

# Homework 2

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## Task #1

The implementation is described in the report from HW1. The only difference from HW1 is the removal of unnecessary behaviors in the curator agent.

## Task #2.1

The implementation of the Dutch auction protocol is split into two behaviors, the AuctioneerBehaviour and the BuyerBehaviour.

The AuctioneerBehaviour is used by the ArtistManagerAgent and the BuyerBehaviour is used by the CuratorAgent.

### AuctioneerBehaviour

The AuctioneerBehaviour will first find all buyers (participants) for the auction. Buyers are registering to the DF and the auctioneer will search for them. After looking them up it will send an INFORM-message to inform all buyers that the auction started.

The AuctioneerBehaviour is a ParallelBehaviour containing a TickerBehaviour for sending new bids periodically and a CyclicBehaviour to receive messages from the buyers.

The TickerBehaviour will first check if the auction status is still ongoing. If it's not it will send an INFORM-message to inform the buyers that the auction ended (with or without bids). If the auction is still ongoing it will decrement the current offer and send the new offer to the buyers using a CFP-message.

The CyclicBehaviour used for receiving messages will accept PROPOSE-messages from the buyers. If a proposal is received it will check if the auction is still ongoing, if so it will check if the price included with the proposal is the current. If everything is okay it will update the auction status to ENDED (thus ending the auction the next tick), and send an ACCEPT\_PROPOSAL-message to the buyer who made the proposal. If something is wrong, it will send the REJECT\_PROPOSAL-message instead.

### BuyerBehaviour <<<<<CHECKED TO HERE>>>>>

The buyer agent is using a CyclicBehaviour for receiving messages from the auctioneer.

Receiving INFORM-messages, informing of the start or end of the auction, only makes some printouts. When a CFP-message is received it will check if the current bid is below or equal to its maximum price. If it is it will respond with a PROPOSE-message to the AuctioneerAgent, proposing to buy the item. When ACCEPT\_PROPOSAL- or REJECT\_PROPOSAL-messages are received it will make printouts.

## Task #2.2

To try out different bidding strategies you can specify a weight when starting the BuyerBehaviour. The weight will be multiplied with the real price of the item that is being auctioned and will be the limit for when the BuyerAgent will propose to buy the item.

A higher weight obviously makes the BuyerAgent proposing to buy the item for a higher price,

increasing the probability to actually buy the item. The time consumption for an auction will also be shorter the higher price the item is bought for.

### Task #3

The Artist Manager has two strategies, selling a high quality product and selling a low quality product. The Profiler agent also has two strategies, buying or not buying a product. Using this information I constructed a payoff matrix.

Profiler Agent \ Artist Manager	High quality	Low quality
Buy	2, 1	1, 2
Not buy	0, -2	0, -1

For the Artist Manager:

Selling a low quality product gives a higher payoff.

Selling a high quality product gives a lower (but yet positive) payoff.

Not selling a low quality product gives a smaller negative payoff.

Not selling a high quality product gives a larger negative payoff.

For the Profiler Agent:

Buying a low quality product gives a lower (but yet positive) payoff.

Buying a high quality product gives a higher payoff.

Not buying a product gives a neutral payoff. (Not differentiating high/low quality.)

I can not find any Nash equilibrium with the utilities I set for the strategies. There is no state where no agent can benefit from changing their strategy while the other keeps their strategy unchanged.

For instance, if the agents select the state where the Profiler Agent will buy a High quality product the utility would be (2,1). Although if the Artist Manager chooses to sell a Low quality product it would have a higher utility.

The same applies for the other way around and for the states where the Profiler Agent does not buy the product there is always such a state as well.

Note: I assumed that the only role of the Curator Agent was to forward the offer from the Artist Manager to the Profiler Agent.