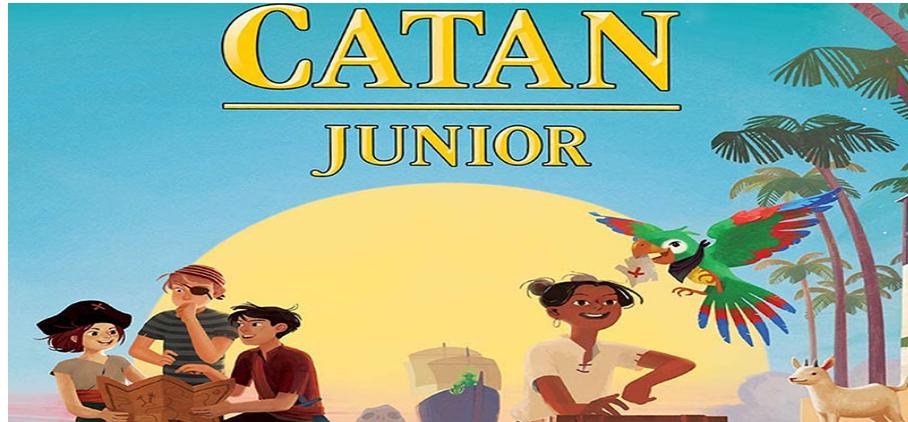


Software Engineering Project - Catan Junior



Objective

You are required to design and implement the *CATAN JUNIOR* game.

Game Setup

The Board: The board of the game is shown in Figure 1.

Resource tiles: cutlasses, goats, wood, gold and molasses (See left side of Figure 2). Each resource tile should be placed in a stockpile next to the board. There are 18 resource tiles for each type of resource.

The Marketplace: Take 1 of each resource tile from the stockpiles and place them on the five booths of the marketplace depicted on the right side of the board (See Figure 2).

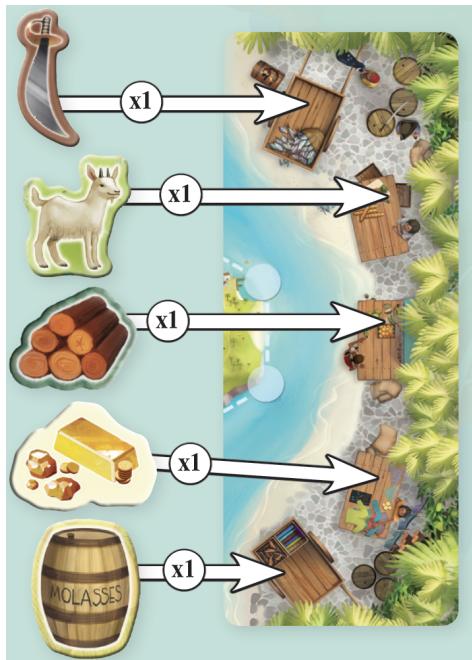


Figure 2. Resource tiles and the five booths of the marketplace.



Figure 1. The CATAN JUNIOR game board

Coco tiles: Shuffle the coco tiles (shown in Figure 3) and place them in a stack next to the board.



Figure 3. Coco tiles

Ghost Captain: Place the Ghost Captain on Spooky Island (See Figure 4).



Figure 4. Ghost Captain.

Players' Pieces: The number of players should range from 3 to 4. Each Player can choose one colour (white, orange, red or blue). Each player has 7 pirates' lairs and 8 ships of the same chosen colour.



Figure 5. Ship and pirates' lair of the orange player.

Some circles on the game board are colored. These are the starting lair-sites of each player (depending on the chosen color). The sites for the starting ships are next to the lair-sites and are marked with colored dotted lines.



Figure 6. Starting lair-sites and ship-sites for the orange player.

Each player should place 1 of their pirates' lairs on each of the 2 lair-sites of their chosen color. Each player should also place 1 of their ships on each of the 2 ship-sites. The sites for the starting ships are beside the starting lairs. They are marked with dotted lines in the chosen color.

Each player is assigned a building cost tile that matches his/her color (see Figure 7). The costs are the same independently of the player's colour. Each player receives one wood resource tile and one molasses resource tile from the stockpile



Figure 7. Building costs tile.

The Game

The goal of the game is to be the first player to build your 7 pirates' lairs. A player can build a pirates' lair on any empty lair-site adjacent to one of his/her ships. A player can build a ship on any empty ship-site adjacent to one of his/her pirates' lairs. A player needs resources to build ships and pirates' lairs. These costs are shown on the building costs tile. A player gets resource tiles from the islands adjacent to his/her pirates' lairs.

At each turn the die is rolled. Each island displaying the number rolled produces a resource for each adjacent pirates' lair. For example, if a 4 is rolled, the treasure caves (lower left of the board) would produce cutlasses, while the sugar cane (lower right of the board) would produce molasses.

The turn of the players follow the same order in which players are created.

At his/her turn a player:

- Rolls the die.
- Builds, buys, and/or trades (in any order).

These activities are

Roll the Die

The result of the die roll applies to all players. For each of the pirates' lairs adjacent to an island with the number rolled, that player receives 1 resource tile that matches the icon of that adjacent island. Note that other players (different than the one who rolled the die) may receive resource tiles.

The player who rolled the die must give the other players any newly earned resources from the stockpile. For example, imagine that the white player rolls a “4” as shown in Figure 8



Figure 8. A player rolls “4”.

The white and the red player each have a pirates’ lair next to the sugar cane island with a “4”, so each of them gets a molasses tile. A treasure cave island is also marked with a “4”, so the blue and the orange players should receive, respectively, 1 and 2 cutlass tiles. Note that each player receives 1 resource for each pirates’ lair s/he has next to an island with a number equal to the number that is rolled. In the example above, because the orange player has 2 lairs next to the “4” cutlass islands, when a “4” is rolled, the orange player gets 2 cutlasses.

If a player rolls a “6” no one receives resource tiles, instead the player should move the Ghost Captain onto another island of his/her choice. Then the current player can take 2 resources tiles produced by the island to which the Ghost Captain was moved. Also if the Ghost Captain is on an island, no player can receive resource tiles for their pirates’ lairs adjacent to that island when the island’s number is rolled.

Build

On his/her turn, a player can use his/her resources to buy Coco tiles and to build pirates’ lairs and ships. A player can build as long as s/he has the required resources. For example, as shown in Figure 7:

- A pirates’ lair costs 1 cutlass, 1 molasses, 1 goat, & 1 wood.
- A ship costs 1 goat & 1 wood.
- A Coco tile costs 1 cutlass, 1 molasses, & 1 gold.

After a player builds something, the resources that s/he spent should be put back into the stockpile.

A player can build a pirates’ lair on an empty lair-site, but only if one of his/her ships is adjacent to it. A player can build a ship on any empty ship-site, but only if it is adjacent to one of his/her pirates’ lairs. Figure 9 shows an example of proper builds.



Figure 9. Example of improper build.

A player must always build in an alternating fashion. Either a pirates' lair and then a ship, or a ship and then a pirates' lair. Also, a player may not build past another player's pirates' lair or ship, and may not share a lair-site or ship-site with another player. Figures 10 and 11 show examples of improper builds.



Figure 10. Example of improper build.



Figure 11. Example of improper build.

Buy

When you buy a Coco tile, turn the tile face up and immediately take the action that is shown (see Figures below).



Back of a Coco tile



Immediately move the Ghost Captain to a new island as if a player rolled “6”



Immediately build a pirates' lair or a ship for free



Immediately receive the resources from the stockpile (either 2 molasses and 2 woods or 2 goats and 2 cutlasses).

Each player should place the used tiles in a different stockpile, this is necessary to keep track of how many Coco tiles a player has bought. When all Coco tiles have been bought it is not possible to use them again.

As soon as a player has the most Coco tiles in front of him/her, s/he can place one of the unused pirates' lairs on Spooky Island. If a player is the first to buy a Coco tile, then s/he has the most tiles, up to that moment.

If the current player has the same number of tiles as any other player s/he should remove his/her pirate's lair from Spooky Island. When the tie is broken, and once again a single player has the most Coco tiles, that player places a pirates' lair on Spooky Island.

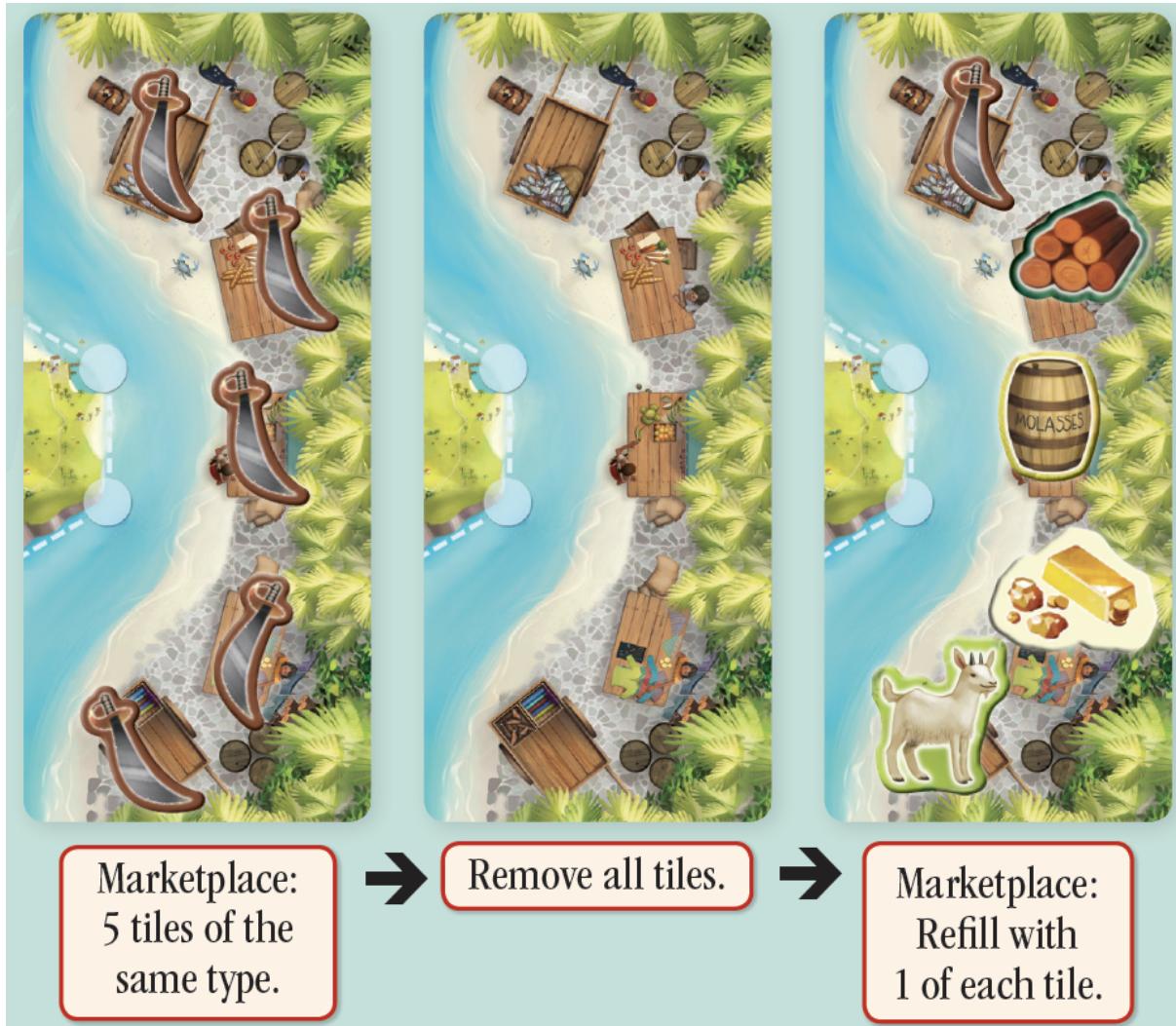
Trade

While a player may not always have the resources to build on his/her turn, s/he has the chance to trade with the marketplace, or with the stockpile. A player can only trade on his/her turn.

Trade with the Marketplace

If a player decides to trade with the marketplace, s/he can take any one of the resources from the booths. In return, s/he must place one of his/her resources back on that booth. That way, there are always 5 resource tiles in the marketplace. Is it only possible to trade with the marketplace once during a player's turn.

As soon as 5 tiles of the same type are in the marketplace, the tiles are removed from the marketplace and returned to the stockpile. Then, it will be necessary to place 1 of each resource on the marketplace booths, just like at the beginning of the game."



Trade with the Stockpile

Another option a player has is to trade directly with the stockpile of resources. A player can take any one resource tile from the stockpile, but in exchange, s/he must replace it with two of his/her resource tiles. The two tiles must be the same. A player may trade with the stockpile as many times as s/he wishes or is able.

For example, a player may place 2 goat tiles into the stockpile and take 1 wood tile from the stockpile in exchange.

If the supply runs out of 1 type of resource tile that a player asks, all players must return all of their tiles of that type to the stockpile.

End of The Game

As soon as a player builds all 7 pirates' lairs (of course, a pirates' lair on Spooky Island also counts!), the game immediately ends and that player wins.

Evaluation Criteria

The project will be evaluated along the following criteria:

- **Clean design (30%)**
 - Game components are implemented appropriately, i.e. separate classes are defined to create different game components.
 - Is the project well structured in classes and modules? Each class should perform a small set of related functionalities (No big classes, long methods)
 - Are interfaces defined and used appropriately?(Interfaces must be created for classes showing similar behaviour but not extending the same superclass)
 - Design patterns (e.g., Singleton, Facade) must be used when necessary.
 - It would be useful to show that you have created use case diagrams, sequence diagrams and class diagrams of your project (Those count 10 points in the total grade).
 - Use the correct data structures, for example, card decks can be represented as a stack
 - Adopt inheritance wisely.
 - In this assignment it may be necessary to use the following design patterns: Singleton, Facade, Observer, Model-View-Controller.
- **Functionality (50%)**
 - The functional requirements of the game are implemented correctly
- **Teamwork (10%)**
 - The distribution of load between teammates is appropriate
 - Distributed version repository (Git) is used appropriately
 - Try to avoid situations where one team member did all the work and another just went for the ride. These things can be understood very easily during the correction of your project.
 - Make sure that your commit messages are self-explanatory and describe the type of modification that was performed in the project.
 - Commits should be performed by both team members frequently.
- **Testing (10%)**
 - Several and meaningful test cases are implemented to test the main project functionalities.
 - Ensure that the main methods of each class are tested: no need to test getters and setters; make sure that important methods (e.g., those that you decided to show in the sequence diagram are tested).