ID2209 – Distributed Artificial Intelligence and Intelligent Agents

Homework 2

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Task1

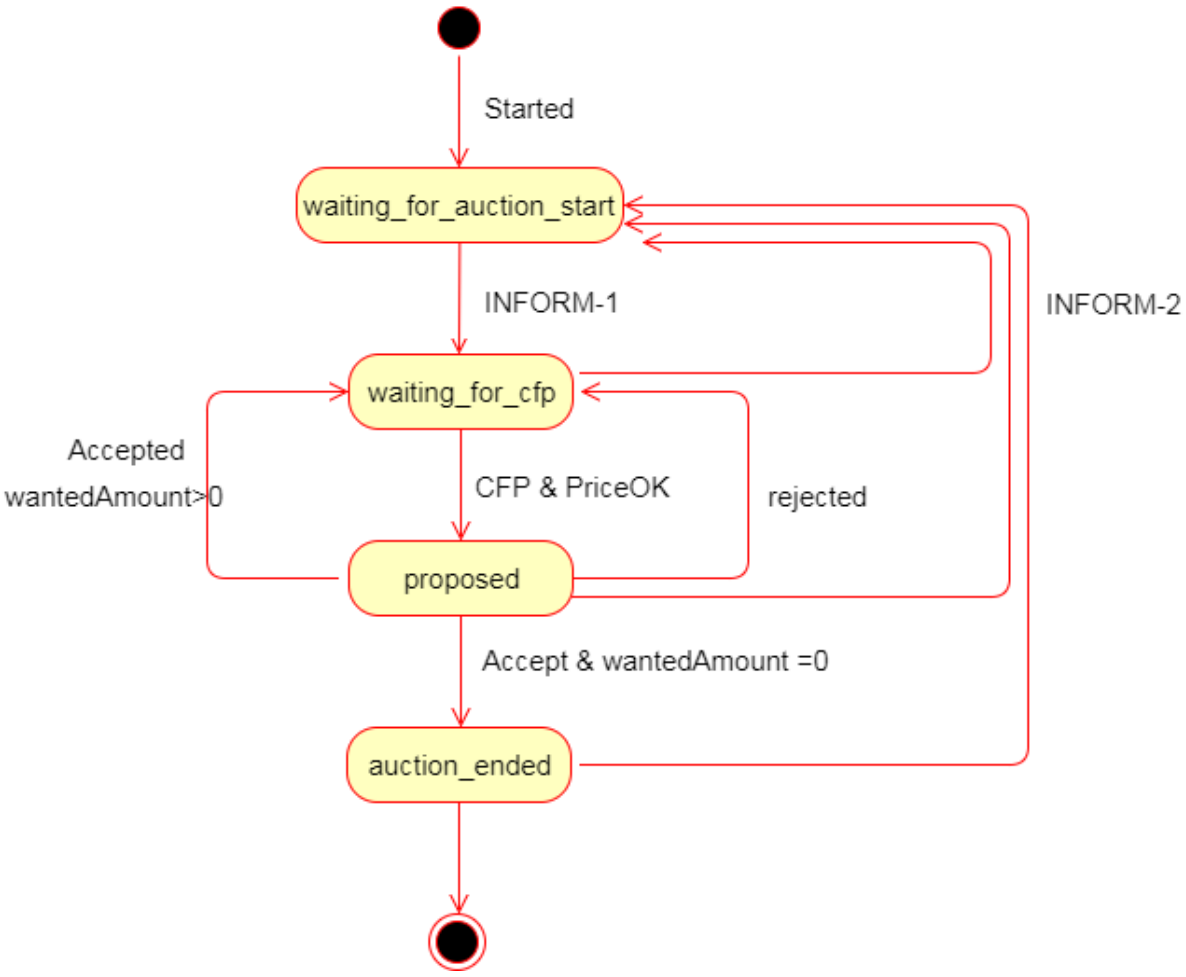
How to run

Import the folder as a new java project in Eclipse. Start a new agent platform and start the agents in the order Buyer(s) and Auctioneer. Starting a Buyer without any arguments or with argument 1 gives you a random Buyer with strategy, while with argument 0 gives you a random Buyer without strategy. Starting a Buyer with argument X,Y (X: 0,1; Y: 1~5) gives you a predefined Buyer(Y: 1~5) with(X:1) or without (X:1) strategy. To get an Auctioneer with strategy, start it without any arguments, otherwise you will get an Auctioneer without strategy. After Auctioneer started, you can choose the predefined items to auction by double clicking an item and then clicking the "start new auction" button on GUI, or you can just fill in the blanks to auction anything.

Buyer

Random Buyer is started with 3 random parameters: *wantedAmount* (the number of the item in auction that he/she wants to buy), *acceptedPrice* (the price that is acceptable for him/her) and willingness. For predefined 5 users, the parameters are fixed.

A state machine is implemented in Buyer.



For Buyer without strategy, he/she sends proposal if the price in CFP received from Auctioneer is not higher than *acceptedPrice*.

For Buyer with Strategy, there are 3 extra parameters:

1. **increaseFactor** (the number greater than 1 to multiply with when Buyer needs to increase *acceptedPrice* according to strategy; the higher the willingness, the higher the *increaseFactor*)
2. ***decreaseFactor*** (the number less than 1 to multiply with when Buyer needs to decrease *acceptedPrice* according to strategy; the higher the willingness, the higher the *decreaseFactor*)
3. **decreaseCounter**(a random number from 1-5 defining how many times a buyer can decrease the *acceptedPrice*).

And the strategy is like this:

1. After auction starts, Buyer increases acceptedPrice if willingness>=0.7 or the number of Buyers >=4; decreases acceptedPrice if willingness<0.4 or the number of Buyers < 3.
2. After receiving CFP with higher price than acceptedPrice, if the selling quantity is more than double of wantedAmount, Buyer waits for lower price; otherwise, Buyer increases acceptedPrice and if new acceptedPrice is not lower than selling price, Buyer sends proposal.
3. After receiving CFP with lower price than or equal price to acceptedPrice, if the selling quantity is more than double of wantedAmount, Buyer decreases acceptedPrice until it is lower than selling price or decreaseCounter is 0; Otherwise, Buyer sends proposal.

Auctioneer

For Auctioneer without strategy, the selling price is reduced every time by 10%. The auction ends when the reduced priced has reached equal or lower to half of the starting price.

For Auctioneer with strategy, the price is again reduced by a starting 10% every round. For every round, the reduction is lowered based on the percentage of items sold in last round compared to how many items there were for that round. The closing price is then changed by that reduction percentage which allows the auction to last longer.

Other classes

CfpContent

Class for the object to be included in CFP messages. It includes selling quantity, price and product details.

BuyerResult

Class for Buyers results after auction generated by Buyer. It includes bought quantity, price.

AuctionHistory

Class for auction history generated by Auctioneer. It includes Buyer's name, bought quantity, price.

Task2

Given these assumptions we can propose several rules for each agent.

Artist Manager – Strategies are to sell low or high quality artifact.

- If he sells a lower quality artifact, it will give him a higher payoff **(100)**
- If he doesn't sell a low quality artifact, it will give him low loss **(-1)**
- If he sells a high quality artifact, it will give him low payoff **(1)**
- If he doesn't sell a high quality artifact, it will give him higher loss **(-100)**

Profiler – Strategies are to buy or not buy artifact.

- If he buys a low quality artifact it will give him low payoff **(1)**
- If he doesn't buy a low quality artifact, he keeps his money and gain nothing **(0)**
- If he buys a high quality artifact it will give him high payoff **(100)**
- If he doesn't buy a high quality artifact, he keeps his money and gain nothing **(0)**

Creating a matrix based on this information

	Low	*High*
Not buy	**-1, 0**	**-100, 0**
Buy	**100, 1**	**1, 100**

Where the first number is the payoff for the artist manager and the latter for the profiler agent.

The Nash Equilibrium is ***<Buy, Low>****,* because:

1. If profiler chooses Buy, artist manager can do no better than Low;
2. If artist manager chooses Low, profiler can do no better than Buy (because buying a low quality product has high pay off than not buying anything).