**Assignment: Group Project (Total : 20% of 50% carry marks)**

**Form a group of a maximum of 4 people. Give your group a name. Your group members should come from the same class. You’re required to submit your names on Spectrum, watch for announcements.**

**Descriptions of problem:**

“An auction is a process of buying and selling goods or services by offering them up for bid, taking bids, and then selling the item to the highest bidder.”

(Wikipedia - <https://en.wikipedia.org/wiki/Auction>).

Auctions have been used in various forms of business including antiques and collectibles, land and property, motor vehicle, bankruptcy, furniture and household equipment. eBay.com is an example of online auction and shopping website where people and businesses buy and sell various goods and services worldwide.

There are various types of auction. Different type of auction has different bidding behaviour. How a bidder will behave in an auction depends on the reason with which the bidder is participating in the auction in the first place.

A few typical examples of the action are summarized in Table 1.

**Table 1: Action types and their definition**

|  |  |
| --- | --- |
| **Auction type** | **Definition / Requirement** |
| English auction / Open ascending price auction) | The open ascending price auction is arguably the most common form of auction in use today. Participants bid openly against one another, with each subsequent bid required to be higher than the previous bid. An auctioneer may announce prices, bidders may call out their bids themselves (or have a proxy call out a bid on their behalf), or bids may be submitted electronically with the highest current bid publicly displayed.  Requirement :   * A maximum bid might be left with the auctioneer, who may bid on behalf of the bidder according to the bidder's instructions. * The auction ends when no participant is willing to bid further, at which point the highest bidder pays their bid. * The auctioneer may set a minimum amount by which the next bid must exceed the current highest bid. * The current highest bid is always available to potential bidders. |
| Japanese Auction | A variation of the English auction. When the bidding starts no new bidders can join, and each bidder must continue to bid each round or drop out. |
| Blind auction / Sealed first-price auction / First-price sealed-bid auction (FPSB) | In this type of auction all bidders simultaneously submit sealed bids so that no bidder knows the bid of any other participant. The highest bidder pays the price they submitted.  Requirement :   * Bidders can only submit one bid each. * Bidders cannot see the bids of other participants, so they cannot adjust their own bids accordingly. * The submitted bids are opened at a place and time that were predetermined earlier on before the auction process commenced. * The seller and auctioneer review the bids during an irrevocable offer period and determine the best bid for the item. |
| Vickrey Auction / Sealed-bid second-price auction | Identical to the sealed first-price auction except that the winning bidder pays the second-highest bid rather than his or her own. |
| Reserve Auction | The item for sale may not be sold if the final bid is not high enough to satisfy the seller; that is, the seller *reserves* the right to accept or reject the highest bid. In these cases a set 'reserve' price known to the auctioneer, but not necessarily to the bidders, may have been set, below which the item may not be sold. The reserve price may be *fixed* or *discretionary*. In the latter case, the decision to accept a bid is deferred to the auctioneer, who may accept a bid that is marginally below it. For example, the auctioneer may accept the bid if ±5% of the minimum price is offered by the bidder. |

You have been selected by a client company to create an auction system that is able to perform all of listed auctions above. Your system has to demonstrate the use of **at least 3 different data structure techniques** that you learn in the course. You are not allowed to use any database except those saved as text files (.txt). An example of bidding/auction information is as below:

**Figure 1: Example of auction information**

|  |
| --- |
| Seller Details  -----------------  (id) (name) (item) (itemID)  A2 Brandon Football Jersey I1  A5 John Vintage Piano I2  A4 Anthony Fridge I3  Bidder Details  ------------------  (id) (firstName) (lastName)  A1 Andy Murray  A2 Brandon Marshall  A3 Calvin Klien  A4 Anthony Bourdain  A5 John Legend  A6 John Boyega  Bidder Calling Price  ------------------------  (id) (biddingTime) (bidderName) (biddingAmount) (biddingItemID)  A1 12:00 Andy 100 I1  A2 12:00 Brandon 100 I1  A3 12:01 Calvin 105 I1  A5 12:02 John 107 I1  A2 12:03 Brandon 102 I1  A6 12:03 John 210 I2  A1 12:03 Andy 50 I2  …  Seller Minimum Sale Price (Minimum price + - 5% of the offered bidding)  --------------------------------------  A4 Anthony 200  A5 John 50 |

During your system development, implement the following basic functions, where these functions/features are compulsory.

* Allows seller and bidder to make new registration.
* Accept bidders’ details (id, bidding time, name, bidding amount, bidding itemID) input through, both, the command prompt and from text file. Any of these options should update the input data in the text file.
* Allows bidders and sellers to remove themselves from the auction system.
* Allows bidders and sellers to edit their details from the action system.
* Prompt user to choose any type of the 5 auctions (as defined above) for bidding.
* Allows user to specify auction start and end times. This limits the selection of bidders from the text file following the specified bidding start and end times.
* Display list of bidders, bidding items, bidding start and end times, seller’s details, type of the chosen auction type.
* After the bidding duration ends, the system should display details of the auction winner that includes :
  + ID and Name
  + Total winning amount
  + Winning item
  + Frequency of bidding for the item won
  + Bidder Status (Newbie, Intermediate, Pro) – Defined based on frequency of bidding.

|  |  |
| --- | --- |
| Bidder status | Bidding frequency |
| Newbie | 1 - 10 |
| Intermediate | 11 - 20 |
| Pro | 21 - |

* Sort the values both in the ascending and descending according to the :
  + Bidding rate (i.e., Highest to the lowest bidders and vice versa)
  + Name (list of bidders)
  + Frequency of bidders
  + List of items for bidding
* Students need to identify and implement additional (but necessary) criteria to ensure proper operability of type auction (refer Table 1). [Tips: Prioritise the criteria accordingly].
* The example text file consisting of the auction information as shown in Figure 1 can be extended to contain further necessary information following the definition/requirements of the action types.

Implementation of additional functions not stated in this requirement would earn you additional marks in your assessment, if they are deemed useful and appropriate.

Your final output should include the following:

* Complete working system. [You are not expected to create the GUI. Your program can be shown using the Netbeans command prompt.]
* A report (both hardcopy and softcopy) should consist :
  + UML diagram
  + List of the system requirements
  + Types of auctions and their corresponding algorithm/pseudocode and data structures
* Oral Presentation
  + Detailed job scope for each group member

The final submission includes the following:

1. Report – hardcopy and softcopy
2. System – softcopy (zipped) and submit on Spectrum in Week 13 (dates to be assigned)

Something to ponder on:

1. In case of a tie (i.e., two or more bidders offer the same amount), what would you do?
2. Anything else?

**- End of Assignment -**