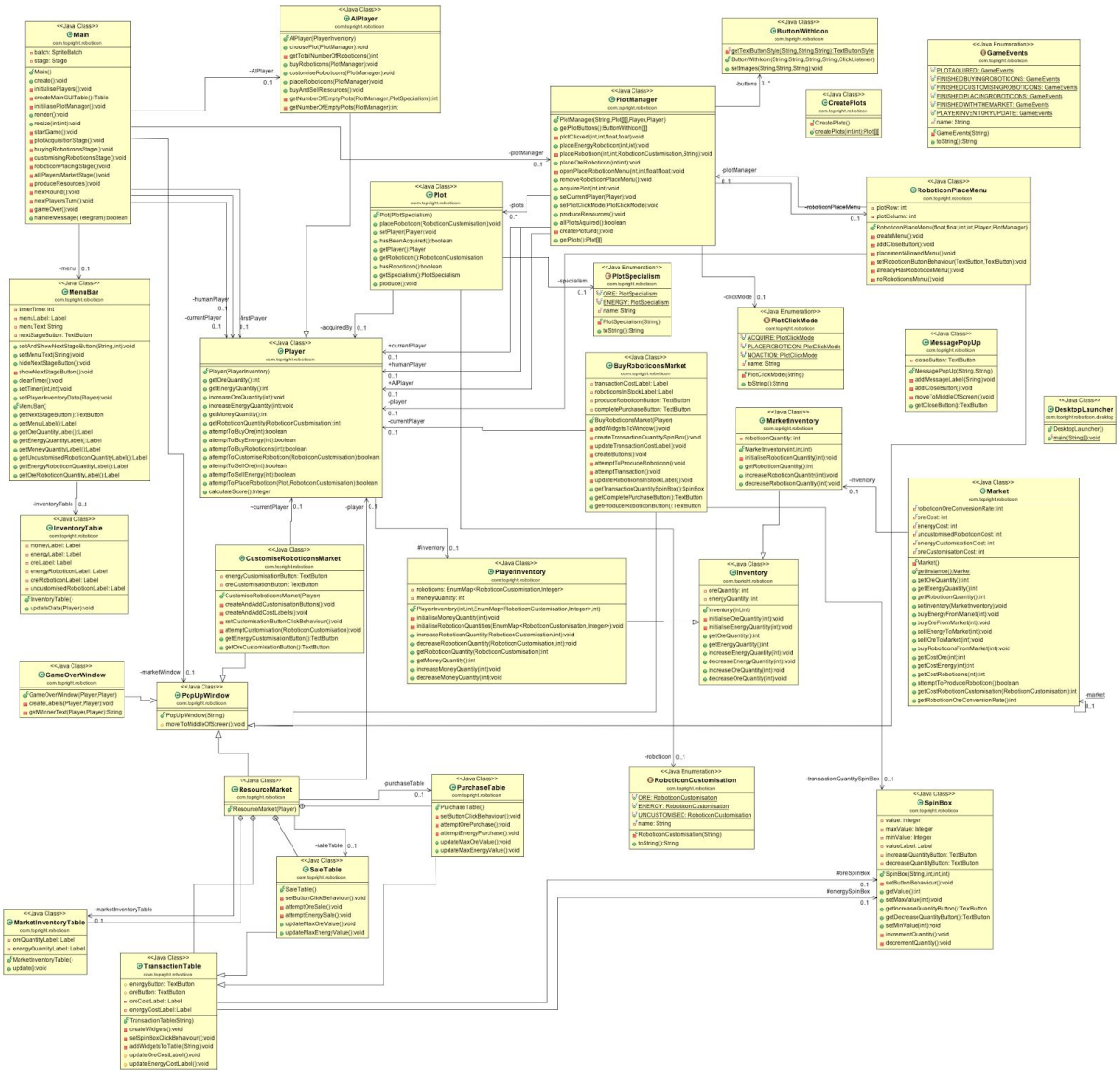
Top Right Corner

Architecture Report

Concrete Architecture

We created a UML 2 class diagram to represent our concrete architecture. The diagram was built using the eclipse plugin ObjectAid.



Link to full size image

How the concrete architecture builds upon the abstract architecture

Several changes were made during the move between abstract and concrete architecture. Many of them were additions to the original abstract architecture, mostly consisting of details relating to the implementation of the program. However some changes were made from the original classes from the abstract architecture. The main change was the removal of the roboticon class from the concrete architecture.

The roboticon class was removed as it was thought to be inefficient to give roboticons their own class and store them separately from the players and the plots. Now in the concrete architecture the roboticons are stored in a variety of ways. In the MarketInventory class there is now a variable for storing the number of uncustomized roboticons, much like PlayerInventory which also stores the number of uncustomized roboticons as well as the number of customised roboticons along with their associated types. While in the Plots class each plot tile now has a variable which stores whether there is a roboticon on it, and if so what type it happens to be. Another change from the original abstract architecture was the addition of costs in the Market class. This gives the market the prices which it should be buying and selling both resources and roboticons at, a feature neglected in the original abstract architecture. The Market was implemented as a singleton class because both players interact with the market and they should only ever interact with the same instance of the Market class as otherwise one player may be able to buy resources that are unavailable to the other (which would be unfair).

One of the additions made to the concrete architecture was the Main class. The Main class is where the program begins and contains many other implementation related items. Notable examples include the startGame() method where the market, players and their inventories, the PlotManager and the GUI are initialized and setup. Other additions to the architecture include the PopUpWindow which is a class used as a base to build many other graphical windows which include; CustomiseRoboticonWindow, GameOverWindow, RoboticonPlaceMenu, BuyRoboticonWindow and the ResourceMarket. CustomiseRoboticonWindow allows the player to customise uncustomized roboticons to collect resources of the selected type. GameOverWindow is used at the end game scenario when there are no empty plots remaining and presents the players scores and displays who the winner of the game is. RoboticonPlaceMenu is used by the player to select which customized roboticon they wish to place on a tile. BuyRoboticonWindow is where players are given the option to buy new uncustomized roboticons. ResourceMarket is a window which allows people to buy and sell to and from the market. The MenuBar and InventoryTable are two other additions and are used for the graphical menu at the top of the game window which are used to relay information to the player. The information provided is money and resources available to the player and what phase the game is currently in. The next turn button is also located on this menu.

Use cases

In the abstract architecture we created a number of use cases describing the steps a user might take to perform various tasks and then created UML diagrams (using Lucidchart) to visualize the behavior of the system and the interaction of its components according to these use cases. The use cases implemented many of the system requirements and helped to show the correctness of the model as it supports the necessary communication links between components. In the move to concrete architecture we updated the use cases to reflect the new architecture. We feel that these use cases still help to show the correctness of the model and so have made them available here: https://sepr-topright.github.io/SEPR/documentation/assessment2/UseCases.pdf

How the concrete architecture satisfies (or fulfills) the initial requirements

The Main class satisfies requirement 1.2 and 1.21 with the method nextPlayersTurn() which ensures each player has a one turn a round, while nextRound() ensures the next rounds start after everyone is finished with the market. Requirement 1.10 is satisfied by Main as the gameOver() method is called once PlotManager finds that there are no available plots remaining. Main also satisfies requirements 1.11, 1.12, 1.13, 1.15 and 1.17 with its methods plotAcquisitionStage(), buyingRoboticonsStage(), customisingRoboticonsStage(), roboticonPlacingStage(), allPlayersMarketStage() being called at the start of their respective turns. Main satisfies requirement 1.16 just after the roboticons placement round where the method produceResources() is called.

Requirement 1.3 and 1.26 are fulfilled by the Main method initiliasePlotManager() which sets up the map with a number of unacquired plots.

The PlotManager class satisfies requirement 1.10 as if all the plots are acquired then the method allPlotsAcquired() returns true, signalling for the game to come to an end. It also fulfills requirements 1.11 with the method acquirePlot() which allows the current player to acquire any free plots. PlotManager using the method placeRoboticon() allows the placement of a roboticon on an empty tile thereby fulfilling requirement 1.15.

The Plot class satisfies requirement 1.4 as each instance of Plot contains the method getPlayer() which returns which player currently owns the plot. Requirement 1.9 is fulfilled by getSpecialism() which returns the resource that tile is most proficient at making when it comes to producing resources for the players.

The Player class satisfies requirements 1.13 and 1.15 with the methods attemptToCustomiseRoboticon() and attemptToPlaceRoboticon() respectively. These allow the player to customise an uncustomized roboticon, given the player has sufficient cash, and to place a customised roboticon given that the plot specified does not already have a roboticon on it.

The Player and AIPlayer class both satisfy requirement 1.1 as they both allow for a human player to play against a computer controlled (AI) player.

The PlayerInventory class satisfies requirement 1.6 with the method initialiseMoneyQuantity() which assigns each player a small amount of money at the start of every game. The PlayerInventory and Inventory classes fulfill requirement 1.5 by PlayerInventory containing variables to store the quantity of roboticons along with their type, as well as the amount of money the player is in possession of using methods to alter their quantities such as increaseRoboticonQuantities() or decreaseMoneyQuantity(). While Inventory contains variables for storing different types of resources such as ore and energy, along with method for altering their values such as increaseOreQuantity() and decreaseEnergyQuantity(). The Inventory class satisfies requirement 1.8 with its methods for initialising the market with the required number of resources at the start of the game such as initialiseEnergyQuantity().

The Market class satisfies requirements 1.19 and 1.20 with its various buy and sell methods which allow players to either buy or sell resources to and from the market, example methods include sellEnergyToMarket() and buyOreFromMarket(). The class also fulfills requirement 1.27 with the method attemptToProduceRoboticon() which will create a new roboticon if the required resources are available in the market. Market also satisfies requirement 1.12 with the method buyRoboticonsFromMarket() which allows players to purchase roboticons.

The MarketInventory class satisfies requirements 1.7 and 1.8 with its variables and methods that facilitate the storage of ore, energy and uncustomized roboticons in the same way as the PlayerInventory class.

The MenuBar class satisfies requirements 1.14 and 1.21 with the method setTimer() which initiates a countdown during the stages which are timed and by having the button nextStageButton which allows the players to indicate they are finished with their turn.

The GameOverWindow class satisfies requirement 1.23 as it produces a pop up window that reports the winner of the game (the player who has the highest score).

Please note: ResourceMaket contains four inner classes: TransactionTable, marketTable, purchaseTable and salTable (purchaseTable and saleTable are subclasses of transaction table). These classes are inner classes as they are not needed anywhere else in the code but allow us to more clearly organise the code in this class by separating it into distinct logical chunks. The saleTable and purchaseTable classes share a lot of common attributes which is why they both inherit from a single transactionTable class.