

CS309

OBJECT-ORIENTED ANALYSIS AND DESIGN

Yuqun Zhang (张煜群)

Department of Computer Science and Engineering
Southern University of Science and Technology

Who and Where Am I?

- Dr. Yuqun Zhang (张煜群)
- Research Interests: Software Analysis, Testing, and Security (Fuzz Testing, Taint Analysis, Defect Prediction, Software Component Analysis, etc.)
- Email: zhangyq@sustech.edu.cn
- Office: Room 610, Engineering Building South
- Office Hours: 2-4pm, Wednesday, or appointment by email

A LITTLE SOMETHING
ABOUT ME...

My Styles and Rules

- Casual
- Interaction
- Mutual Respect
- NO CHEATING!!!!
 - You may work together in this class, as specified on each specific assignment. Do **NOT** use any resource without citation.

Instructor and Teaching Assistant

- Yueming Zhu (朱悦铭)
 - Email: zhuym@sustech.edu.cn
- Lei Tian (田蕾)
 - Email: tianl3@mail.sustech.edu.cn
- Jiahong Xiang (香佳宏)
- Wencheng Zhang (张闻城)
- Kai Li (李开)
- Haoran Wang (王浩然)
- Shangxuan Wu (武尚萱)
- Yiwei Ren (任艺伟)
- Tianyunxi Wei (魏田纉溪)
- Xiang Yi (易翔)
- Yajing Tan (谭雅静)
- Zexuan Jia (加泽瑄)
- Yuchen Wang (王宇琛)
- Ling Jiang (蒋灵)
- Qi Luo (罗旗)

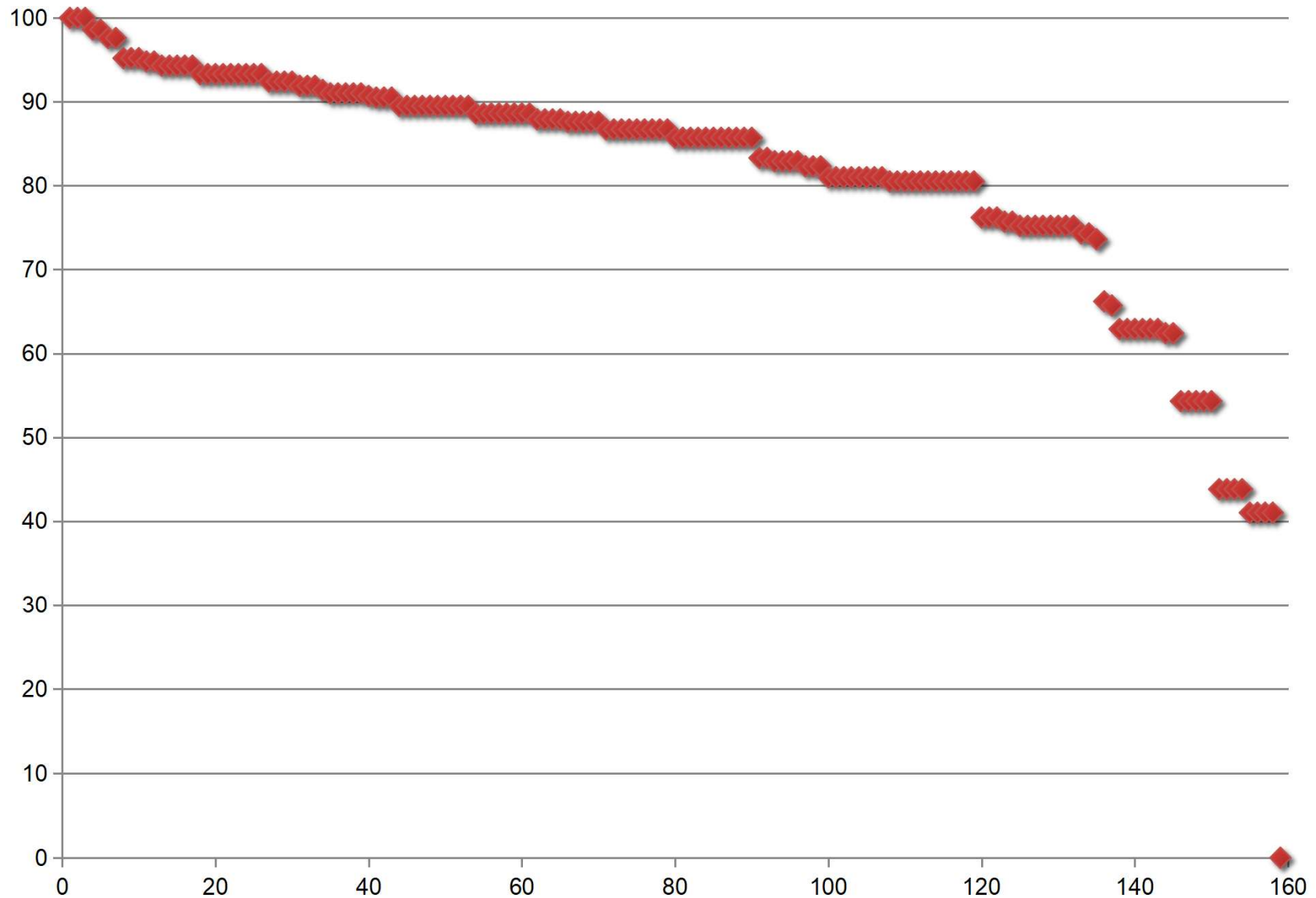
Textbooks

- Freeman et al., *Head First Design Patterns*
- Martin Fowler, *Refactoring*
- Block, *Effective Java*
- Zeller and Krinke, *Essential Open Source Toolset: Programming with Eclipse, JUnit, CVS, Bugzilla, Ant, Tcl/TX and More*
- McConnell, *Code Complete: A Practical Handbook of Software Construction*
- Pilone, *UML 2.0 Pocket Reference*

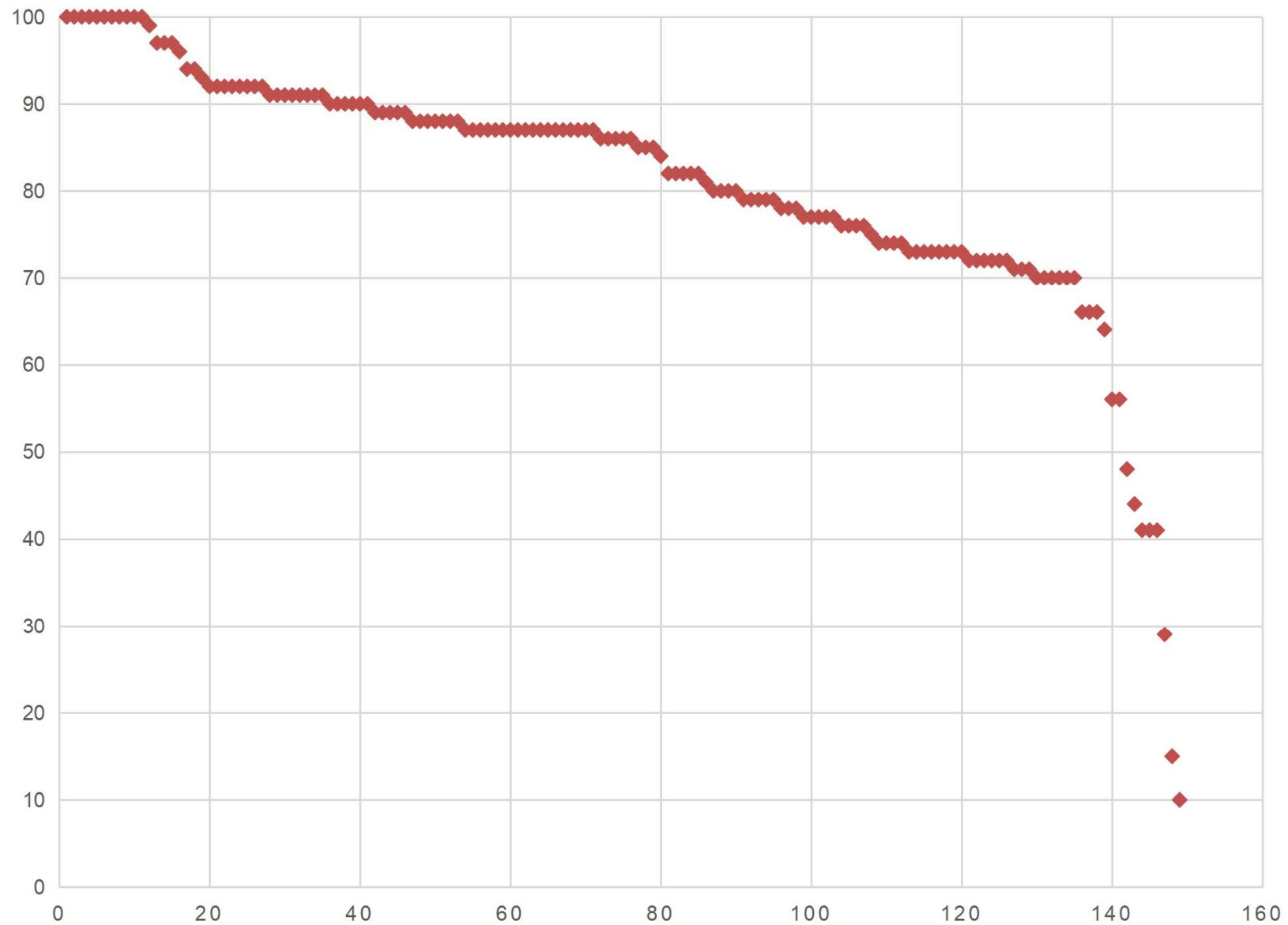
Evaluation and Grading

- Weekly Lab Tutorials– 25%
- Project – 35%
 - Web applications/Games
 - Group of 4 to 5 (before the end of next week)
 - We have ~200 registered students, so please be subject to the group size!!
 - 3 presentations (proposal, progress, final)
 - 1 written report
- Exams – 35%
 - Final:
 - What's on an exam? Anything from any aspect of class, including lab sections.
 - No hints (重点)
- In-Class Exercises/Attendance – 5%
 - Spontaneous (That means in general I do not call the roll. But I have my own moves 😊 😊)

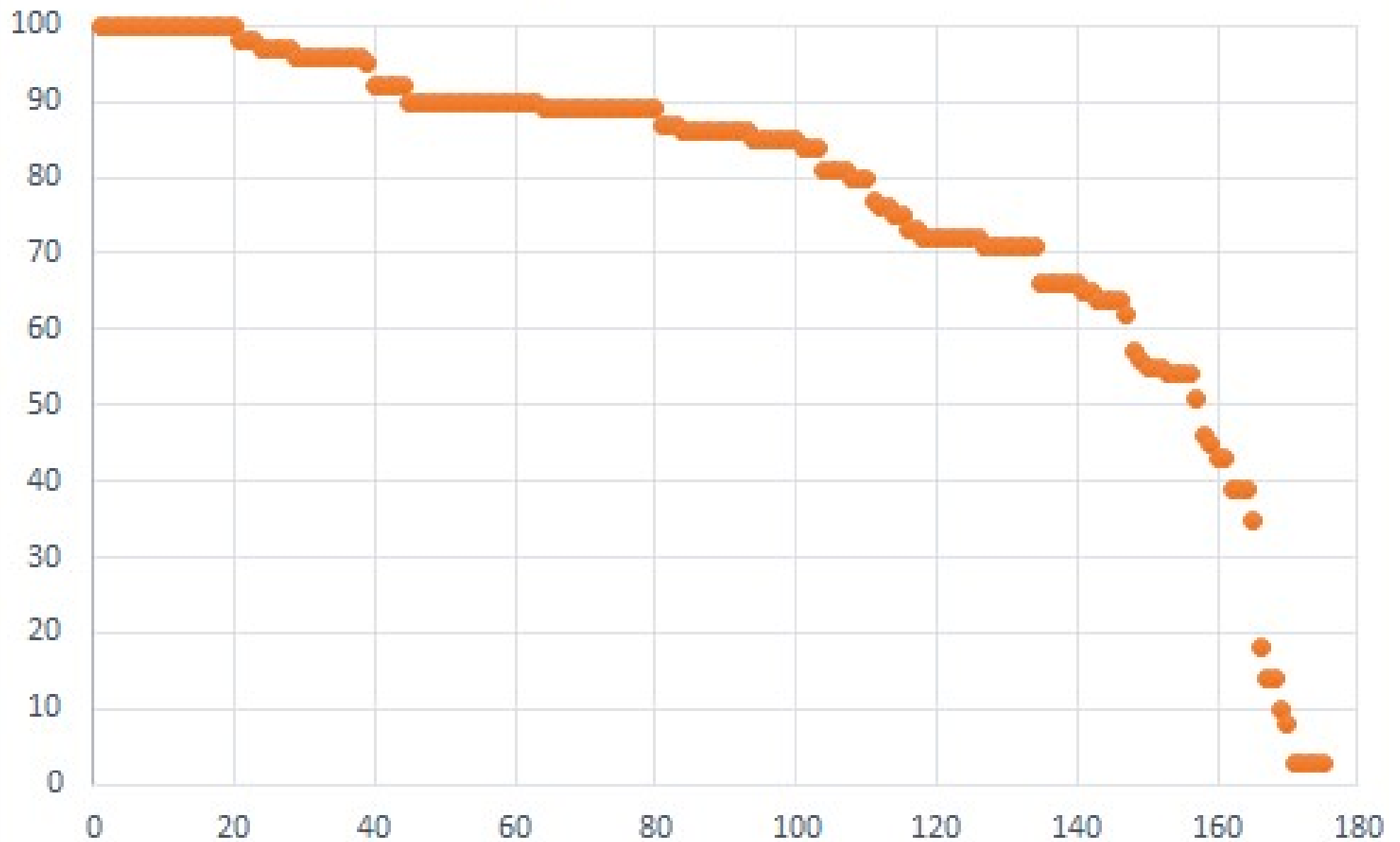
Project in 2018 Fall

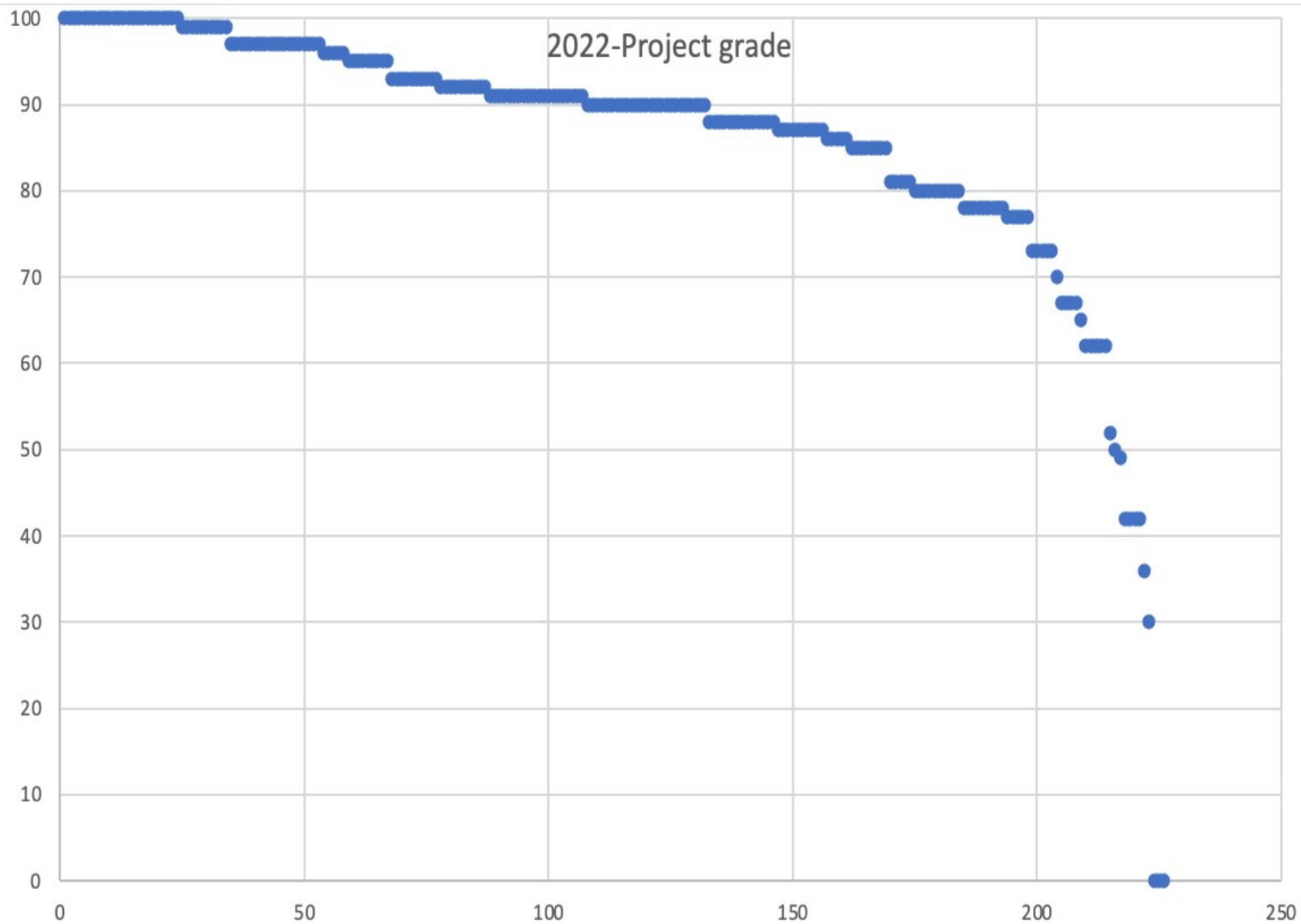


Project in 2019 Fall



Project in 2020 Fall





You could say this is a “breathing” class (not a “水” class).

I just want you to be happy in this semester.



ALRIGHT, LET'S GET REAL

Expectations

- You're going to have to “own” your education in this class
 - I have a feeling this is going to be an awesome semester...
- But...
 - Expect that I may not be able to give you an immediate answer (I'm alright if my response to your question is “I don't know,” so you're going to have to be alright with that, too)
 - I (or the TAs) WILL always try to help find you the answers you need in a timely fashion. Be patient.

Tips of Handling Problems

- Once you encounter problems (theory or practice), you are expected to
 - first, try your real best to solve them by yourself

Tips of Handling Problems

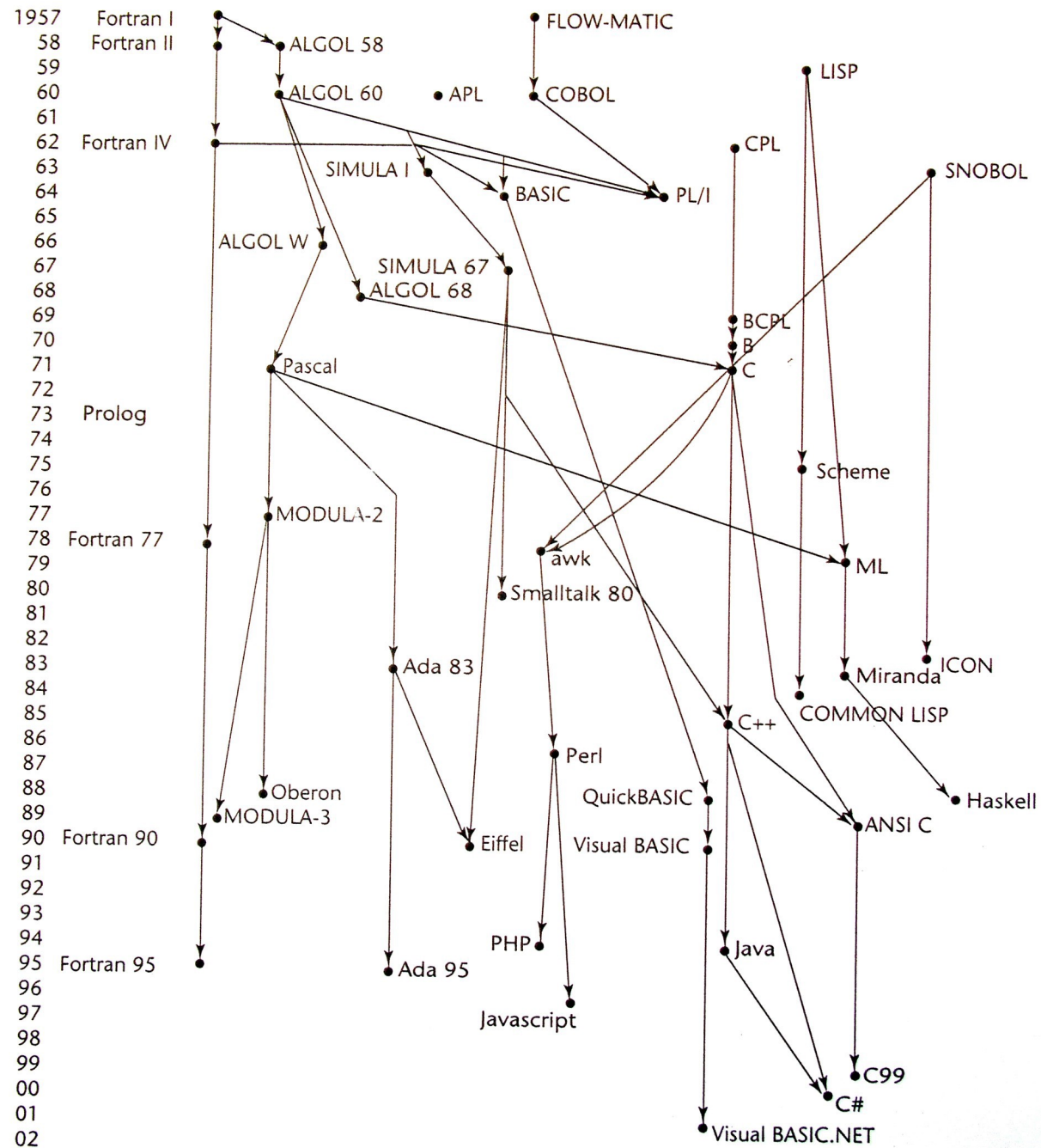
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Tips of Handling Problems

- Once you encounter problems (theory or practice), you are expected to
 - first, try your real best to solve them by yourself
 - if not working, try to talk with your cohorts.
 - if not working, then ask us
- If we find that you are not paying effort by yourself, we would be reluctant to help you at later time.



What You Would Learn

- Of course the object-oriented design and analysis
- Typically, you are going to learn something about
 - requirement engineering (UML)

UML Examples

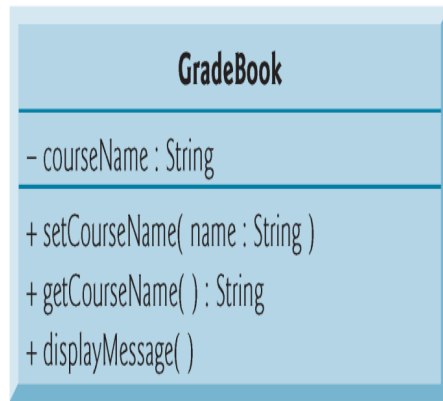


Fig. 7.3 | UML class diagram for class GradeBook.

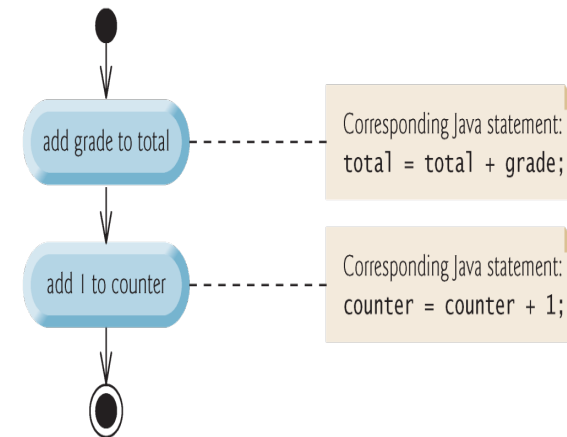


Fig. 3.1 | Sequence structure activity diagram.

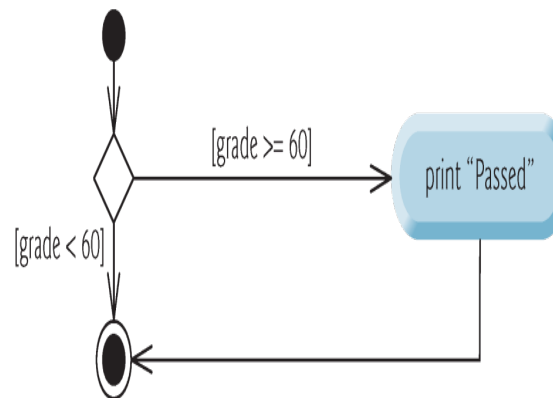


Fig. 3.2 | if single-selection statement UML activity diagram.

What You Would Learn

- Of course the object-oriented design and analysis
- Typically, you are going to learn something about
 - requirement engineering (UML)
 - design pattern (including information hiding, design principles, etc)
 - refactoring
 - web app frameworks? testing?

Your Projects

- Each group picks one problem from a pool
- We created 5 projects for you. Yet you can work on your own if you want to.
- Come talk to me if you want to come up with your own ideas. DO EXPECT THAT YOUR IDEAS MIGHT BE ASSIGNED WITH A LOWER STARTING SCORE.
- One contact person is needed for each group (**This year, all the project requirements are proposed by student assistants. It is pretty necessary to contact them during your progress. They are the bosses!**).

The Project List

- **Dormitory Selection System**: Customize a system for graduate students at SUSTech to facilitate dormitory selection
- **Project Helper**: Build a website for assisting teachers and students to access course projects
- **Sustech Campus**: Create an online website to assist visitors in viewing routes and information about SUSTech
- **Mahjong**: Build a video game for Mahjong.
- **Maze**: Build a video game for Maze.

Dormitory Selection System:

- The system should enable graduate students to view and select dormitories, while also allowing faculty members to manage the dormitory allocation process.
- Basic Requirement (75%):
 - Dormitory Management System:
 - Support multiple dormitory buildings in different locations.
 - Each dormitory building comprises multiple rooms.
 - Room types: single, double, triple, and quadruple occupancy.
 - Faculty Portal:
 - Enable faculty to upload or modify dormitory-related information, including zoning, building details, floor plans, room layouts, and descriptions.
 - Support user management, allowing manual addition, deletion, and modification of individual student users. Bulk import of student information and account creation through tables should be possible.
 - Set dormitory selection timeframes.
 - Provide the ability to export dormitory selection data.

Dormitory Selection System:

- Basic Requirement:
 - Student Portal:
 - Allow students to view and filter available rooms.
 - (Note: Room search hierarchy: Zoning [Phase II] -> Building [17 buildings] -> Floor [3 floors] -> Room number [301]) Include a profile module for students to publish personal information, accommodation habits, and the ability to search for potential roommates.
 - Implement a roommate formation module, where each student can either create or join a team.
 - Offer a room bookmarking module, allowing students to save a limited number of preferred rooms and monitor their availability.
 - Include a commenting module for students to leave feedback on rooms or respond to comments.
 - Implement a dormitory selection module that opens at specified times, allowing selection by teams.
 - Provide a notification module for comment and team-related information.

Dormitory Selection System:

- Advanced Requirements (25%):
 - Incorporate elements specific to SUSTech, considering real-world scenarios.
 - Introduce a campus map (SUSTech map) to display dormitory building locations, room positions, and bed placements. Users should be able to click for previews and selections.
 - Design staggered selection times differentiating between male and female students, doctoral and master's students, waiting list selection times, and room type displays.
 - Implement a room exchange feature on the platform.
 - Include online communication capabilities.
 - Address high concurrency for dormitory selection.
 - Implement an anti-cheating system to restrict scripting and allow only single-user logins.
 - Develop a dedicated client.
 - Ensure an aesthetically pleasing user interface.
 - Deploy servers for system operation.
- Stakeholders: Xiang Yi (易翔), Yiwei Ren (任艺伟)

Project Helper:

- Basic Requirement (75%):
 - Support two user groups: teachers and students.
 - Teacher: Can send or modify the course project notice to all or some students.
 - Student: Can edit and update personal information on the website, including: technical stack, programming skills, and intended teammates.
 - Group management:
 - Teachers can create multiple groups based on group size, group deadline, group number and other information.
 - Teachers can add, delete, and modify all information for any group.
 - Teachers can set the instructor, presentation time and other group information.
 - Students are free to join groups, each student can only join one group.
 - Homework:
 - Teachers can post individual or group work, review, comment and grade the completed work.
 - Students can submit assignments.
 - Grade book:
 - Teachers can upload results in excel or csv format (similar to sakai)
 - Students can view their grades.

Project Helper:

- Advanced Requirement (25%):
 - Add new roles: an administrator, teacher's assistant, or group leader. Give new roles the permissions they deserve.
 - Group privacy settings: Students only see members of their own group and group information. The group may disclose some information, such as recruitment information and group members.
 - Group mutual evaluation.
 - Diversified online rendering homework formats: pdf, markdown, doc
 - Grade display: Visual data (for teachers or students).
 - Online chat.
 - Various registration and login methods
 - Fancy UI (components, layout, home page, personal space, etc.)
- Stakeholders: Yunxi Weitian (魏田纭溪), Kai Li (李开)

Sustech Campus:

- Create an online website to assist visitors in viewing routes and information about SUSTech; help registered users access non-public information about the school; make reservations for relevant resources, and provide feedback on the school's facilities。
- Basic Requirements (75%):
 - Three permissions: visitor, user, and administrator
 - Provide a campus map displaying key buildings including classrooms, dormitories, cafeterias, engineering buildings, sports facilities, and roads.
 - Visitor:
 - Select a building to view building introduction
 - Search for bus routes between two buildings
 - View building reviews, including text and photos, etc.

Sustech Campus:

- Basic Requirements (75%):
 - User:
 - Support all visitor permissions
 - After registering and logging in, users can apply to review buildings, including text and photos, etc. Reviews will be displayed in the building introduction page after approval.
 - After registering and logging in, users can view or search for detailed information about buildings, such as classroom information, gymnasium venues, and canteen stalls.
 - Choose one of the three options for implementation: classroom booking, cafeteria meal ordering, or sports facility reservation. Reservation information supports viewing, filtering, editing, and cancellation.
 - Administrator:
 - Support setting and modifying building descriptions
 - Support setting and modifying bus routes
 - Support checking comments on buildings
 - Support setting, modifying and viewing reservation information, and provide data analysis functions such as reservation statistics
 - Support batch registration of accounts and blacklisting functionality (limit comments, etc.)

Sustech Campus:

- Advanced Requirements (25%):
 - Fancy UI
 - Implement the calculation of walking routes and campus bus routes according to the latitude and longitude of any two points. Dynamic path demonstration can be added
 - Implement the high concurrency of reservation services
 - Implement payment function
 - Provide campus cultural and creative products purchase service
- Stakeholders: Yajing Tan (谭雅静), Shangxuan Wu (武尚萱)

Mahjong:



Mahjong:

- Mahjong Competition Rules (MCR) is developed by the General Administration of Sports of China in 1988.
 - [Easiest Mahjong tutorial (for beginners) - YouTube](<https://www.youtube.com/watch?v=pka0nVlahb0>)
 - [Mahjong Competition Rules (MCR)](http://mahjong-europe.org/portal/index.php?option=com_content&view=article&id=31&Itemid=167)
 - [Mahjong Competition Rules Learning Journey Episode 1: The Basics of MCR Scoring Elements - YouTube](https://www.youtube.com/watch?v=fygPJg6_Ins)
 - [Mahjong Time - Mahjong Competition Scoring](<https://www.mahjongtime.com/chinese-official-mahjong-scoring.html>)
- The project provides some tutorials and resources for reference only.
 - [Unity - How to Make a Mahjong Videogame - YouTube](<https://www.youtube.com/watch?v=GCqM7zntRTU>)
 - [Mahjong tile (Custom Design) - Free 3D model](<https://sketchfab.com/3d-models/mahjong-tile-custom-design-2b148b418677495487fc60009ca241e7>)
 - [The project provides: Classic style Mahjong 3D Model](https://drive.google.com/file/d/1RKCRIO7DEHTKM72dxIVwrwOzUIXs6ONQ/view?usp=drive_link)

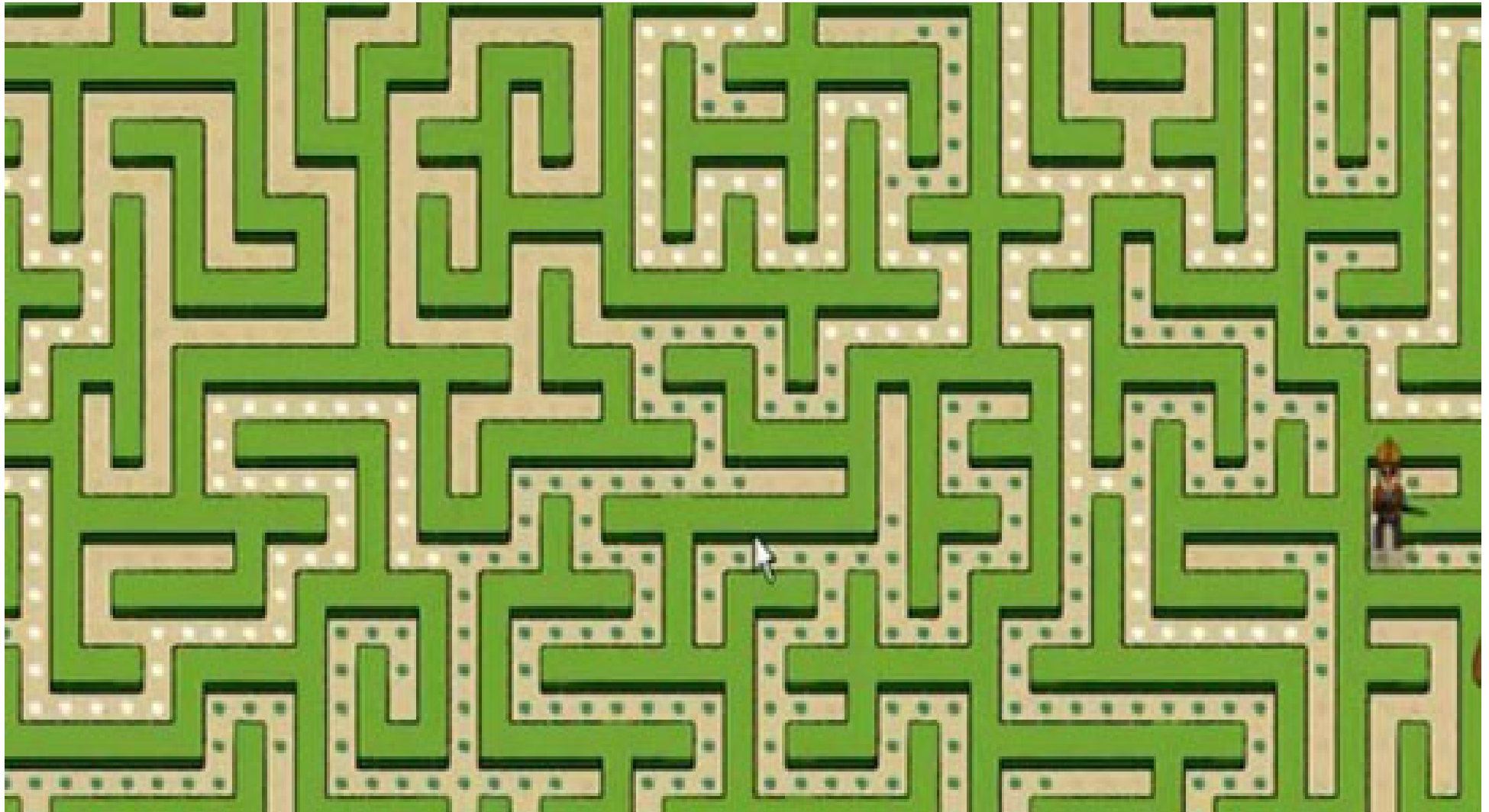
Mahjong:

- Basic Requirement (75%):
 - Complete game interface
 - Start interface
 - Lobby/waiting for admission interface
 - Gaming interface (3D)
 - Settlement scoring interface
 - Complete gameplay: meets all basic rules of MCR
 - Pieces combination type calculation
 - Basic operation: Chow, Pong, Kong, etc.
 - Score calculation
 - Basic UI interface and interaction
 - Display and retain the pieces played by yourself and other players
 - UI interaction for operations such as "chow, pong, kong, etc."

Mahjong:

- Basic Requirement (75%):
 - Saving and playback
 - Save the game
 - Ended games can be replayed, and unfinished games can be continued
 - Sound effects and background music
 - Background music
 - Sound effects when players operate Basic UI interface and interaction
- Advanced Requirement (25%):
 - More exquisite games: changeable pieces backs, tablecloths, background music, etc. in the game
 - AI stand-alone mode: use algorithms or models in stand-alone mode, instead of randomly playing pieces
 - Online mode: play online with other players through LAN or server
 - Statistics: Statistics of players' scores, trends and other data, other players can view them in the game
 - Exchange and communication: Players in the lobby and in the game can send text conversations, emoticons, etc.
 - Better network services: such as more reasonable synchronization methods, handling of players disconnected, etc.
 - More mahjong games rules: such as Sichuan Mahjong, Taiwan Mahjong, etc., or customized mahjong rules
- Stakeholders: Zexuan Jia (加泽瑄)

Maze:



Maze:

- As a maze, an entrance and an exit are a must. To this, elements of collection and puzzle solving must be added.
- Basic Requirements (70%):
 - Complete Game Interface (UI)
 - Menu before entering the game level, designed according to the needs of the game (player nickname, game lobby, room, etc.)
 - UI when entered the game level
 - Player current status - Number of collectibles
 - Game Status - The time elapsed from the start of the game to the present
 - Settings / Pause Options - Game settings can be adjusted such as mouse movement, volume, etc
 - Game Scenes
 - At least two maps, and each one meets the following content: (detailed quantitative requirements will be given later)
 - Exit entrance.
 - Collectibles.
 - A certain number of organs.
 - Beautiful maps

Maze:

- Basic Requirements (70%):
 - Game Scenes
 - Music and sound effects
 - The background music of the game, the sound effect when the player performs different actions
 - Player Action
 - Players have HP and attack power
 - Move, jump
 - Collect collectibles
 - Interact with the scene, and multiple puzzle solving should be done by interacting with scene objects
- Advanced Requirements (30%):
 - More beautiful graphics
 - Beautiful UI
 - Scene rendering
 - Player and mechanic animations, interactive animations
 - Person or perspective switching (e.g. first person <--> third person)

Maze:

- Advanced Requirements (30%):
 - Game Content (should be meaningful to the game)
 - Trading / Buying System (Currency, Store Settings)
 - Backpack system
 - Buffs / debuffs (e.g. jumping ability, movement speed, etc.)
 - Portal
 - Enemy
 - Minimap with limited field of view
 - Online Mode
 - Co-op: Puzzles must be solved by the cooperation of two or more players
 - Ranking list
- Stakeholders: Yuchen Wang (王宇琛), Haoran Wang (王浩然)

Tips for your projects

- Frequently contact your stakeholders. They manage the requirements and have written detailed descriptions.
- Launch your projects ASAP. You don't want to start off just two weeks before the final ddl.
 - Whoever accomplish the projects and present them on mid-term presentation can be awarded with a bonus of 10% of your final project score.
- If you want to be better graded, you should go for as many bonus points as possible.
- You need to run your deliverables with test cases.
- Don't simply rely on the technical leader (大腿) in your team. We would grade you based on your individual contributions to the team in a rigorous manner.

QUESTIONS?
