



EEET2482 Software Engineering Design
COSC2082 Advanced Programming Techniques
Semester 3, 2024

Assignment Report

AUCTION APPLICATION

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Date : January 17, 2025

I. INTRODUCTION

This assignment aims to apply all Object-Oriented Programming (OOP) in the course to build a software application using C++, which is beneficial for further development in the future. This software application is about a credit-based auction that can simulate the real-world functionalities of an auction. Nonetheless, to focus on the ability to apply a variety of topics provided by the course, the application's user interface (UI) is console-based. This report illustrates the structure of this auction application and further details about all the functionalities within. Furthermore, the class diagram is also provided for the ease of visualization of the structure of this application and design management.

II. APPLICATION DESIGN AND DEVELOPMENT

1. Software Design (Class Diagram)

The Explanation of the class diagram, the relationship between the classes and the description of the attributes and methods of each class are discussed.

Class Diagram:

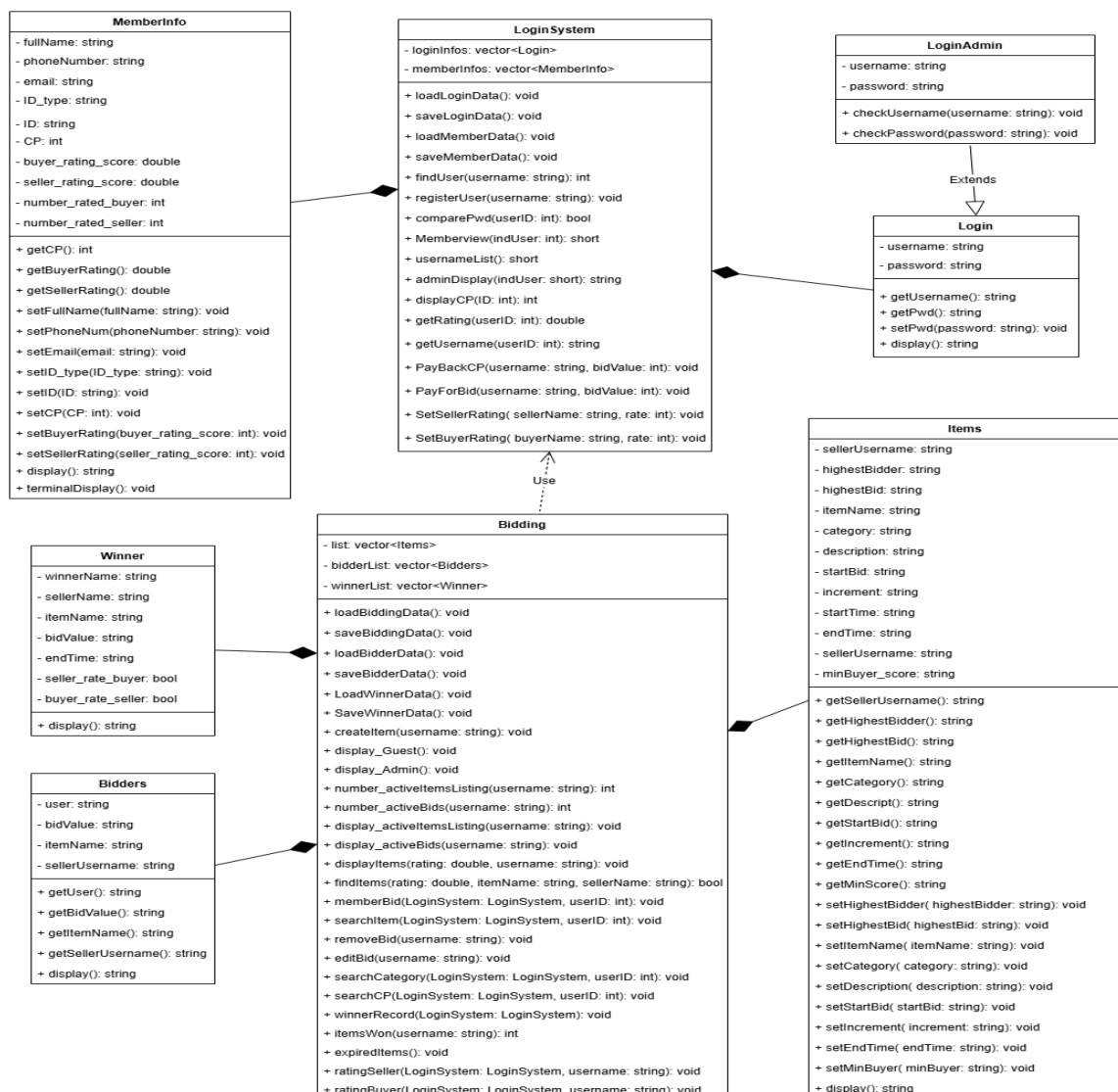


Figure 1: Class diagram of the auction application

Description of Each Class:

Class: Login	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	username: string	Store the username of the user	Essential for identifying the user
	password: string	Store the password of the user	Necessary for user authentication
Method(s)	getUsername(): string	Return the username	Allows retrieval of the username for display or processing
	getPwd(): string	Return the password	Allows retrieval of the password for validation
	setPwd(password: string): void	Set new password	Enable updating the password
	display(): string	Return the string of login information separated by a dash	Get the string to be written back into the "LoginInfo" data file for data saving

Class: MemberInfo	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	fullName: string	Store the full name of the member	Important for personal identification
	phoneNumber: string	Store the phone number of the member	Useful for contact purposes
	email: string	Store the email address of the member	Useful for contact purposes
	ID_type: string	Store the type of ID (Citizen ID/Passport)	Specifying ID type
	ID: string	Store the ID number of the chosen ID type	Important for personal identification

	CP: int	Store the credit points of the member.	Important for tracking member's credit balance
	buyer_rating_score: double	Store the score as the buyer.	Reflect the member's reliability as a buyer
	seller_rating_score: double	Store the score as the seller.	Reflect the member's reliability as a seller
	number Rated_buyer: int	Store the number of times the member has been rated as a buyer.	Help to calculate the average buyer rating score
	number Rated_seller: int	Store the number of times the member has been rated as a seller	Help to calculate the average seller rating score
Method(s)	getCP(): int	Return the credit points	Allow retrieval of the member's credit points
	getBuyerRating(): double	Return the buyer rating score	Allow retrieval of the buyer rating score
	getSellerRating(): double	Return the seller rating score	Allow retrieval of the seller rating score
	setFullName(fullName: string): void	Set the full name	Enable updating the member's full name
	setPhoneNum(phoneNumber: string): void	Set the phone number	Enable updating the member's phone number
	setEmail(email: string): void	Set the email address	Enable updating the member's email address
	setID_type(ID_type: string): void	Set the ID type	Enables updating the member's ID type
	setID(ID: string): void	Set the ID number	Enable updating the member's ID number

	setCP(CP: int): void	Set the credit points	Enable topping up member's account balance
	setBuyerRating(buyer_rating_score: int): void	Set the buyer rating score	Enable calculating the buyer rating score
	setSellerRating(seller_rating_score: int): void	Set the seller rating score	Enable calculating the seller rating score
	display(): string	Return the string of member information separated by a dash	Get the string to be written back into the "MemberInfo" data file for data saving
	terminalDisplay(): void	Display the member details in the terminal	Help to view member's personal information in the terminal

Class: LoginSystem	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	loginInfos: vector<Login>	Store a list of members' login information	Necessary for managing multiple members' logins
	memberInfos: vector<MemberInfo>	Store a list of members' personal information	Necessary for managing multiple members' personal information
Method(s)	loadLoginData(): void	Load login data from "LoginInfo" data file back to a list of members' login information	Essential for initializing the system with existing login data
	saveLoginData(): void	Save login data to "LoginInfo" data file	Important for the existing login data to be maintained
	loadMemberData(): void	Load member data from "MemberInfo" data file back to a list of members' personal information	Essential for initializing the system with existing member information data

	saveMemberData(): void	Save member data to "MemberInfo" data file	Important for the existing member data to be maintained
	findUser(username: string): int	Find and return the index of a user by username in the members' login information list	Necessary for locating a specific member in the system or identifying whether the user exists in the system
	registerUser(username: string): void	Register a new member with the given username	Used to add a new user to the system with the login and personal information
	comparePwd(userID: int): bool	Prompt the user to input the password and compare it with the existing one for validation	Ensure the entered password matches the stored password before logging into further features as a member
	Memberview(indUser: int): short	Display member information with the defined index in the list of login information and enable updating personal information	Showing member information and allowing editing of that information
	usernameList(): short	Display a list of usernames in alphabetical order. Then prompt the user to enter a specific username for viewing information	Admin can view the list of users
	adminDisplay(indUser: short): string	Display the personal information of a specific member based on the defined index in the list of login information and return its username for further displaying purposes	Admin can view the information of a specific member
	displayCP(ID: int): int	Return the credit points for a member	Allow retrieval of a member's credit points
	getRating(userID: int): double	Return the rating of a member	Allow retrieval of a member's rating score
	getUsername(userID: int): string	Return the username for a member	Allow retrieval of a member's username

	PayBackCP(username: string, bidValue: int): void	Pay back credit points to a member	Manage credit points for transactions
	PayForBid(username: string, bidValue: int): void	Deduct credit points of a member after a bid	Manage credit points for transactions
	SetSellerRating(sellerName: string, rate: int): void	The buyer rates the seller	Calculating the new rating score of the seller
	SetBuyerRating(buyerName: string, rate: int): void	The seller rates the buyer	Calculating the new rating score of the buyer

Class: LoginAdmin	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	username: string (inherit from Login class)	Store the admin username	Identifies the admin user
	password: string (inherit from Login class)	Store the admin password	Authenticates the admin user to access further features
Method(s)	checkUsername(username: string): void	Validate the admin's username. If validation fails, prompt to enter again	Ensure the entered username matches the stored username of an admin
	checkPassword(password: string): void	Validate the admin's password. If validation fails, prompt to enter again	Ensure the entered password matches the stored password before logging to further features as an admin

Class: Bidders	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	user: string	Store the bidder's username	Identify the bidder
	bidValue: string	Store the bid value	Track the amount bid by the user
	itemName: string	Store the name of the item being bid on	Identify the item

	sellerUsername: string	Store the seller's username	Identify the seller of the item being bid on
	endtime: string	Store the end time of the item	Allow removing data of the expired item in the "BidderData" data file
Method(s)	getUser(): string	Return the bidder's username	Allow retrieval of the bidder's username
	getBidValue(): string	Return the bid value	Allows retrieval of the bid value
	getItemName(): string	Return the item name	Allow retrieval of the item name
	getSellerUsername(): string	Return the seller's username	Allow retrieval of the seller's username
	getEndTime(): string	Return the item's end time	Allow retrieval of the item's end-time
	display(): string	Return a string of the bidder information	Get the string to be written back into the "BidderData" data file for data saving

Class: Items	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	sellerUsername: string	Store the seller's username	Identify the seller
	highestBidder: string	Store the highest bidder's username	Track the current highest bidder
	highestBid: string	Store the highest bid value	Track the current highest bid amount
	itemName: string	Store the name of the item	Identify the item
	category: string	Store the category of the item	Classify the item
	description: string	Store the short description of the item	Provide some details about the item
	startBid: string	Store the starting bid value	Set the initial bid amount
	increment: string	Store the bid increment value	Determine the minimum increment for bids

	startTime: string	Store the start time of the auction	Indicate when the auction begins
	endTime: string	Store the end time of the auction	Indicate when the auction ends
	minBuyer_score: string	Store the minimum buyer score required to bid	Ensure only qualified buyers can see and bid
Method(s)	getSellerUsername(): string	Return the seller's username	Allow retrieval of the seller's username
	getHighestBidder(): string	Return the highest bidder's username	Allow retrieval of the highest bidder's username
	getHighestBid(): string	Return the highest bid value	Allow retrieval of the highest bid value
	getItemName(): string	Return the item name	Allow retrieval of the item name
	getCategory(): string	Return the category of the item	Allow retrieval of the item category
	getDescription(): string	Return the description of the item	Allow retrieval of the item description
	getStartBid(): string	Return the starting bid value	Allow retrieval of the starting bid value
	getIncrement(): string	Return the bid increment value	Allow retrieval of the bid increment value
	getEndTime(): string	Return the end time of the auction	Allow retrieval of the auction end time
	getMinScore(): string	Return the minimum buyer rating score	Allow retrieval of the minimum buyer rating score
	setHighestBidder(highestBidder: string): void	Set the highest bidder's username	Enable updating the highest bidder's username
	setHighestBid(highestBid: string): void	Set the highest bid value	Enable updating the highest bid value
	setItemName(itemName: string): void	Set the name of the item	Enable updating the item's name

	setCategory(category: string): void	Set the category of the item	Enable updating the category of the item
	setDescription(description: string): void	Set the description of the item	Enable updating the description of the item
	setStartBid(startBid: string): void	Set the starting bid of the item	Enable updating the starting bid of the item
	setIncrement(increment: string): void	Set the bid increment	Enable updating the bid increment
	setEndTime(endTime: string): void	Set the end date & time of the auction	Enable updating the end date & time of the auction
	setMinBuyer(minBuyer: string): void	Set the minimum rating score that the buyer must have for bidding the item	Enable updating the minimum buyer score.
	display(): string	Return a string of the item information for saving into data file	Get the string to be written back into the "BiddingData" data file for data saving

Class: Winner	Name and Data type	Description	Reason/Explanation (<i>why we need it as an attribute/ method</i>).
Attribute(s)	winnerName: string	Store the username of the auction's winning bidder.	Identify the winner of the auction
	sellerName: string	Store the username of the item's seller.	Identify the seller of the item.
	itemName: string	Store the name of the item won	Identify the item won after the auction.
	bidValue: string	Store the winning bid value.	Track the final bid amount that won the auction.
	endTime: string	Store the end time of the auction.	Indicate when the auction ended.
	seller_rate_buyer: bool	Indicate whether the seller has rated the buyer or not	Ensure mutual rating for a specific item's auction between buyer and seller.

	buyer_rate_seller: bool	Indicate whether the buyer has rated the seller or not	Ensure mutual rating for a specific item's auction between buyer and seller.
Method(s)	display(): string	Return a string of the winner information separated by underscores.	Get the string to be written back into the "WinnerData" data file for data saving

Class: Bidding	Name and Data type	Description	Reason/Explanation (why we need it as an attribute/ method).
Attribute(s)	list: vector<Items>	Store a list of items	Manage multiple items for bidding and displaying information
	bidderList: vector<Bidders>	Store a list of bidders	Manage multiple bidders for bidding and updating information
	winnerList: vector<Winner>	Store a list of winners of the auctions	Manage multiple auction winners
Method(s)	loadBiddingData(): void	Load bidding data from "BiddingData" data file back to a list of items	Essential for initializing the system with existing bidding data.
	saveBiddingData(): void	Save bidding data to "BiddingData" data file	Important for the existing bidding data to be maintained
	loadBidderData(): void	Load bidder data from "BidderData" data file back to a list of bidders	Essential for initializing the system with existing bidder data
	saveBidderData(): void	Save bidder data to "BidderData" data file	Important for the existing bidder data to be maintained

	LoadWinnerData(): void	Load the winner data from "WinnerData" data file back to a list of the bids' winners	Essential for initializing the system with existing winner data
	SaveWinnerData(): void	Save winner data to "WinnerData" data file	Important for the existing winner data to be maintained
	createItem(username: string): void	Create a new item with the proper attributes of the "Item" class for bidding	Allow members to list new items for auction
	display_Guest(): void	Display item listings for guest	Allow guest to view item listings with limited details
	display_Admin(): void	Display item listings for admin	Allow admin to view item listings of all members with all details
	number_activeItemsListing(username: string): int	Return the number of active items listed by a member	Track the number of active listings for each member
	number_activeBids(username: string): int	Return the number of active bids placed by a member	Track the number of active bids for each member
	display_activeItemsListing(username: string): void	Display item listings for a specific member	Allow each user to view item listings with all details
	display_activeBids(username: string): void	Display active bids placed by a member with some details	Allow each member to view the active bids they placed
	displayItems(rating: double, username: string): void	Display items being sold based on member's rating score	Filter and display items being sold for a member according to his/her rating score (except his/her selling item)

	findItems(rating: double, itemName: string, sellerName: string): bool	Find items based on rating score, item name, and seller name	Check if there is an item matching the chosen criteria.
	memberBid(LoginSystem: LoginSystem, userID: int): void	Allow a member to place a bid on the selling item	Important for managing and updating the bidding progress of the items
	removeBid(username: string): void	Remove a bidding item listed by a seller ((if there is no active bid placed yet)	Allow sellers to remove their item listings
	editBid(username: string): void	Edit details of a bidding item listed by a seller (if there is no active bid placed yet)	Allow sellers to modify their item listings' information
	winnerRecord(LoginSystem: LoginSystem): void	Record the winner of an auction after its end time and add CP to the seller	Help to update the winner after each auction.
	itemsWon(username: string): int	Return the number of items won by a member in the Winner list	Track the number of items a member has won in the auctions
	expiredItems(): void	Handle expired items by finding and deleting them from the lists	Help to remove forever items that are no longer available for bidding after the auction's end time is passed
	searchCategory(LoginSystem: LoginSystem, userID: int): void	Find an item in the bidding item list by category.	Allow members to filter and search items by category
	searchItem(LoginSystem: LoginSystem, userID: int): void	Find an item in the bidding item list by name.	Allow members to filter and search items by name

	searchCP(LoginSystem: LoginSystem, userID: int): void	Find an item in the bidding item list by credit point range	Allow members to filter and search items by credit point range
	ratingSeller(LoginSystem: LoginSystem, username: string): void	Allow a buyer to rate a seller	Facilitate the rating of sellers by buyers
	ratingBuyer(LoginSystem: LoginSystem, username: string): void	Allow a seller to rate a buyer	Facilitate the rating of buyers by sellers

Class Relationships:

Composition Relationships:

- Class **Login** and Class **MemberInfo** is Composition parts of Class **LoginSystem**:
The LoginSystem class contains vectors of Login and MemberInfo objects. This means that LoginSystem manages collections of these objects, and their lifetimes are tied to the LoginSystem instance.
- Class **Bidders**, Class **Items** and Class **Winner** are Composition parts of Class **Bidding**:
The Bidding class contains vectors of Items, Bidders, and Winner objects. This indicates that Bidding manages collections of these objects, and their lifetimes are tied to the Bidding instance.

Dependency Relationships

- Class **Bidding** depends on Class **LoginSystem**:
The Bidding class has methods that take LoginSystem objects as parameters such as memberBid, searchItem, searchCategory, searchCP, winnerRecord. This indicates that Bidding relies on LoginSystem to perform certain operations, such as accessing member information and validating member actions.

Inheritance Relationships

- Class **LoginAdmin** inherits from Class **Login**:

The LoginAdmin class is derived from the Login class, which means it inherits all the attributes and methods of the Login class. It can also override the existing attributes and extend the functionality of Login by adding methods for further admin use purposes, such as checkUsername and checkPassword.

2. Implementation Result

In this section, the basic and advanced features of the application are demonstrated with annotated picture evidence.

a. Welcome Screen

Result Summary: The Welcome screen works perfectly fine as expected.

Screenshots of Sample Result:

```

EET2482/COSC2082 GROUP ASSIGNMENT
Semester 3 2024
AUCTION APPLICATION

```

```

Instructor: Dr Ling Huo Chong
Group: 6
Trinh Chi Quang, s3881227
Vu Nguyen Nhu Phong, s3879523
La Minh Thuan, s3877847
Nguyen Thong Linh, s3937160

```

```

Use the app as 1. Guest    2. Member    3. Admin    4. Exit
You can choose 2 to register!

```

```

Enter your choice: 2
Username could not contain white space!
Enter username: quangtrinh
Enter password: quangTrinh4566@
Login successfully!

```

```

Account Overview: quangtrinh

```

```

-----
Active Item Listings: 0 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings

```

```

-----
No.  Name                               Category    Current bid  Current bidder  End Date & Time

```

```

You have no item listing yet!

```

```

Account active bids

```

```

-----
No.  Name                               Category    Account bid  Current bid  Seller  End Date & Time

```

```

You dont have any bid yet

```

```

Menu:

```

```

1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit

```

```

Enter your choice: _

```

Figure 2: Welcome screen

b. Basic Features

Result Summary:

Feature Name	Feature Description	Status (Implemented/ Not Implemented)	Bugs/Limitations if it has
1. Non-member access	Non-member (as guest) can view item listings with limited details: item name, category, and short description.	<i>Implemented</i>	
2. Non-member registration	Non-member (as guest) can register to become a member. Upon registration, they will start with 0 credit points and a default rating of 3 (all information is recorded and stored). The registration process must include a strong password policy.	<i>Implemented</i>	
3. Member Login and information edit	A member can log in with registered username and password. They can view and update their profile information, including changing password and topping-up credit points.	<i>Implemented</i>	
4. Admin view	Admin can view all member profiles and item listings without restrictions.	<i>Implemented</i>	

5. Seller features	A member (as seller) can create, edit, or remove item listings only if no active bids have been placed on those items.	<i>Implemented</i>	
6. Buyer restriction	A member (as buyer) cannot cancel their bid once it has been placed on an item.	<i>Implemented</i>	
7. Buyer search tool	A member (as buyer) can search items by name, category, or credit point range. The search should filter items according to their rating score.	<i>Implemented</i>	
8. Buyer view	A member (as buyer) can view item details including the current highest bid, the current bidder and the auction's end date & time.	<i>Implemented</i>	
9. Buyer bidding	A member (as buyer) can place bids on items, provided they have sufficient credit points.	<i>Implemented</i>	
10. Auction conclusion	A member (as buyer) can win the auction if they place the highest bid. When the auction concludes, the credit points of both the buyer and seller should be updated accordingly.	<i>Implemented</i>	
11. Rating	A member can perform the ratings and reviews after completing a transaction.	<i>Implemented</i>	
12. Average rating and reviews left	A member can view their own average rating, as well as reviews left by others.	<i>Partial Implemented</i>	Only average rating is shown
13. Save data	All data must be saved into data file(s) before the application ends. Upon starting the application, this data should be loaded and made available for use	<i>Implemented</i>	

Screenshots of Sample Result (for each feature):

- Non-member Access:

```

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Use the app as 1. Guest    2. Member    3. Admin    4. Exit
You can choose 2 to register!

Enter your choice: 1    Access as a Guest

View as Guest
You must register or login to view more information!
-----
No.   Name                               Category    Description
1     Iphone 13                           Electronics second hand

Limited information from items are given

Use the app as 1. Guest    2. Member    3. Admin    4. Exit
You can choose 2 to register!

Enter your choice: █    Guest can register for further functionalities

```

Figure 3: Guest view

- Non-member registration:

```

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Use the app as 1. Guest  2. Member  3. Admin  4. Exit
You can choose 2 to register!

Enter your choice: 2
Username could not contain white space!
Enter username: phongvu
Account not found!
Do you want to view as Guest or register a new account?
1. View as guest
2. Register new account  Registration
3. Exit
Enter your choice: 2
Enter new password to register: phongvu0105
Password must have more than 8 characters and must contain lowercase, uppercase, number and special characters
Please enter again: Phongvu0105@ Strong password policy
Your password is strong
Please provide your personal information:
Enter your full name: Phong
Enter your phone number: 0943
Enter your email: phongvu@gmail.com
Enter your ID type: 1 - Citizen ID or 2 - Passport: 1
Contain only number!
Enter your ID series: 09234
You have registered successfully!

Full name: Phong
Phone number: 0943
Email: phongvu@gmail.com
ID type: Citizen ID
ID: 09234
CP: 0
Buyer rating score: 3
Number of rated as Buyer: 1
Seller rating score: 3
Number of rated as Seller: 1

```

Figure 4: Member registration with strong password policy, default CP, and default ratings

- Member login and information edit:

```

Use the app as 1. Guest  2. Member  3. Admin
You can choose 2 to register!

Enter your choice: 2
Please input username. Warning!: Username could not contain white space!
Enter username: quangtrinh
Enter password: Quangtrinh4566@
Login successfully!

Account Overview: quangtrinh
-----
Active Item Listings: 1 | Active Bids: 1
Items Won: 0 | Account Balance: 6300 CP
Account active item listings
-----

```

No.	Name	Category	Current bid	Current bidder	End Date & Time
1	Iphone 13	Electronics	50	biconvit	02/13/2025 18:00

```

Account active bids
-----

```

No.	Name	Category	Account bid	Current bid	Seller	End
	Date & Time					

Figure 5: Member login with registered account

```

Account Overview: quangtrinh → Member account after login
-----
Active Item Listings: 1 | Active Bids: 0
Items Won: 1 | Account Balance: 5890 CP
Account active item listings
-----
No.  Name                Category    Current bid  Current bidder  End Date & Time
1    Iphone 13            Electronics  10           NA              02/13/2025 18:00

Account active bids
-----
No.  Name                Category    Account bid  Current bid  Seller
You dont have any bid yet

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 1 → Option "1" to view information
Full name: Trinh Chi Quang
Phone number: 0946167646
Email: trinhquang0411@gmail.com
ID type: Passport
ID: C388
CP: 5890
Buyer rating score: 3.8
Number of rated as Buyer: 5
Seller rating score: 3
Number of rated as Seller: 1
Do you want to update your info?
1-Change password
2-Change full name
3-Change phone number
4-Change email
5-Change ID
6-Add Credit Point
7-Dashboard
Enter your choice: █
  
```

Option "1" to view information

List of member profile information

List of editable profile information and topping-up credit point

Figure 6: Member view profile and edit information

- Admin view:

```

Use the app as 1. Guest  2. Member  3. Admin  4. Exit
You can choose 2 to register!

Enter your choice: 3
Enter username of admin account: admin
Enter password of admin account: 1234
Login successfully!

View as Admin
1. View members
2. Items Listing
3. Exit
Enter your choice: 1  → Option "1" to view member
Username list:
biconvit
hello
hoanglinh
phongvu
quangtrinh  } List of users

Please enter a username to view info: quangtrinh → Enter username to view info
Full name: Trinh Chi Quang
Phone number: 0946167646
Email: trinquang0411@gmail.com
ID type: Passport
ID: C388
CP: 5890
Buyer rating score: 3.8
Number of rated as Buyer: 5
Seller rating score: 3
Number of rated as Seller: 1

Account Overview: quangtrinh
-----
Active Item Listings: 1 | Active Bids: 2
Items Won: 1 | Account Balance: 5890 CP
Account active item listings
-----
No.  Name                Category  Current bid  Current bidder  End Date & Time
1    Iphone 13            Electronics  10           NA              02/13/2025 18:00
Account active bids
-----
No.  Name                Category  Account bid  Current bid  Seller  End Date & Time
You dont have any bid yet

```

Figure 7: Admin view members

```

View as Admin
1. View members
2. Items Listing
3. Exit
Enter your choice: 2  → Option "2" to view Item Listing
Account active item listings
-----
List of items
No.  Name                Category  Current bid  Current bidder  End Date & Time
1    Iphone 13            Electronics  10           NA              02/13/2025 18:00

View as Admin
1. View members
2. Items Listing
3. Exit
Enter your choice:  → Back to menu options

```

Figure 8: Admin view items

- Seller features:

```

Please provide item's information to create
Item's name: Iphone 13
Category: electronics
Short description: Used phone
Start Bid: 30
Increment: 3
End Time includes month/day/year/hour - MM/DD/YYYY/HH: 1/18/2025/00
Minimum buyer rating score from 1 to 5: 3
Account Overview: quangtrinh
-----
Active Item Listings: 2 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings
-----

```

No.	Name	Category	Current bid	Current bidder	End Date & Time
1	M4A1	Weapon	50	phongvu	01/18/2025 00:00
2	Iphone 13	Electronics	30	NA	01/18/2025 00:00

The item is saved after created

Figure 9: Seller creates an item

```

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 6
Enter item want to edit: M4A1
M4A1 has already bid, you cannot modify
Account Overview: quangtrinh
-----
Active Item Listings: 2 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings
-----

```

No.	Name	Category	Current bid	Current bidder	End Date & Time
1	M4A1	Weapon	50	phongvu	01/18/2025 00:00
2	Iphone 13	Electronics	30	NA	01/18/2025 00:00

Bidder item cannot be modified

```

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 6
Enter item want to edit: Iphone 13
There are some characteristics of item you are able to edit:
1.Item name - 2.Category - 3.Short description - 4.Start bid - 5.Increment - 6.End time - 7.Minimum buyer score
Enter the number characteristic want to edit as (1, 2, ...): 1
Enter new Item name: Iphone 14
Account Overview: quangtrinh
-----
Active Item Listings: 2 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings
-----

```

No.	Name	Category	Current bid	Current bidder	End Date & Time
1	M4A1	Weapon	50	phongvu	01/18/2025 00:00
2	Iphone 14	Electronics	30	NA	01/18/2025 00:00

Modify item that has not been bid

Figure 10: Seller can only edit the item that has not been bid

```

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 5

Enter item want to remove: M4A1 ← Bidded item cannot be removed
Your item: "M4A1" has already been bid, you can not remove
Account Overview: quangtrinh
-----
Active Item Listings: 2 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings
-----
No. Name Category Current bid Current bidder End Date & Time
1 M4A1 Weapon 50 phongvu 01/18/2025 00:00
2 Iphone 13 Electronics 30 NA 01/18/2025 00:00

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter again: 5

Enter item want to remove: Iphone 14 ← Modify item that has not been bid
Iphone 14 remove succesfully
Account Overview: quangtrinh
-----
Active Item Listings: 1 | Active Bids: 0
Items Won: 1 | Account Balance: 453 CP
Account active item listings
-----
No. Name Category Current bid Current bidder End Date & Time
1 M4A1 Weapon 50 phongvu 01/18/2025 00:00

```

Figure 11: Seller can only eliminate the item that has not been bid

- Buyer restriction:

```

Account Overview: phongvu
-----
Active Item Listings: 0 | Active Bids: 0 This account represents a buyer, does not create any item for bid
Items Won: 2 | Account Balance: 5585 CP
Account active item listings
-----
No. Name Category Current bid Current bidder End Date & Time
You have no item listing yet!

Account active bids
-----
No. Name Category Account bid Current bid Seller End Date & Time
You dont have any bid yet

Menu:
1. View Information
2. Create bid
3. Listing available bids → Choose option "3" to see available items for bid
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 3

Name Category Seller Current bid Increment End Date & Time Seller rating
Iphone 13 Electronics quangtrinh 10 (Start) 5 02/13/2025 18:00 3.00

Menu:
1. Bid } Buyer can bid or Exit only, can not cancel the bid after the bid is placed
2. Exit
Enter your choice:

```

Figure 12: Buyer restriction (cannot cancel a bid once the bid is placed)

- Buyer search tool: The account with the rating score as the buyer of 3 is used to test in this case.

```

Please provide item's information to create
Item's name: Iphone 14
Category: electronics
Short description: Used phone
Start Bid: 100
Increment: 20
End Time includes month/day/year/hour - MM/DD/YYYY/HH: 1/18/2025/01
Minimum buyer rating score from 1 to 5: 5

```

Figure 13: "Iphone 14" item with minimum buyer score of 5

```

Search tool
Menu:
1. Item's name
2. Category
3. Credit point range
4. Exit
Enter your choice: 1

Search item by name
Menu:
1. search
2. exit
Enter your choice: 1
Enter item name: M4A1
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
M4A1                Weapon     quangtrinh  50           phongvu         01/18/2025 00:00

Search item by name
Menu:
1. search
2. exit
Enter your choice: 1
Enter item name: Iphone 14
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

Search item by name
Menu:
1. search
2. exit
Enter your choice: 1
Enter item name: M4A
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

```

Item name exists

Item name exists, but the rating score of searcher is lower than the requirement

Item name does not exist

Figure 14: Search item by the item name

```

Search item by category
Menu:
1. search
2. exit
Enter your choice: 1
input search: (Weapon | Electronics | Figure): weapon
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
M4A1                Weapon     quangtrinh  50           phongvu         01/18/2025 00:00

Search item by category
Menu:
1. search
2. exit
Enter your choice: 1
input search: (Weapon | Electronics | Figure): electronics
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

Search item by category
Menu:
1. search
2. exit
Enter your choice: 1
input search: (Weapon | Electronics | Figure): Figure
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

```

Weapon category has item

Electronics category has "Iphone 14" item, but the rating score of searcher is lower than the requirement

Figure category does not have item

Figure 15: Search item by the category

```

Search item by Credit Point range
Menu:
1. search
2. exit
Enter your choice: 1
Enter minimum CP: 0
Enter maximum CP: 25
You have search range credit point from: $0 to $25
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

Search item by Credit Point range
Menu:
1. search
2. exit
Enter your choice: 1
Enter minimum CP: 25
Enter maximum CP: 50
You have search range credit point from: $25 to $50
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
M4A1                Weapon     quangtrinh  50           phongvu         01/18/2025 00:00

Search item by Credit Point range
Menu:
1. search
2. exit
Enter your choice: 1
Enter minimum CP: 51
Enter maximum CP: 200
You have search range credit point from: $51 to $200
From your search:
-----
Name                Category    Seller      Current bid  Current bidder  End Date & Time
No matching item!

```

There is no item in this CP range

There is item in this CP range

There is item in this CP range, which is "Iphone 14", but the rating score of the searcher is lower than the requirement

Figure 16: Search item by credit point range

- Buyer view:

```
Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Exit
Enter your choice: 3 → Option "3" to list the available items that the user can see based on the user's rating score
```

Name	Category	Seller	Current bid	Increment	End Date & Time
Iphone 13	Electronics	quangtrinh	50	5	02/13/2025 18:00
miku figure	Figure	hello	2000	10	02/02/2025 02:00

Figure 17: Buyer view

- Buyer bidding:

```
Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Exit
Enter your choice: 3 → Option "3" to list the available items that the user can see based on the user's rating score
```

Name	Category	Seller	Current bid	Increment	End Date & Time
Iphone 13	Electronics	quangtrinh	50	5	02/13/2025 18:00
miku figure	Figure	hello	2000	10	02/02/2025 02:00

```
Menu:
1. Bid
2. Exit
Enter your choice: 1 → Option "1" to bid the item
```

```
Enter item name: Iphone 13
Enter seller name of Iphone 13: quangtrinh } Input the information of item want to bid on
Enter your bid: 55
```

Name	Category	Seller	Current bid	Increment	End Date & Time
Iphone 13	Electronics	quangtrinh	55	5	02/13/2025 18:00
miku figure	Figure	hello	2000	10	02/02/2025 02:00

Figure 18: Buyer successfully bid the item on the available list

- Auction conclusion: After the item has expired, the active bids of all account bidding in that item will be deleted, and the items won by the user, who won that item, are counted up.

```
Account Overview: hello
-----
Active Item Listings: 0 | Active Bids: 0
Items Won: 1 | Account Balance: 1700 CP
Account active item listings
-----
No.  Name                                     Category
You have no item listing yet!
```

Figure 19: Update item won and active bids

- Rating:

```

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 7
Menu:
1. Rate sellers
2. Rate buyers
3. Exit
Enter your choice: 2

Buyers, items and end time you bid from:
phongvu - AK47 - 1/14/2025/22

phongvu - AK47 - 1/14/2025/23

Enter buyer name you want to rate: phongvu
Enter item name phongvu bid from you: AK47
Enter end time of AK47: 1/14/2025/22
Enter your rate to the phongvu: 2
Menu:
1. Rate sellers
2. Rate buyers
3. Exit
Enter your choice: 2

Buyers, items and end time you bid from:
phongvu - AK47 - 1/14/2025/23

Enter buyer name you want to rate: phongvu
Enter item name phongvu bid from you: AK47
Enter end time of AK47: 1/14/2025/23
Enter your rate to the phongvu: 3

```

Seller "quangtrinh" rates buyer "phongvu"

```

Account Overview: phongvu
-----
Active Item Listings: 0 | Active Bids: 0
Items Won: 2 | Account Balance: 5085 CP
Account active item listings
-----
No. Name Category
-----
Account active bids
-----
No. Name Category
You dont have any bid yet

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 1
Full name: Vu Nguyen Nhu Phong
Phone number: 0827387032
Email: liducvt123@gmail.com
ID type: Passport
ID: C389
CP: 5085
Buyer rating score: 2.66667
Number of rated as Buyer: 3
Seller rating score: 3
Number of rated as Seller: 1

```

From account "phongvu"

Figure 20: Members rate each other's and the rating score is updated

- Average rating:

```

Account Overview: quangtrinh
-----
Active Item Listings: 1 | Active Bids: 0
Items Won: 1 | Account Balance: 5890 CP
Account active item listings
-----
No. Name Category Current bid Current bidder End Date & Time
1 Iphone 13 Electronics 10 NA 02/13/2025 18:00

Account active bids
-----
No. Name Category Account bid Current bid Seller End Date & Time
You dont have any bid yet

Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 1
Full name: Trinh Chi Quang
Phone number: 0946167646
Email: trinhquang0411@gmail.com
ID type: Passport
ID: C388
CP: 5890
Buyer rating score: 3.8
Number of rated as Buyer: 5
Seller rating score: 3
Number of rated as Seller: 1

```

Option "1" to view profile information

Average rating score as seller and buyer

Figure 21: Member views the rating score via "view information" option

- Save data:

```
Menu:
1. View Information
2. Create bid
3. Listing available bids
4. Search tool
5. Remove bid
6. Edit bid
7. Rating buyers and/or sellers
8. Exit
Enter your choice: 8
Login Infos are saved!
Member Infos are saved!
Bidding Data is saved!
Bidders Data is saved!
Winner Data is saved!
```

Data is automatically saved when the option "8. Exit" is chose.

Notify that all data is saved successfully

Figure 22: The necessary data are saved successfully when exiting the application

c. Advanced Features

Result Summary:

Feature Name	Feature Description	Status (Implemented/ Not Implemented)	Bugs/Limitations if it has
1. Activity Dashboard	When a member logs into the application, a personalized dashboard should be displayed showing their account overview, active item listings and active bids.	Implemented	
2. Automatic Bid limit function	Buyers can set an automatic bid limit for an item they are bidding on. The application will automatically increment their bid until their set limit is reached	Not Implemented	
3. Automatic bid limit conflict	Automatic bid limits cannot be identical for multiple buyers on the same auction item. If a new buyer sets an automatic bid limit equal to an existing bid limit, the application will reject the limit and prompt them to adjust the limit to the next available bid increment.	Not Implemented	

Screenshots of Sample Result:

```

Login successfully!

Account Overview: quangtrinh
-----
Active Item Listings: 1 | Active Bids: 1
Items Won: 0 | Account Balance: 6300 CP
Account active item listings
-----

```

No.	Name	Category	Current bid	Current bidder	End Date & Time
1	Iphone 13	Electronics	55	hello	02/13/2025 18:00

```

Account active bids
-----

```

No.	Name	Category	Account bid	Current bid	Seller	End
Date & Time						

Figure 23: Activity Dashboard

IV. DISCUSSIONS & CONCLUSIONS

This auction application can provide a platform for the user to create an account to upload items and search for other items for bidding purposes. It collects all the information of the user and items that serve the transaction between sellers and buyers. Besides, there are many functions for the user to employ, which play a vital role in simulating the real-world auction. To sum up, this application can work properly and provide basic functions to completely execute an auction with the same result as in the real world.

The implementation is the same as the design of the class diagram. Designing the class diagram in advance provides a clear view of the structure of the code and how to implement each function effectively. However, the class diagram design in advance is just the foundation to build the complete application, it always needs to be updated along the development path. Therefore, the class diagram is essential for not only simple but also more complex applications as well.

This assignment provides the procedure for building an application using C++, which sets a foundation for creating more complex applications in the future. This assignment also reflects the importance of teamwork and workload management in the project, which significantly affects the project's performance. Comprehend how to apply the class diagram to prepare for the implementation. Moreover, gaining experience in working with multiple files in coding and debugging. Learning how to use GitHub could be considered another objective in this project.

V. REFERENCES (USE IEEE STYLES)