



Bilkent University

Department of Computer Engineering

CS 319 - Object-Oriented Software Engineering

Final Report

Iteration 2

Settlers of Catan

Group 1D

Berke Oğuz

Alkım Önen

Kaan Tapucu

Ibrahim Eren Tilla

Hasan Yıldırım

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1.Introduction

We had already implemented many features to the game in the first implementation. However, we had some missing parts such as the robber or the random distribution of the hexes. For the second iteration we had decided to add new features to the game which changes both the gameplay and the game strategies. Moreover, we had decided to make the game multiplayer, besides the single player version.

All group members used IntelliJ IDEA as their integrated development environments and synchronized the code via GitHub. During the course of the project, we preferred to meet in school campus for maximum attendance and minimum waste time waste. Moreover, we used social media platforms to communicate with each other, such as WhatsApp and Skype.

As it was promised in our second iteration design report, additional features were implemented into the game. We put great emphasis on discussing the logic of the code and additional features for the game while all group members were present in the meeting. As for the code itself, we split the implementation goals into different sections, such as the GUI, the back-end of the game, additional features and the network for the multiplayer part of the game. Making sure of the cohesion of the different sections is sustained necessitated many meetings throughout the term.

2. Implemented Functionalities & Design Changes

For the second iteration we had only a few missing parts for the main game logic. Therefore, we mostly worked on UI improvements and promised additional features for the gameplay.

- Many graphical improvements were implemented on the menu and main game screen.
- Robber was implemented to the game.
- Map is now created with randomly distributed areas.
- Happiness functionality was added.
- Fishing feature was added which affects the happiness feature.
- Multiplayer feature was added through network connections by sending and receiving data on a server.
- Pop-up screens were added to the game.
- Chatting feature was added to the multiplayer option of the game.
- A new building type, Capital, was added as the new superior building. It is required to have a capital for winning.
- We have decided to increase the victory points required to win the game from 10 to 15.

2.1 Details of Improvements

Fishing is one of the new features that we added to the game. If a player has a city or settlement besides the docks, he/she can have a chance to fish, which affects the happiness of their city which is another feature that we decided to add to the game.

Happiness is the other promising additional functionality which affects the game strategy. We decided to add happiness feature to all players. It affects the player actions during the gameplay. If happiness score is less than two, players cannot construct any city or settlement to the map. If the happiness score is higher than others, the player gains extra victory points. Any city or settlement besides the robber decrease the happiness score of that player while fishing and connected buildings increase it.

Multiplayer is another functionality that we added to the game. We create a TCP server and client for the data transmission between different computers. By using sockets and threads we create our server and client. Then, receive the data via server and share it to all computers.

We added chatting feature to the multiplayer part of the game. Players can communicate via chatting which makes offer feature of the game more logical.

There is also another building type that was added that changes the winning condition: capital. Players now cannot win the game without having a capital city.

2.2 Design Changes

We make changes on the subsystem decomposition in high level software architecture. We add network managers like server manager and client manager to the design. We showed these changes to the control part of the MVC design pattern. Also we do some changes in the view part like connecting the UI's with FXML files which we did not consider in the first design report iteration.

Moreover, we add `serverManager`, `serverGameManager`, `clientManager` ,and `clientGameManager` classes to the class diagram. These classes are taking data from other classes and make the game multiplayer by transferring data to every computer.

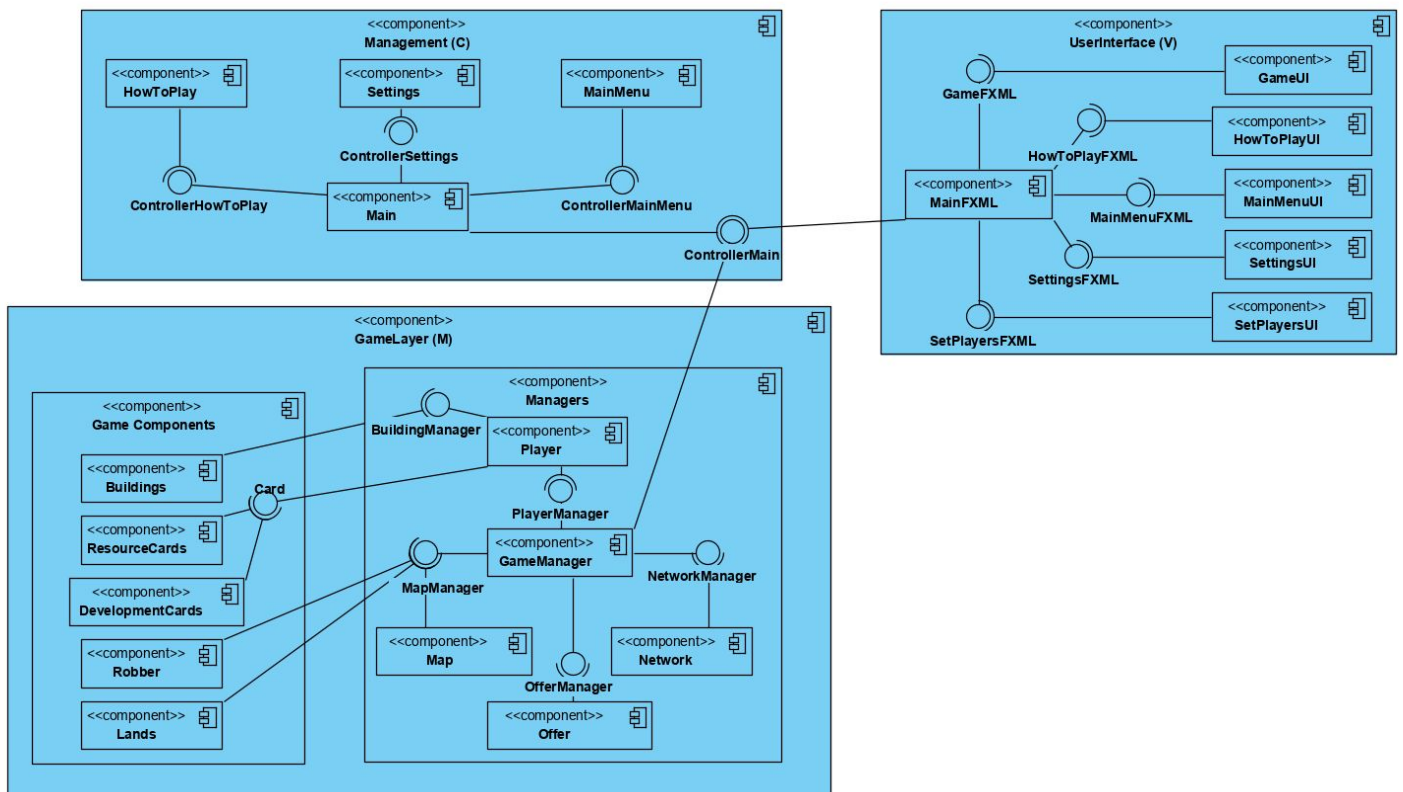


Figure 1 - Subsystem Decomposition

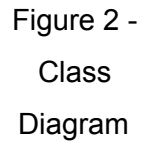


Figure 2 -
Class
Diagram

3. Lessons Learnt

First think that we learnt as a team is being a part of a team and working together. At the beginning of the semester, it was harder to communicate, however, we improve our discussion skills and got used to each other which made it easier to understand each other. Other important thing that we learned is sharing codes via gitHub by connecting intelliJ by git accounts. As a team, we were not so experienced using gitHub before. Moreover, we experienced forward engineering process throughout the semester. First we discuss the ideas and draw the diagrams, then we try to implement our codes according to these diagrams. Another important thing that we learnt is learning new things by searching on the internet. As an example, we were not any idea about networking before the project. However, we learnt to create server and receive the data from there by ourselves.

4. User's Guide

4.1 Main Menu

This is the “Main Menu” screen. Here, the player can either learn how to play the game, go into settings to toggle the sound on or off, or just simply play the game. If he/she decides not to play the game, he/she can quit the game by pressing the “Exit” button from the lower left part of the screen.



Figure 3 - Main Menu

4.2 How to Play

“How to play” button in the menu screen direct user to how to play screen. In that screen game is explained in detailed to the users. It is recommended to read this part for the users that are not familiar with the game. The player can return to the main menu by pressing the “Back to Menu” button from the lower right part of the screen.

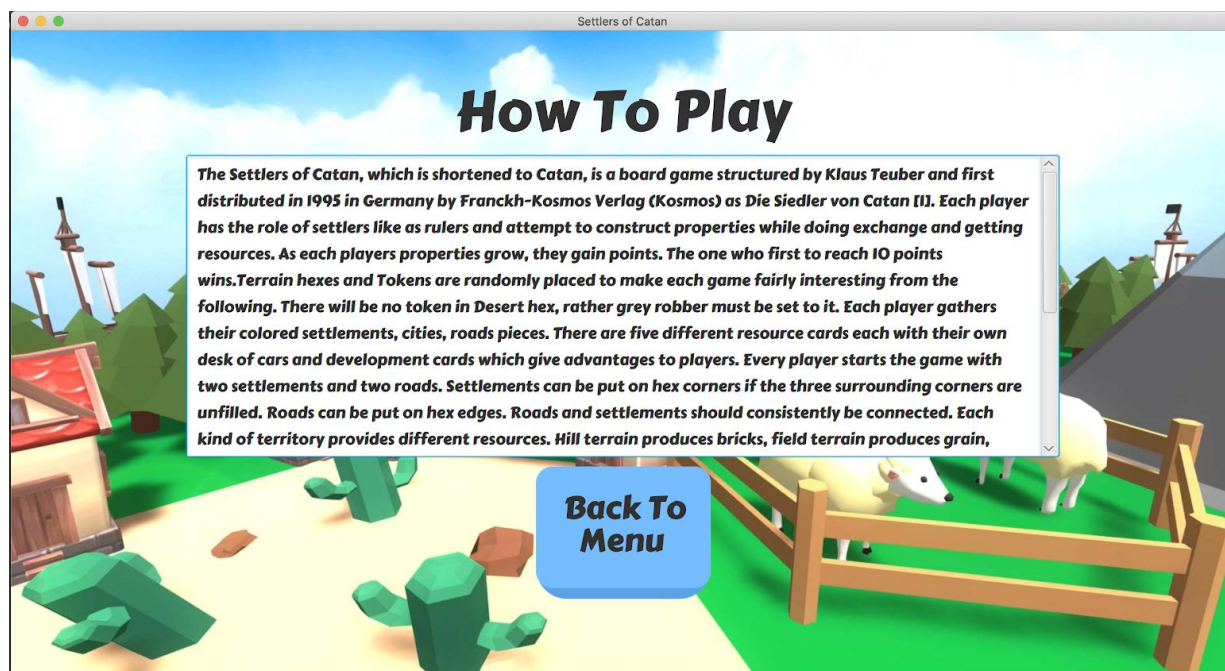


Figure 4 - How to play screen

4.3 Create Game

One of the players create the game and write his/her name. The screen shows the other players joined the room. When the player that creates the game press the start button, game starts.



Figure 5 - Create game screen for multiplayer

4.4 Join Game

Other players use this button to join a multiplayer game. Player write his/her name and press the join button to direct to the already created game lobby.



Figure 6 - Join game player for multiplayer

4.5 Set Players

After pressing the “Play Game” button from the main menu, the player is led to the “Player Names” screen. Here, all the four players should type their names in their related spaces. If a name of a player is not specified, it is initialized as “Player X” where X denotes the number of the player (e.g. if Player 4 is left empty, Player 4 will be named so).

After choosing the players' names, players can either start the game using “Start Game” button from the lower right part of the screen, or go back to the main menu using the “Go Back” button from the lower left part of the screen.



Figure 7 - Set player names for singleplayer

4.6 Play Game

This is the single player option. Four players write their names and play the game from a single computer. After starting the game players are directed to the main game area. Players start the game with two settlements and two roads. The game is turn based. Every player build their buildings to the map. In other turns, every player will roll dice and decide what they have to do in their turns like buy a development card, buy any building or trade processes. After that user clicks the “End Turn” button and give his/her turn to the other player. Players gain victory points when they satisfy conditions like building road or having the longest road ...etc. Any of the players that reaches the fifteen victory points wins the game and game will end.

The upper left corner is the “Offers & Trade” tab where whoever’s turn it is, can trade with other players or trade with the bank choosing from a drop down list. The upper right corner is the “Development Cards” tab. This is where the user can see how many and which type of development cards he/she has and choose and play them.

The upper part is the “Resources” tab where the user can see how many resources of which type that he/she has. There is also the “Building Costs” tab in the bottom left corner where players can see which building costs how many resources of either type. Lower right corner is the “Player Screen” tab. This is where whose turn it is written and the rolled dice number is shown. The “End Turn” button is also here where the player presses in order to end his/her turn.

The center lower part is the “Leaderboards” tab where every player can see who has how many points and who has the largest army or longest road. The upper center part is the “Map” where every player is in an interaction with. They build settlements, cities and roads here. This is where the “game” is played!



Figure 8 - Game screen

4.7 Settings

In the “Settings” screen, the player can toggle the sound on or off by using the checkbox. He/She can go back to the main menu using the “Back to Menu” button from the lower right part of the screen.



Figure 9 - Settings screen

5.Build Instructions

5.1 System Requirements and Installation

Settlers of Catan game is executable and it will have .exe extension. Game will be a desktop application. Game will be worked with java SDK version 11.

- Download the source codes of the game from gitHub
- Users have to open the source code in any java IDE.
- SDK version has to be 11.0.4.
- Build and run the game.