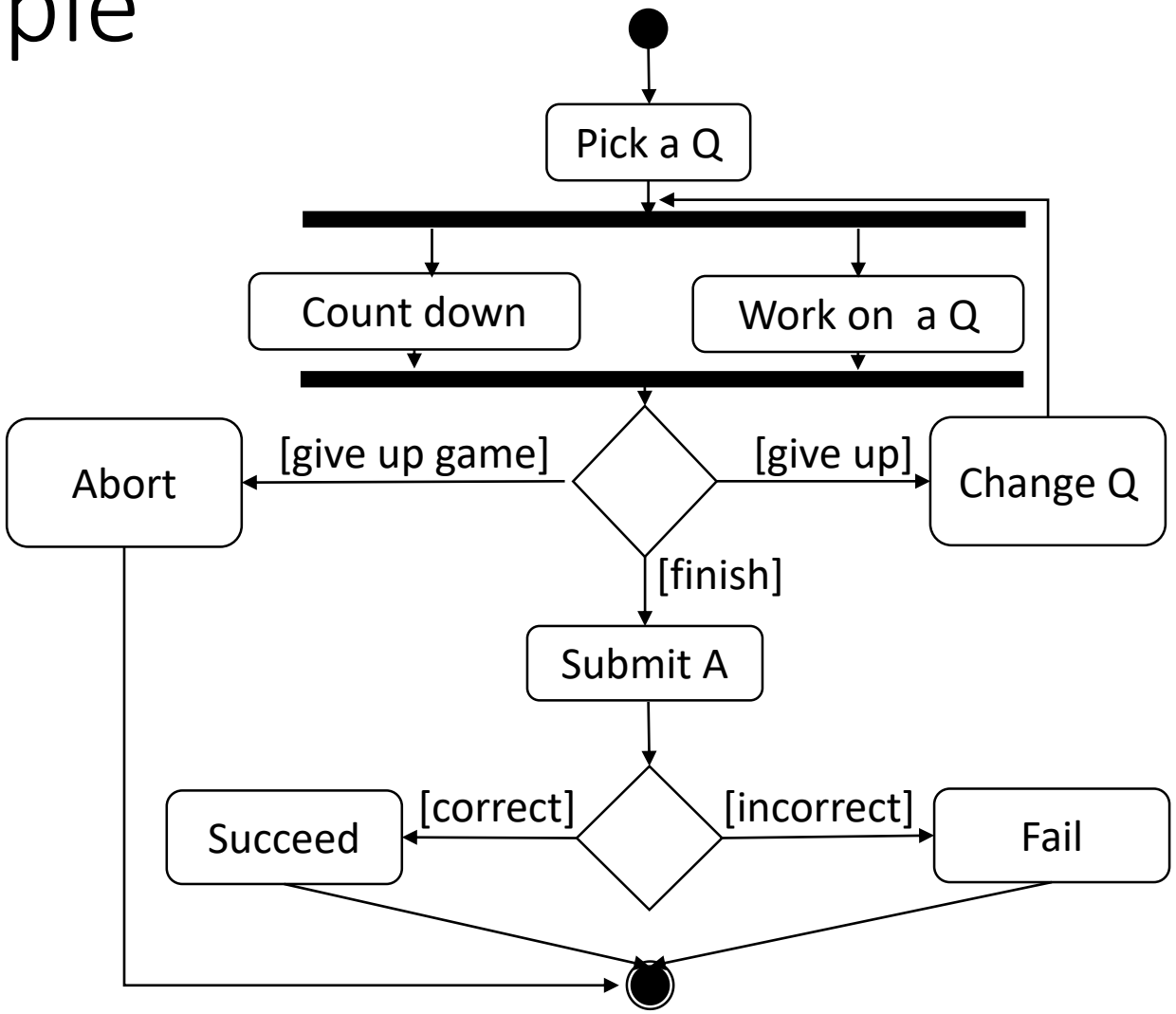
Activity diagram components

- Components
  - Start
  - Actions
  - Fork/Join
  - Decision/Merge
  - Flow
  - Final

Example


Pick a Q
Work on a Q
Abort
[give up game]
[give up Q]
Change Q
[finish]
Submit A
Succeed
[correct]
[incorrect]
Fail

Example


Pick a Q
Count down
Work on a Q
Abort
[give up game]
[give up]
Change Q
[finish]
Submit A
Succeed
[correct]
[incorrect]
Fail

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?

Who will read requirement document & why?

- Users
- Design team
- *Developers*
- Testing team

What to put in a requirement document?

What are the requirements?

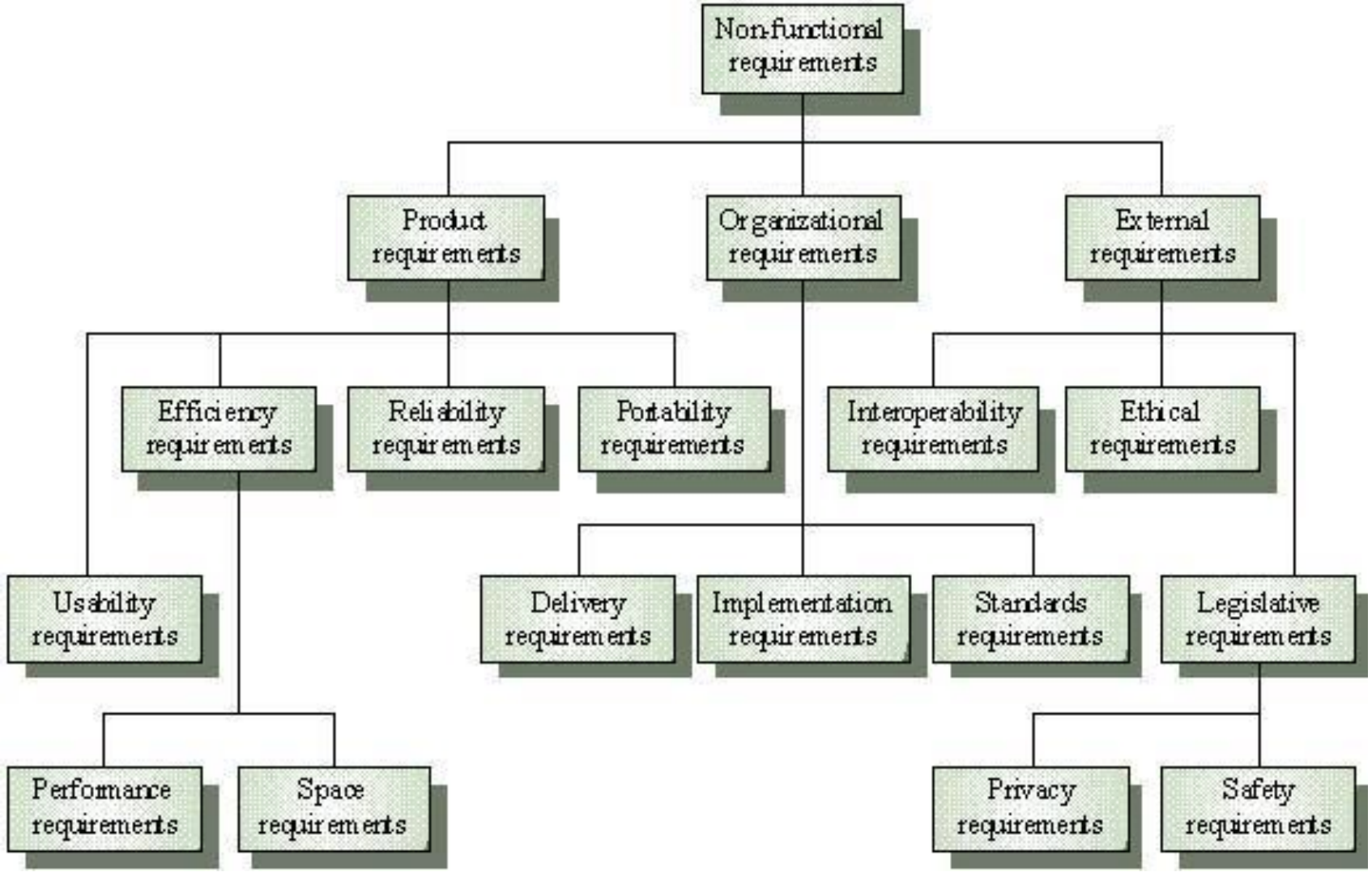
- Functional requirement
- Non-functional requirement

What are the requirements?

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

- Non-functional requirement (how to measure them quantitatively?)
  - 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



Non-functional requirements

- Try to use quantitatively measurable metrics to describe them
- Examples

Requirement document format

- IEEE standard
  - http://en.wikipedia.org/wiki/Software_requirements_specification