BILKENT UNIVERSITY

ENGINEERING FACULTY

DEPARTMENT OF COMPUTER ENGINEERING

CS319

Final Report

Group 1F-Monopoly

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1. Introduction

After the design iteration had been submitted, we started to implement the game. IntelliJ IDEA had been used for programming of the game and Github had been used as a version control system. Also, in order to design the user interface we benefit from JavaFX library.
The game is played in multiplayer mode with a minimum of 2 people and a maximum of 8 people. The game is played in 3D on a table. The camera angle changes in every turn according to the area where the current player is sitting.Players are shown with characters with specified colors. During the game, the functionalities the player can do are shown with the buttons in the game scene. These are basically, buy or sell buildings, buy city, mortgage, agreement with another player, roll dice and end turn. When the player wants to do one of them, he/she clicks the button and the related popup is opened. In addition to that, there are 6 kinds of regions. These are pirate region, chance card region, quarantine region, test region, city and starting point. Pirate region is shown with skull mode and the chance card region is shown with question mark model. Test region is shown with the vaccine model. Quarantine region is shown with a hospital model. The starting point is white in color. When the game is started, all the cities are grey in color. When the player buys the city, the color of the city takes the color of the player. All the models in the game are 3D. The game continues until one person remains.

2. Design Changes

Only major design change different from our design report is the observers. We decided to use the Observer pattern to synchronize the information in the Game logic with the 3D Scene. We bind observers to our models (Player and City), they notify the Scene items to show the change to the user.

3. Lessons Learned

3.1 Technical Part

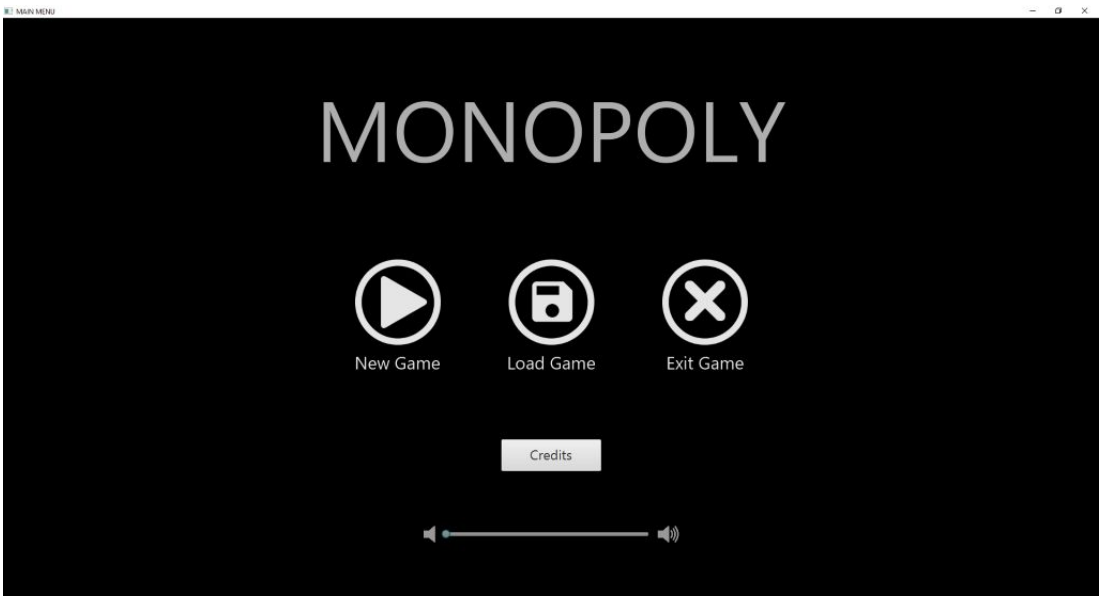
- Manage a project created from scratch.
- Prepare application level and domain level diagrams.
- Learned how to documentize a project.
- Using diagrams is really easing the effort.
- Learned JavaFX from scratch for UI.
- Singleton classes are easy to implement and very useful. In addition to that they help programmers to organize the code.
- Using a version control system with an integrated development environment is also easing the.

3.2 Teamwork

- Teamwork is really important for a project.
- Communication and being aware of what your team is implementing is very important for each programmer otherwise huge times may be wasted.
- Using a version controller system with a team.
- Partitioning tasks according to needs in implementation.

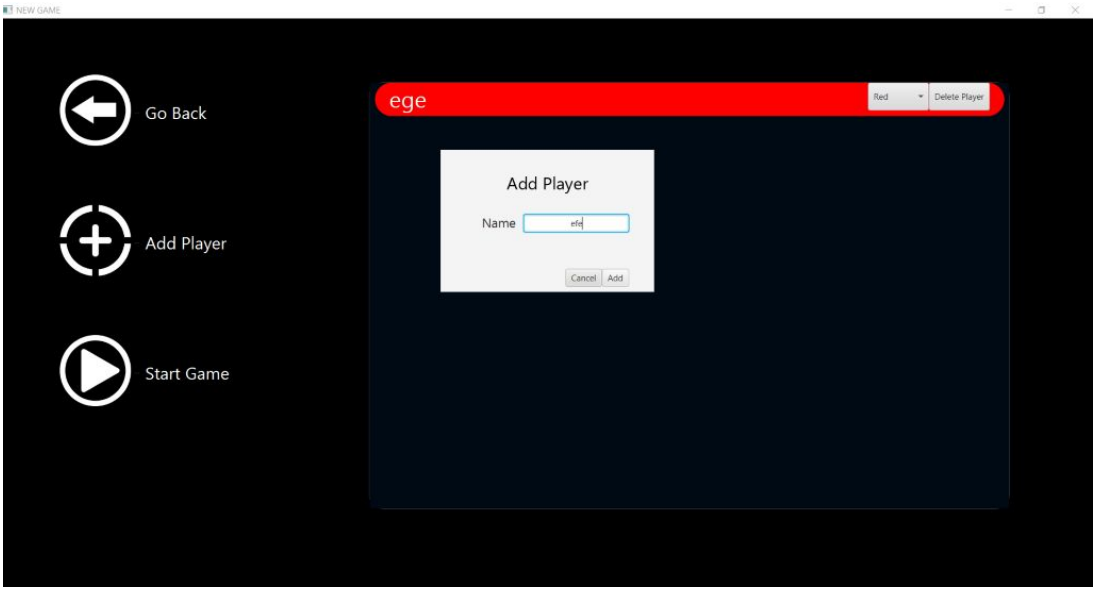
4. User Manual

4.1. Initial Screen



- New Game button takes the players to the New Game screen
- Load game button takes the player to the Load Game screen
- Exit button terminates the application.
- Credits button shows the name of the developers of the game
- Volume is adjustable from volume bar in bottom

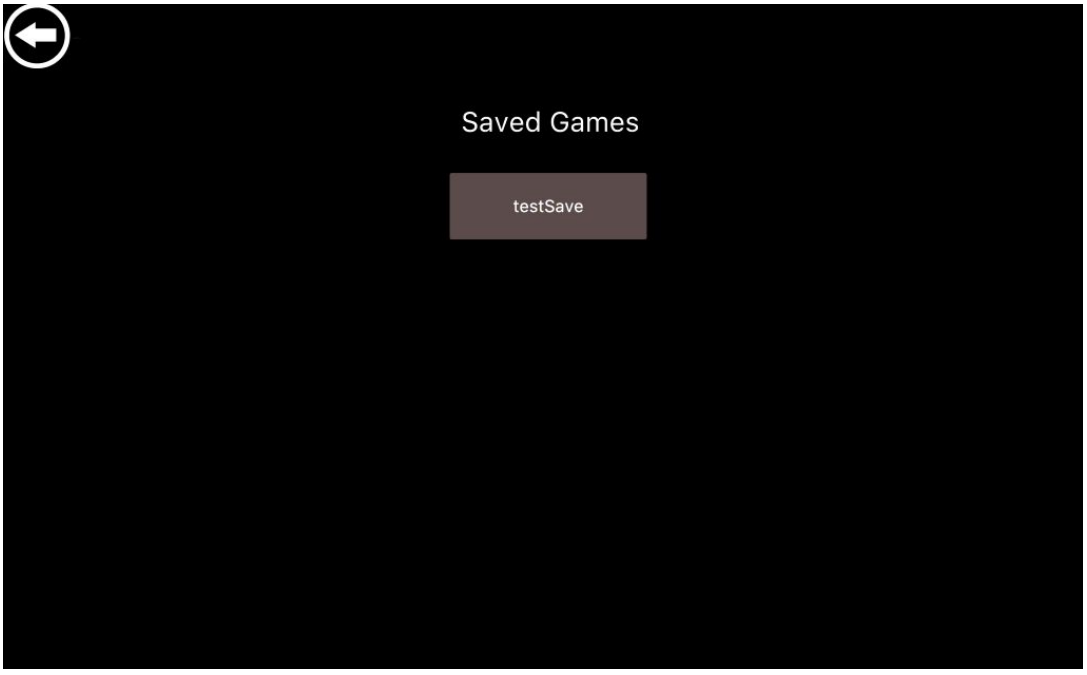
4.2. New Game Screen



- The Go back button takes the players to the Main Menu Screen.
- Add player button shows the popup which takes the name of the player and adds it to the player list. After the player is added, he/she can change the default color of the pawn. Also, using the delete button, the specified player is removed from the player list.

- The Start Game button takes the player to the Game Scene.

4.3. Load Game Screen



- From saved games player can choose any game that is saved before and continue that game. When the player clicks the name of the saved game, that game is opened.
- The arrow on the top left screen takes the player back to main menu screen.

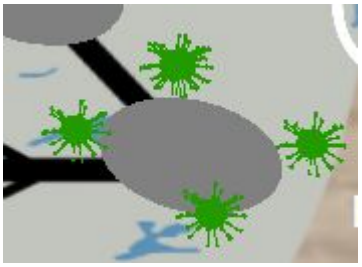
4.4. Game Screen

- This screen holds the map in the middle.
- On top left there is a name of the current player.
- On top right there is money of the current player.

- On bottom, current player's region cards are displayed. These cards have the same color with the player. If the city is mortgaged, this card will be displayed as grey. When the player clicks these cards, the popup of that city is displayed.
- On the right there are buttons with different functionalities:
    - End Turn button which terminates the current player's turn and starts the next player's turn. This can be chosen if only the current player rolled the dice.
    - Save Game button which saves the current game to a file.
    - Roll Dice button which rolls dice and players will move according to result. This button also opens a popup and displays the rolling result. After the player moves, this button disappears until next turn.
- In addition to these buttons there is a panel on the bottom right. Players can follow the money exchanges, infection, and region operations from this panel.
- On the left there are buttons with different functionalities:
    - When Buy Building button is clicked, it opens a popup to buy a building on a specified city. This button can only be clicked if the current player has a region.
    - When the Sell Building button is clicked, it opens a popup to sell a building on a specified city.
    - When the Mortgage button is clicked, it opens a popup in which player can choose to mortgage a city or lift the mortgage from a city.
    - When Agreement button is clicked, it opens a popup in which player can form an agreement and propose to another player.
- In the middle there is a map of the game and players start from the white region. Grey regions are cities, white regions with a hospital next to it is quarantine region, green region is test infection region, black regions with question mark on it is chance regions and black regions with skull on it is pirate invasion regions.
- If a player clicks on a city on the map, a popup will be displayed about the city.
- When a player comes to a chance region or a pirate invasion region, a popup is displayed. So that players will be informed about what chance region or pirate invasion region makes them do.
- When players get infected, the player's pawn's hat and cloak becomes green, which are initially black. When the infection is gone, the hat and cloak become black again. So, a player can understand when they have an infection.


Player color: red(infected)

- When a city becomes infected, the model of the virus will be displayed on the city. When infection is gone from the city, the virus will not be displayed any more. So, players can understand when a city is infected from the virus.


(infected city)

4.4.1. Buy Building Popup

- Buy building popup asks the player to choose a city he/she owns and enter the number of buildings that player wants to construct. When the Buy button is clicked, a specified number of buildings are constructed in the specified city, if the user can afford it and the selected city is in the consecutive group of 3 or more.
- Close button closes the popup.

4.4.2. Sell Building Popup

- Sell building popup asks the player to choose a city he/she owns and enter the number of buildings that will be removed. When the Sell button is clicked, a specified number of buildings are removed on specified city if there are a specified number of buildings on the city.
- Close button closes the popup.

4.4.3. Mortgage Popup

- In the mortgage popup, firstly, the player should choose he/she will either mortgage the city or lift the mortgage.
- If the player chooses the mortgage operation, popup asks to select the city that will be mortgaged and click the mortgage button to complete the operation. When the city is mortgaged, the owner cannot get a rent on this city until the mortgage is lifted. In addition to that region card of the player becomes grey so that player can see which regions are mortgaged.
- If the player chooses the lift mortgage operation, popup asks to select the city from which the mortgage will be lifted. After the mortgage is lifted, players get a rent from that city.
- Close button closes the popup.

4.4.4. Buy City Popup

- When a player comes to a city, a city popup will be displayed on the screen, so the player can see the price and rents of that city. In this popup there are also buy and close buttons. If the city does not belong to anyone and the player can afford it, the player can buy this city by clicking the buy button.
- Close button closes the popup.

4.4.5. Chance Region Popup

- This popup shows the picked chance card's action and informs the player about the action of the chance region (the action is automatically handled).
- This popup can be closed by the close button.

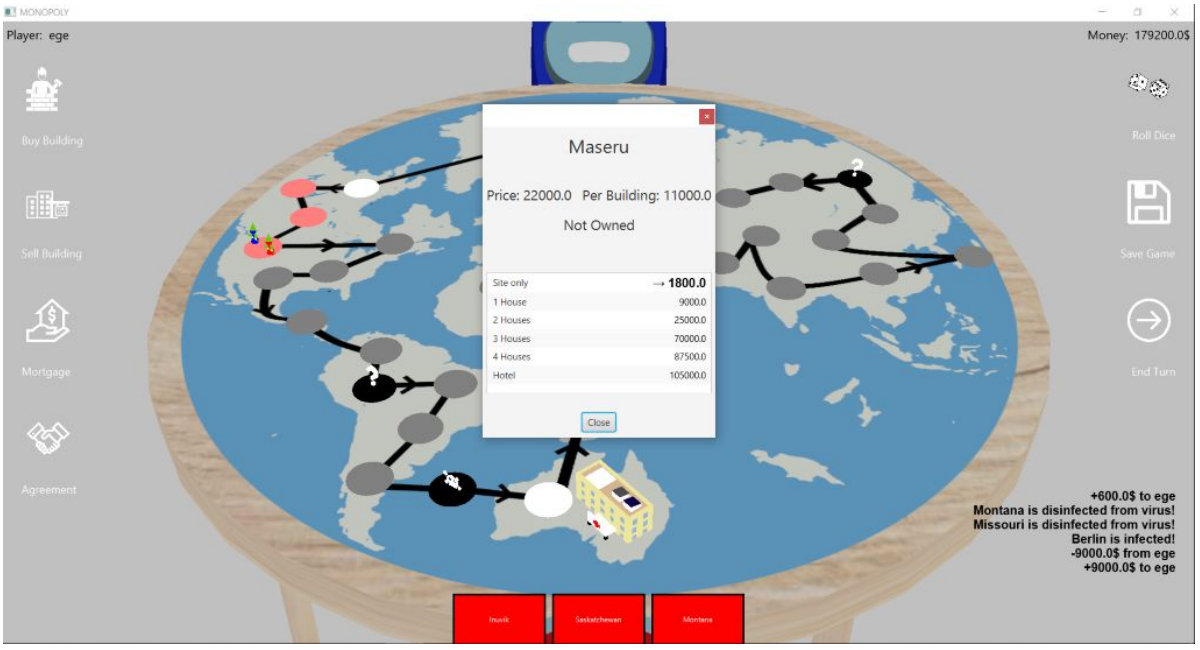
4.4.6. Pirate Invasion Region Popup

- This popup is displayed when the player comes to a pirate invasion region. It informs the player about the action of the pirate invasion region.

4.4.7. Roll Dice Popup

- This popup will be displayed when the roll dice button is clicked. So that player can see what they rolled.
- This popup can be closed by clicking the close button.

4.4.8. Random City Popup

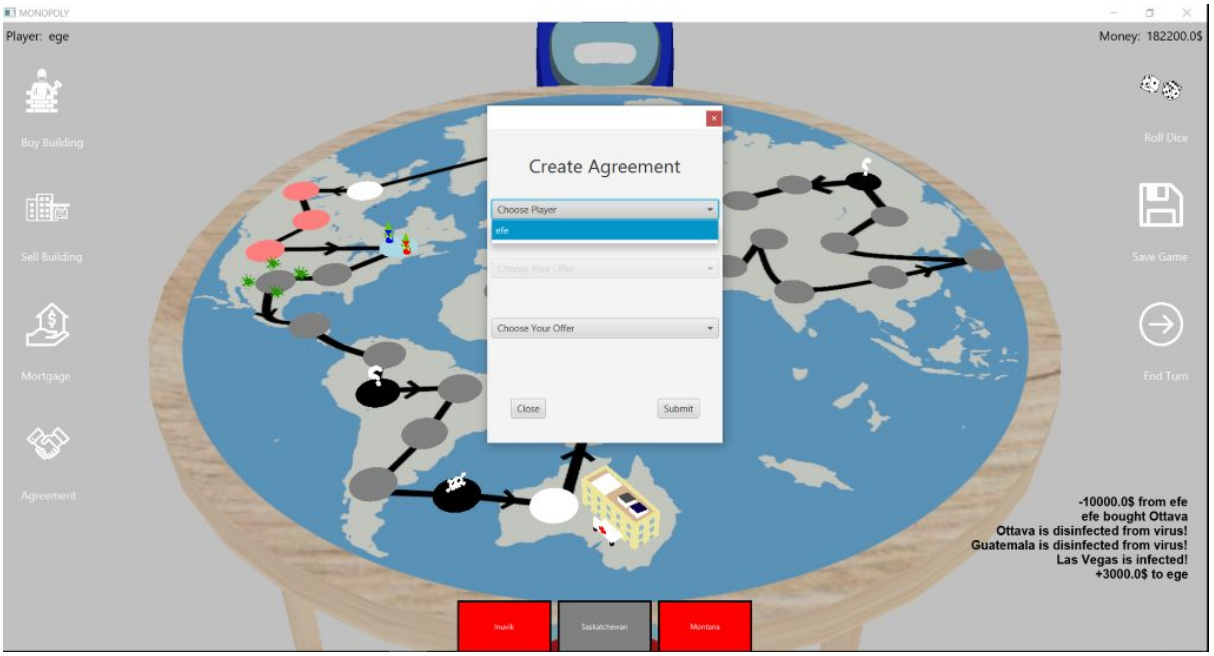


- This popup is displayed when the player clicks on any city from the map. It displays information about that city. So that players can get information about cities which they do not possess or come.
- This popup can be closed by clicking the close button.

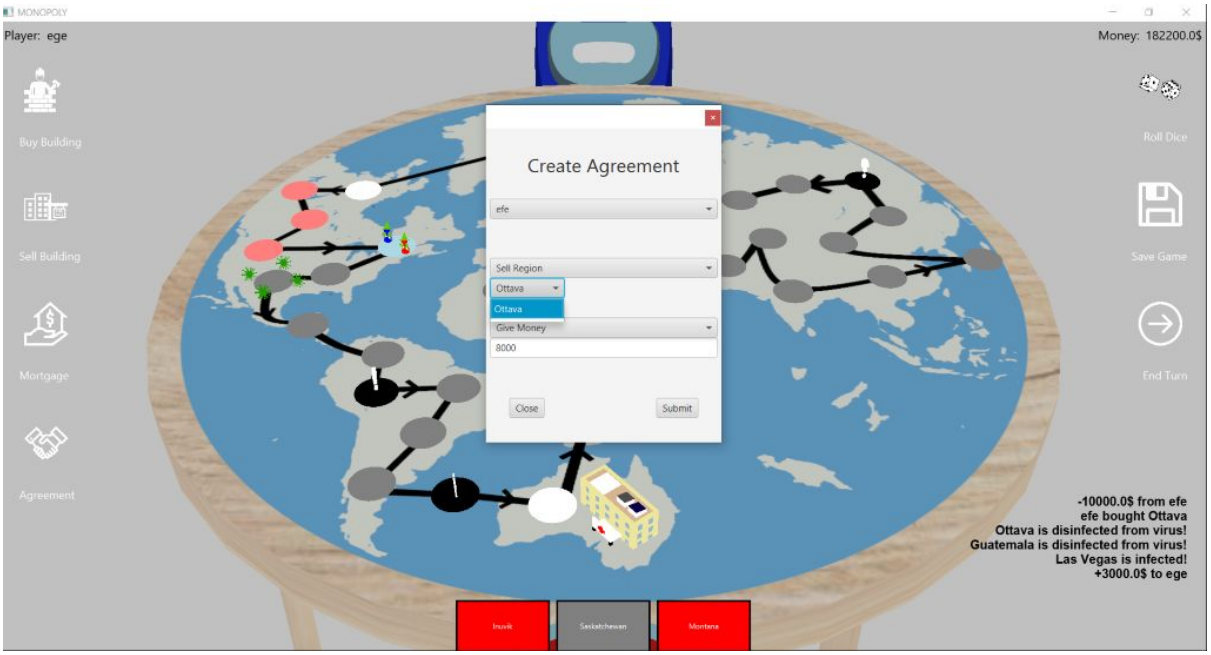
4.4.9. City Card Popup

- This popup is the same with the random city popup but this is displayed when the player clicks on his/her city card at the bottom of the screen. So that players can look at their cities' attributes.
- This popup can be closed by clicking the close button.

4.4.10. Agreement Popup



- This popup is displayed when the player clicks on the agreement button. First player chooses the other player to from agreement. Then



- Player chooses the offers of both sides and then submits.
- This popup can be closed by clicking the close button.

- This popup opens if there is an unresulted offer for the player. Player is informed by this popup about the agreement and as a result player can accept or decline the agreement. This popup is closed when the accept or decline buttons are clicked.

5. Build Instructions

5.1. Command Line

1. Make sure you have java 15.0.1 2020-10-20, Java(TM) SE Runtime Environment (build 15.0.1+9-18), Javafx and jimObjModelImporterJFX.jar.

2. Go to the directory of the project using the command line, run the following command. (replace `/path/to/javafx/sdk` with your path to **javafx sdk/lib** and `/path/to/jimObjModelImporterJFX.jar`).

```
javac -d out --module-path /path/to/javafx/sdk
--add-modules javafx.controls,javafx.fxml,javafx.media
-classpath ".:/path/to/jimObjModelImporterJFX.jar:"
src/controllers/modelcontrollers/*.java
src/controllers/observers/*.java
src/controllers/popupControllers/*.java
src/controllers/scenecontrollers/*.java src/models/*.java
src/models/chanceCards/*.java
src/storage/filemanager/*.java src/utils/*.java
src/Main.java src/views/customJavaFXObjects/*.java
```

3. Copy the assets, gameSettings, views/popupViews, views/sceneviews folder to the /out folder.

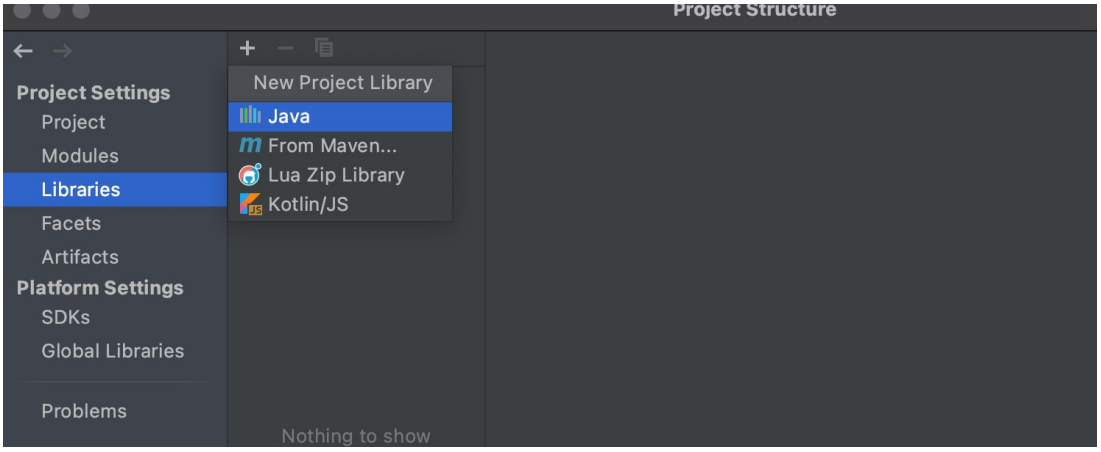
4. Run the following command in order to start the game

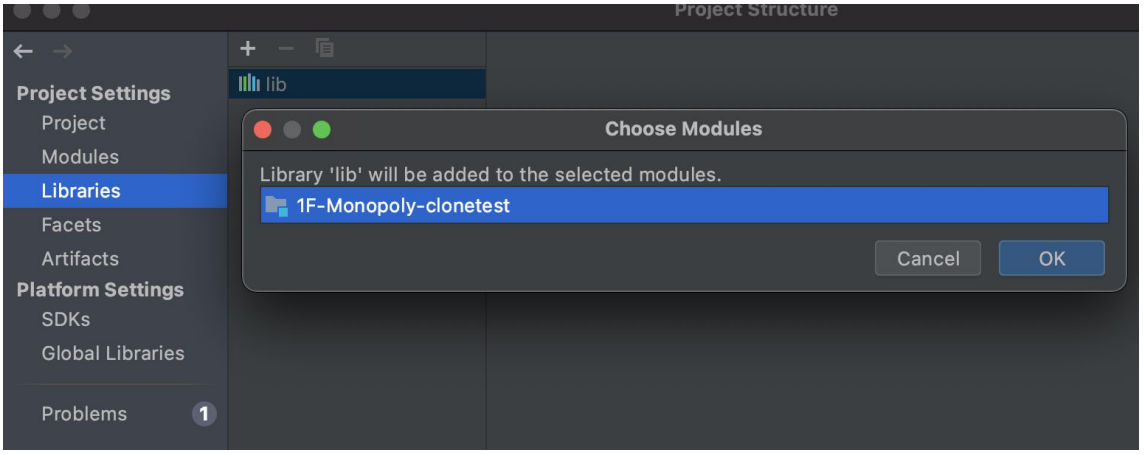
```
java --module-path /path/to/javafx/sdk --add-modules
javafx.controls,javafx.fxml,javafx.media Main
```

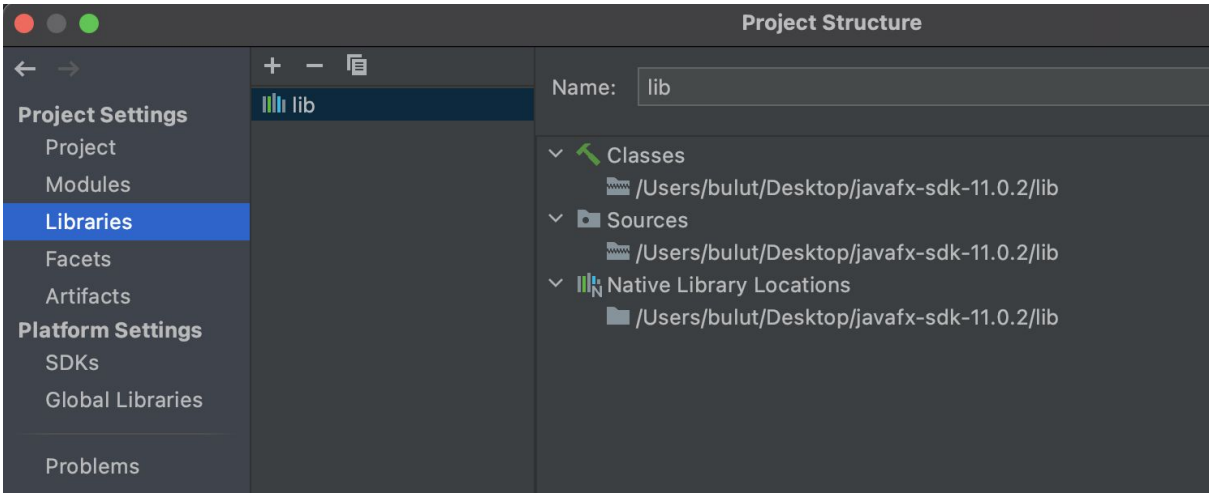
5.2. IntelliJ

If you have Intellij you can also build using that IDE.

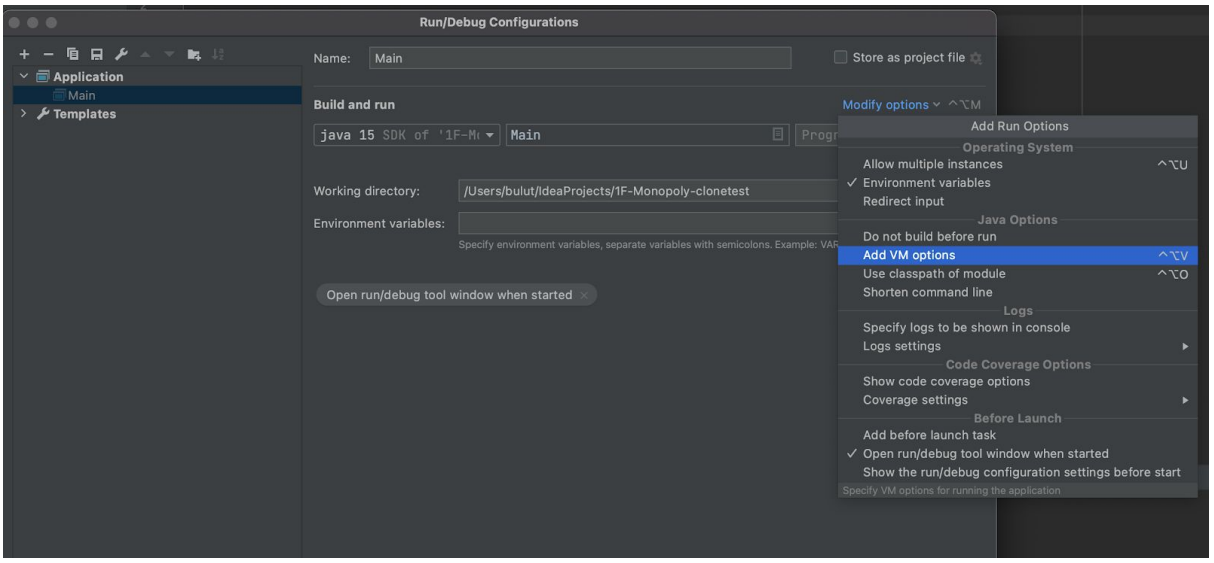
1. Clone the project using VCS.
2. Go to module settings and add java fx library.

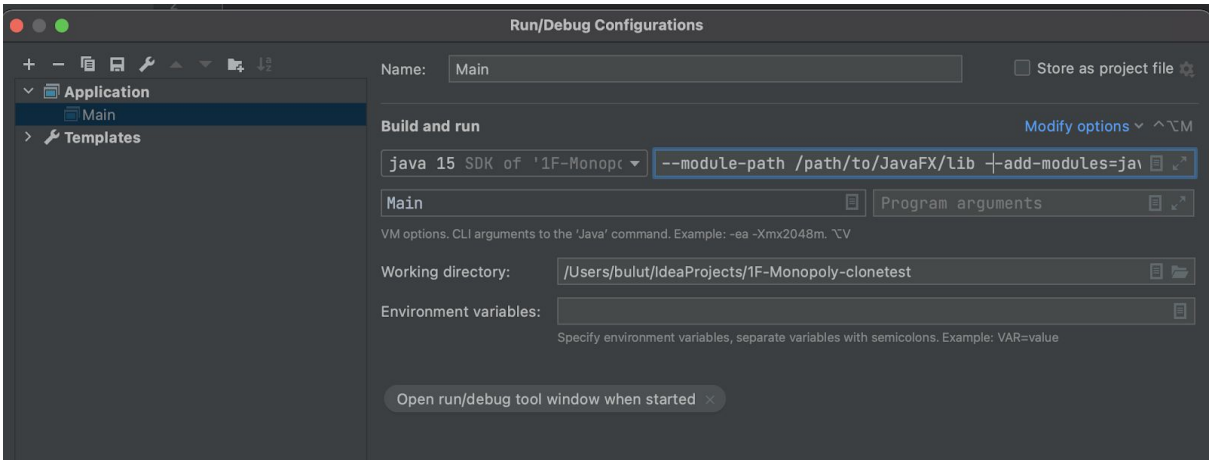




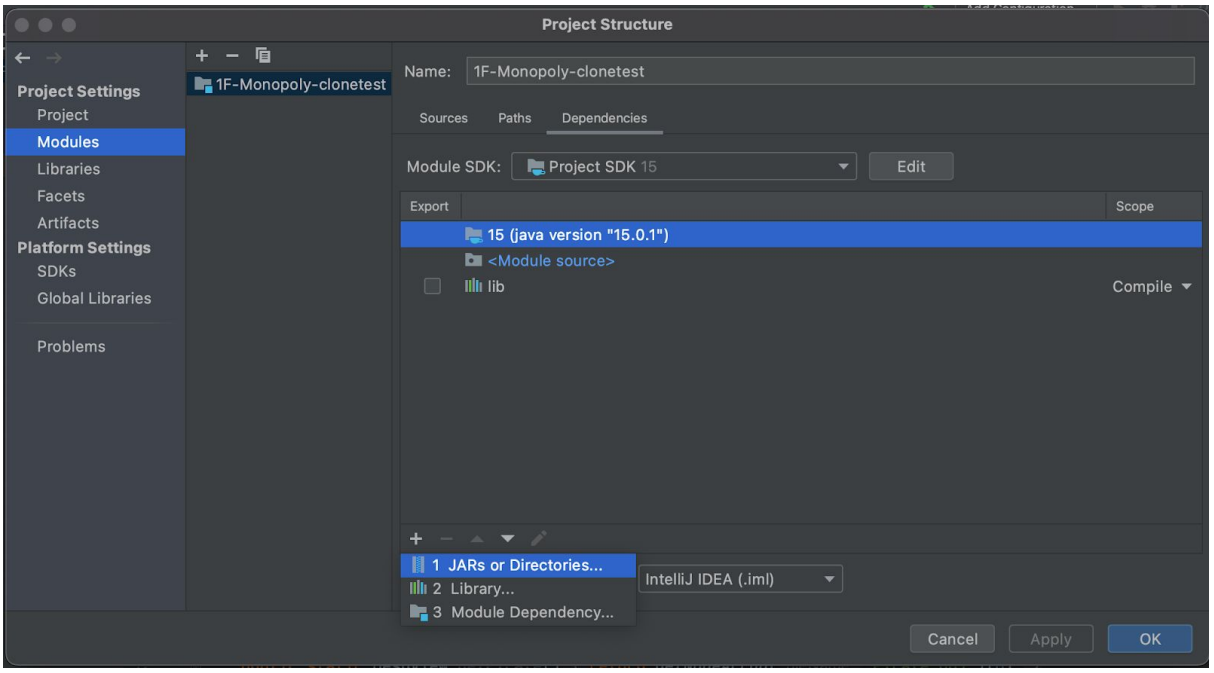


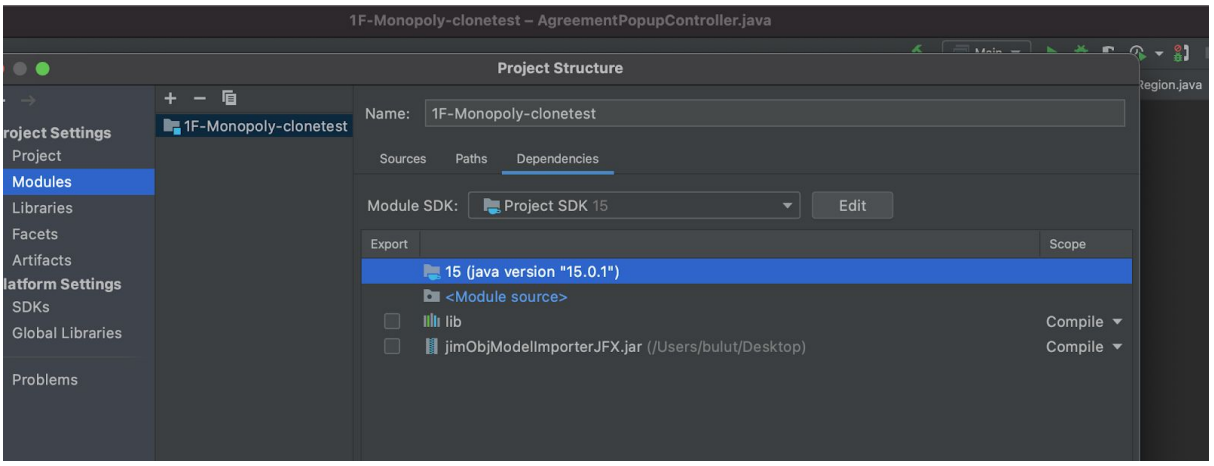
3. Go to run and edit configurations and add following to the environment variables. --module-path /pathtojavafx/lib --add-modules=javafx.controls,javafx.fxml





4. Then add jimObjModelImporterJFX.jar from the dependencies (You can find it from zip file in the repository.





5. Now you can run main.

6. Work Allocation

Ahmet Feyzi Halaç

- Worked on sequence, activity and state Diagrams in Analysis Report
- Worked on Persistent Data Management and Low Level Design in Design Report
- Implemented all things related to JavaFX 3D (pawns, houses, regions, table, camera)
- Implemented observers (Observer pattern) to connect information of the game with the 3D scene (region colors, building numbers, infected information, player location)

Bulut Gözübüyük

- Worked on Non-functional and Pseudo requirements and User Interface in Analysis Report.
- Worked on Hardware & Software Mapping and Introduction & Design Goals in Design Report
- Implemented all things related to Create Game Stage (User interface, player creation, modification, deletion, pop ups etc.).
- Implemented City Card Popup, Agreement and Offer pop ups of the game.
- Contributions to the user interface of the game scene.
- Created build instructions in the Final Report.

Ege Şahin

- Worked on Functional Requirements and Rules in Analysis Report.
- Worked on Global Software Control and Low Level Design in Design Report.
- Worked on User Manual on Final Report.
- Implemented Buy Building, Sell Building, Mortgage, Roll Dice Popup controllers and their interfaces.
- Implemented Chance Card Classes and Player class.
- Modified some of the classes.

Göktuğ Gürbüztürk

- Worked on Introduction, Use Case diagrams and their descriptions in Analysis Report
- Worked on Access Control and Boundary Conditions in Design Report
- Created Load game screen and implemented its controller
- Implemented Region and Agreement classes that inherited these two classes.
- Implemented City, Chance Region, Buy City, Pirate Region and Roll Dice Popup controllers and their interfaces.
- Designed the user interface of the game screen

Aybars Altınışık

- Worked on Class Diagram in Analysis Report
- Worked on Subsystem Decomposition in Design Report
- Implemented the main logic of the game.
- Implemented Game and GameManager Classes
- Implemented Agreement and Offer classes.
- Implemented Buildings class.
- Modified most of the classes from Models package.