University of Southampton

Bryan Vullo (bv1g22)
Mohannad Elsaadawy (me1n21)
Shaho Zagrosi (sz10g21)
Rabia Bilmen (rmb1n21)
James Staton (js5n21)

COMP1216. Software Modelling and Design (2022-23)

Group 32: Silk Road - Online Auction Service

1 Introduction

Our team consists of five members, including a product manager, a software designer, and three developers. Our task is to design and develop Silk Road into an online auction system that meets the desired requirements.[1]

Bryan Vullo (Product Manager) As the product manager, my role is to oversee the development of Silk Road. I will work closely with the software designer to ensure that the system meets the requirements specified and that it is user-friendly and easy to navigate. I will also be identifying any potential issues and working with the developers to resolve them.

Mohannad Elsaadawy (Software Designer) As the software designer, my role is to create the design for Silk Road. I will use UML tools to create diagrams and models that show the structure and behavior of the system. I will ensure that the design meets the requirements specified and that it is scalable and flexible.

Shaho Zagrosi (Back-end Developer) As the back-end developer, my role is to write the code that powers Silk Road. I will ensure that it meets design specifications and that it is scalable and optimized for performance. I will also be responsible for integrating the system with any external services, such as payment gateways.

Rabia Bilmen (Front-end Developer) As the front-end developer, my role is to create the user interface for Silk Road. I will ensure that the user interface is user-friendly, responsive, and meets the design specifications. I will also be responsible for optimizing the user interface for performance and accessibility.

James Staton (Quality Assurance Engineer) As the quality assurance engineer, my role is to ensure that Silk Road is free of bugs and errors. I will be responsible for creating and executing test plans and ensuring that the system meets the requirements specified.

[1] Note that we have assumed that the seller gets notified if their auction has failed.

2 Scope

Need: The online auction system provides a secure platform for users to buy & sell items through an online marketplace. It allows users to access a variety of items, which they can bid on & provides sellers with a platform to sell their items to a global audience. The system should be easy to use, secure & maintain the integrity of the auction process.

Goals: The Silk Road Auction System has one main goal: To develop & provide a user-friendly online auction platform that meets the requirements specified by the client. Some of the functionality provided includes: Allowing users to submit items for auction & to bid on items being auctioned. The system will be secure & protect the privacy & personal information of all users. The system will be capable of handling multiple auctions simultaneously. Buyers & Sellers will be able to provide feedback on each other respectively.

Business Case: Silk Road will generate revenue through several different avenues. First, we plan to charge a small fee for each successful auction transaction, which will help cover the platform's operating costs. Silk Road will also generate revenue through targeted advertising & data analytics, which will provide valuable insights into user behaviour & market trends. This, in turn, will allow users to tailor their marketing behaviours to suit current market trends, offering them an opportunity to capitalise on the full power of Silk Road.

Stakeholders There are several key stakeholders that need to be considered: Sellers & Bidders (Users) who use the platform to buy & sell items, management teams who are responsible for making business decisions related to the auction system as well as developing, updating & testing the system. Other stakeholders include: Developers, Investors in Silk Road & Relevant online DPA authorities.

High-level Operational Concepts The Silk Road system will manage the auction process, including bid tracking, auction closure, & seller/bidder feedback.

- Seller opens auctions for item, sets reserve price & timer
- Bidder can browse through open auctions or search for specific items
- Bidder can view feedback of seller they wish to buy from
- Bidder can place bid & see other bids
- If bid exceeds reserve price, the highest bidder wins
- Bidder can provide feedback on seller

Success Criteria Silk Road's success will be measured on the number of transactions flowing through the system. The Success criterion aim will be to have 8,000 live auctions per day by 2024 and have 12,000 active users by 2025, with an average of 275,000 transactions (Completed Auctions) per month (28 day rota) by the end of the year 2025.

3 Scenarios

3.1 Scenario 1. Successful Auction

Actors: Megan (Seller); Ben (Buyer/Bidder); Chris (Buyer/Bidder) [2]

1. Megan would like to sell her high-end gaming laptop. It is in good condition and she believes she can get a good price for it. Megan decided to turn to Silk Road to aid her in selling her laptop. Megan decides to post a listing for a high-end gaming laptop on Silk Road.
2. Megan signs up for an account on Silk Road, which gets authenticated and she is then granted a Buyer and a Seller profile. Megan accesses her seller profile and starts the auction process.
3. Megan uploads multiple pictures of different angles of her laptop, as well as providing a detailed product description, clearly indicating the condition of the laptop, the specification of the laptop, as well as any extra additional information.
4. Megan sets her desired starting price for the auction, her reserve price and the timer for how long the auction should last. Megan submits her auction. Following a quick system check and validation, Megan's auction is live on Silk Road for other users to see.
5. The listing includes the specifications, reserve price, and end time for the auction. The reserve price is set at £1200. The auction is set to last for 5 days before closing. If the highest bid does not meet at least the reserve price, Megan will close the auction after 4 days.
6. Ben is a Silk Road user who is on the search for a high-end gaming laptop in good condition. He is searching specifically for such an item, when he sees Megan's auction. Ben decides to place a bid for £1200.
7. The auction is now into day 4 and will remain open for a few more hours. Chris, also a Silk Road user, sees Megan's auction. Chris decides to place a bid of £1300. The auction exceeds the timer and has ended. Chris wins the auction with the highest bid of £1300.
8. Silk Road informs Ben that the auction has closed and that Chris has won the auction. Silk Road also informs Chris that he was won the auction and informs Megan that her auction has closed at a bid of £1300.

Figure 1: Megan

Figure 2: Ben

Figure 3: Chris

[2] All human images on this page are generated by a machine-learning algorithm from BoredHumans.com ©

3.2 Scenario 2. Unsuccessful Auction

Actors: Amy (Seller); Andrew (Buyer/Bidder); Harry (Buyer/Bidder) [3]

1. Amy would like to sell her old Espresso Coffee Machine. It is in good condition with minor faults and she believes she can get a good price for it despite this. She decides to list the coffee machine up for auction on Silk Road, a service which she previously used to sell a kitchen Tupperware set successfully.
2. Amy takes all-round pictures of her coffee machine, clearly showing all angles as well as the minor scratches on the machine. She sets her desired price for the machine, as well as providing a clear description and she clearly states that the machine has faults, albeit is still in good working condition.
3. Amy decides to set the machine at a reserve price of £350 and sets the auction timer to 2 days, which she believes is sufficient for an item of this value
4. Amy already has one penalty point on her seller profile, due to previously withdrawing an item that she had up for auction, after the reserve price had already been met. She is aware of this and thus decides to set the price at a reasonable limit.
5. Amy proceeds to setting her auction status as "live". The system takes 10 minutes to run through the validation checks and publishes her auction on the live online marketplace.
6. Andrew is in need of a coffee machine, however doesn't want to spend a big sum of money on a new one. Harry is also searching for a coffee machine.
7. Andrew submits a bid of £300, which is the most he is willing to pay for a used coffee machine. Harry decides to also bid for the machine, and bids at £320. They are both aware that this is less than the reserve price and hope that Amy will reduce her asking price
8. After 2 days, the system closes the auction. As the reserve price wasn't met, the system has declared this an unsuccessful auction and has withdrew Amy's listing. Amy is notified of the outcome.
9. Andrew and Harry are notified of the auction result and Amy is free to start another auction if she so wishes; Amy doesn't receive any penalty points as the auction was declared unsuccessful by the system due to the reserve price not being met.

Figure 4: Amy

Figure 5: Andrew

Figure 6: Harry

[3] All human images on this page are generated by a machine-learning algorithm from BoredHumans.com ©

3.3 Scenario 3. Cancelled Auction

Actors: Ivanka (Seller); Vladimir (Buyer/Bidder); James (Buyer/Bidder) [4]

1. Ivanka would like to sell her brand new Samsung 48-inch curved TV. It is in perfect condition and still wrapped and she believes she can make profit from the TV, which retails at 8000 Russian-Rubles; she bought the TV for 7000 Russian-Rubles and believes she can sell it for 7500 Russian-Rubles. Ivanka believes this is a fair offer as it is below RRP.
2. Ivanka decides to access her seller profile and upload the pictures of the TV inside the sealed box. She provides a brief description of the TV and explains that it is unopened and brand new. She explains that she bought it, but was gifted another TV by her grandfather and no longer required this one
3. Ivanka opens her auction and the system places it "live" after validity checks. The auction timer is set to 7 days.
4. Vladimir has been on the hunt for a new TV at a decent price, and has turned to Silk Road in the hope of finding a bargain.
5. James is also searching for a TV, but does not have anything in mind. He is simply browsing through TV auctions.
6. James stumbles upon Ivanka's auction and appreciates that it is a good deal, as he was not looking to spend too much on a TV. James decides to bid with 6800 Russian-Rubles, and hopes that Ivanka will reduce her asking price towards the end of the auction time. James is easy-going as he isn't too desperate for a new TV.
7. Vladimir finds the specific TV he is looking for; it is listed by Ivanka and he can see that she has very good seller feedback, and likes that the TV is brand new, however he doesn't want to spend 7500 Russian-Rubles. He notices a bid of 6800 Russian-Rubles and decides to bid 7000.
8. After 6 days, Ivanka notices that her highest bid so far is 7000 Russian-Rubles and she is adamant that the TV is worth more than that.
9. Ivanka decides to keep the TV for a little longer. She cancels her auction. The system validates the cancellation. No penalty points issued.
10. The system cancels the auction and informs Vladimir and James that the seller has decided to cancel the auction due to the reserve price not being met.

Figure 7: Ivanka

Figure 8: Vladimir

Figure 9: James

[4] All human images on this page are generated by a machine-learning algorithm from BoredHumans.com ©

4 Use Cases

4.1 Use Case 1. Successful Auction

Use Case Name	Successful Auction
Scope(System Boundary)	Online Auctioning Service
Primary Actor	Buyer/Bidder
Stakeholders	Seller/Owner, Buyer/Bidder, Online auctioning service, transport/delivery service, Banks
Preconditions	The online auctioning service is live on the web. The users (seller and bidder) have an internet connection. The bidder has a valid bank account and does not bid more than he has in that account.
Main Success Scenario (System Happiness)	Both the seller and bidder have registered and logged into the online auctioning service. The seller has less than two penalty points. The seller put an item up for auction on the online auctioning service. Setting the item name, reserve price, start time and end time of the auction. The bidder submitted a bid greater than the previous bid. The bidder submitted a bid greater than the reserve price set by the seller. The bidder has submitted the last bid in the auction. The bidder is not the seller. The auction is over (it is past the end time set by the seller). The bidder is informed by the online auctioning service that they won the auction. The bidder enters their bank details and pays for the item at the price of his bid. The bidder is in time to give feedback to the seller so they leave feedback. The feedback is then added to the seller's status.
Extensions (Exceptions)	

Figure 10: Use Case Description of Successful Auction

4.2 Use Case 2. Cancelled Auction

Use Case Name	Cancelled Auction
Scope(System Boundary)	Online Auctioning Service
Primary Actor	Seller/Owner
Stakeholders	Seller/Owner, Buyer/Bidder, Online auctioning service
Preconditions	The online auctioning service is live on the web. The users (seller and bidders) have an internet connection.
Main Success Scenario (System Happiness)	Both the seller and bidders have registered and logged into the online auctioning service. The seller has less than two penalty points. The seller put an item up for auction on the online auctioning service. Setting the item name, reserve price, start time and end time of the auction. Several bidders place bids on the item, each bid greater than the previous but none exceeding the reserve prices. The seller is not one of the bidders. The seller decides to cancel the auction. They recieve no penalty points as the reserve price was not exceeded. All involved bidders are informed that the auction has been cancelled and no winner is declared.
Extensions	If there was a bid that exceeded the reserve price, the seller will have been penalized.

Figure 11: Use Case Description of Cancelled Auction

5 Use Case Diagram

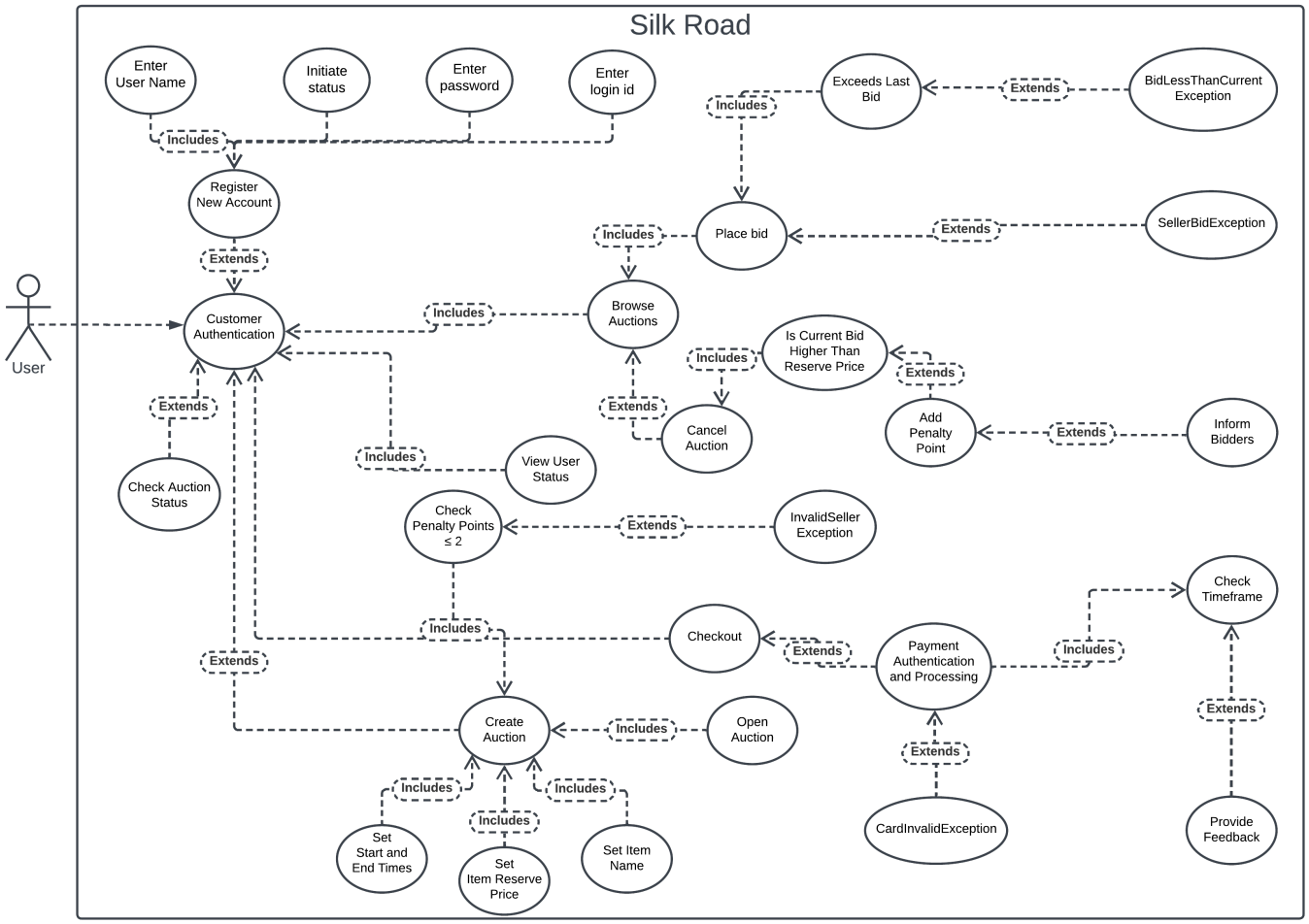

Figure 12: Use Case Diagram of the System

6 Class Diagram

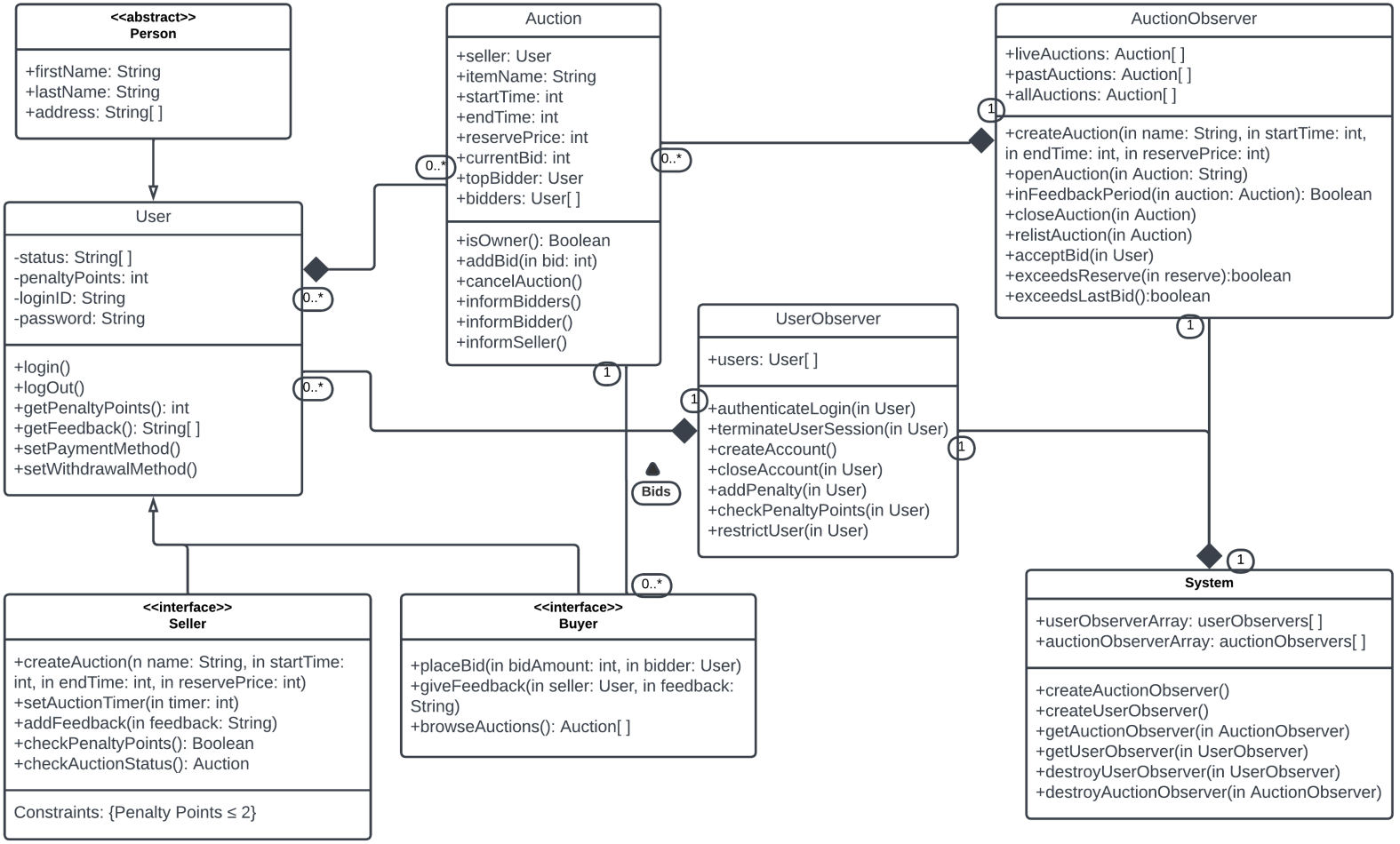

Figure 13: Class Diagram of Auction System

7 Sequence Diagram

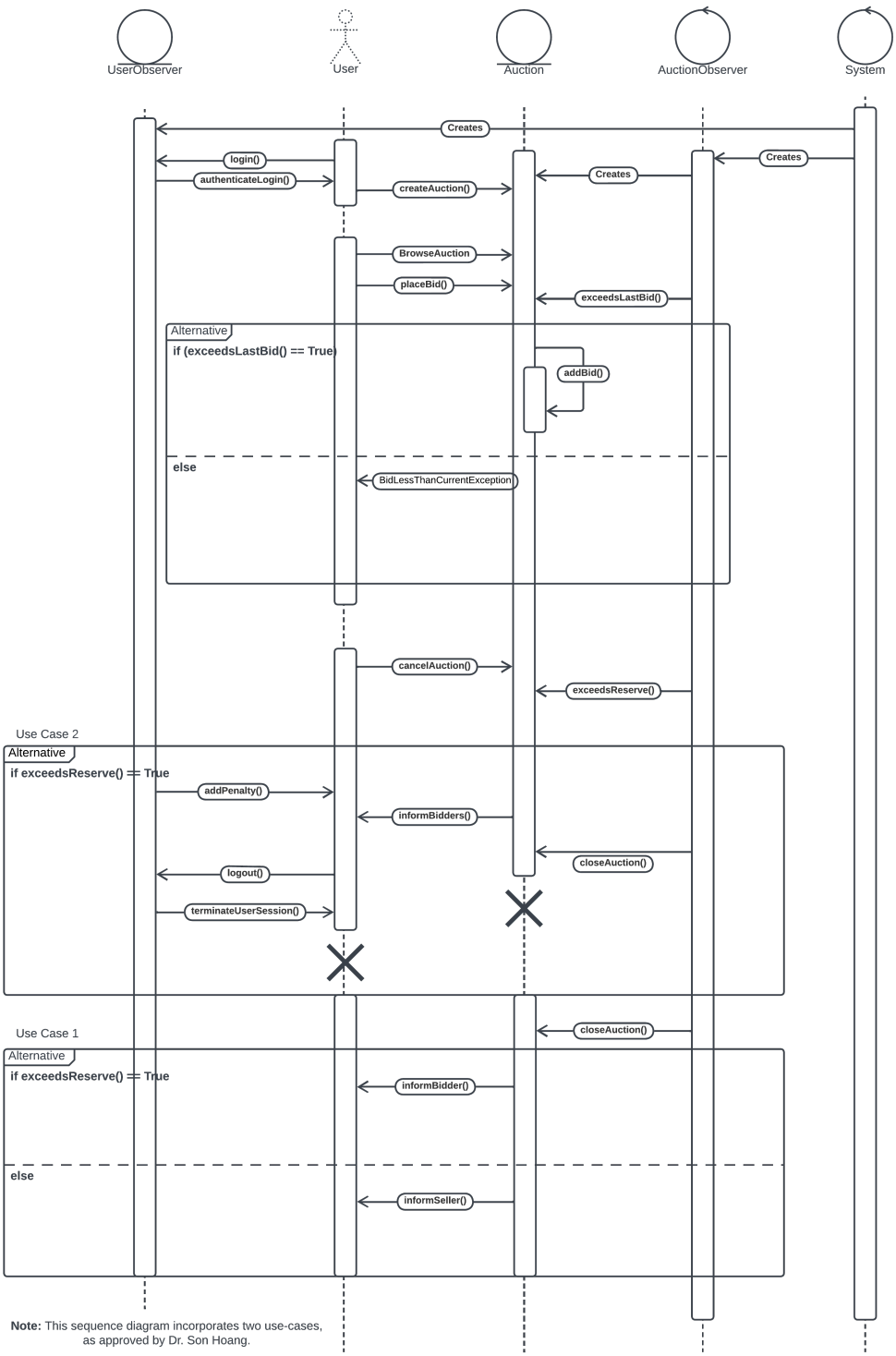

Figure 14: Sequence Diagram of 2 Use Cases

8 Activity Diagram

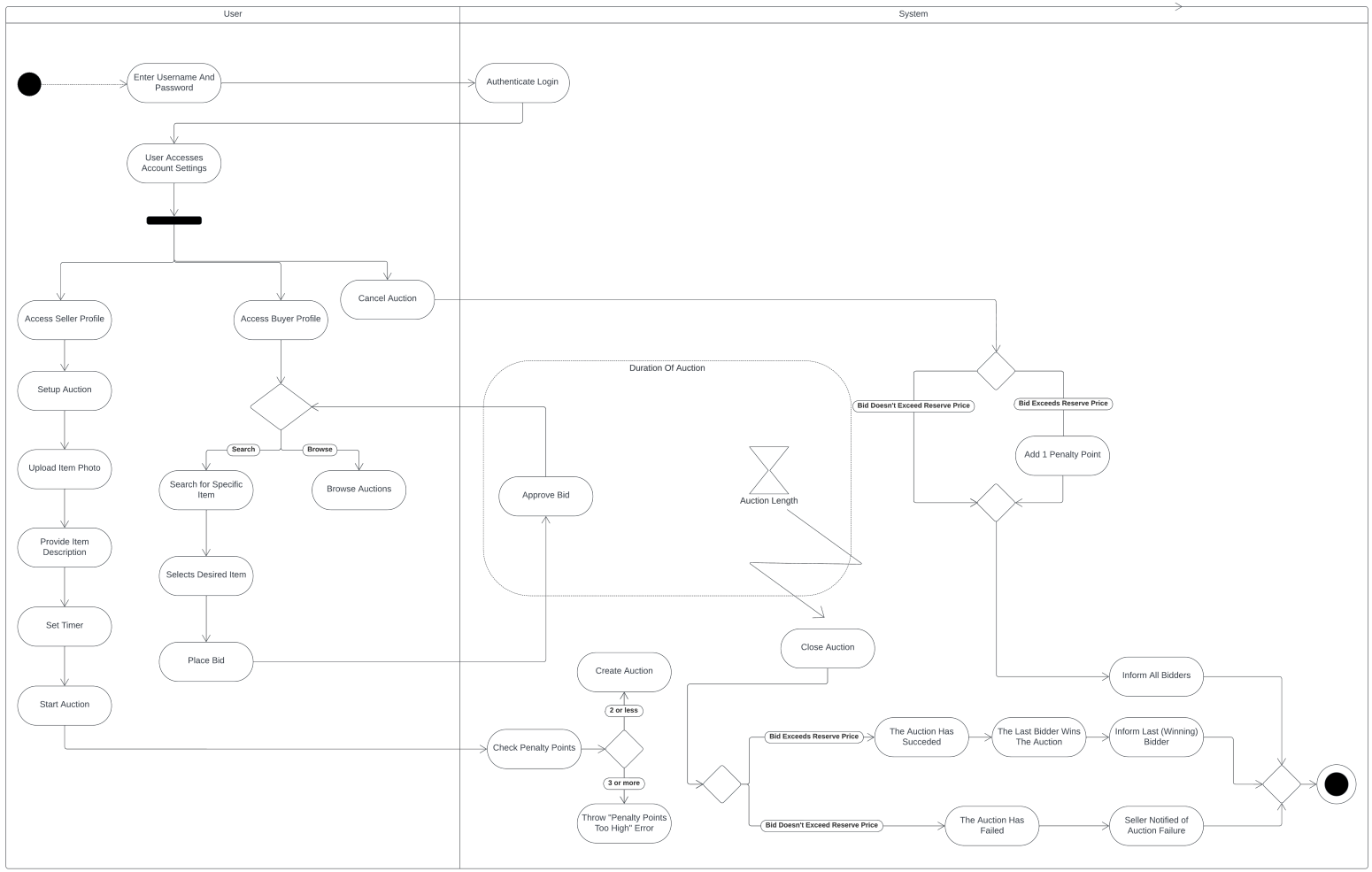

Figure 15: Activity Diagram of Auction

9 State Diagram

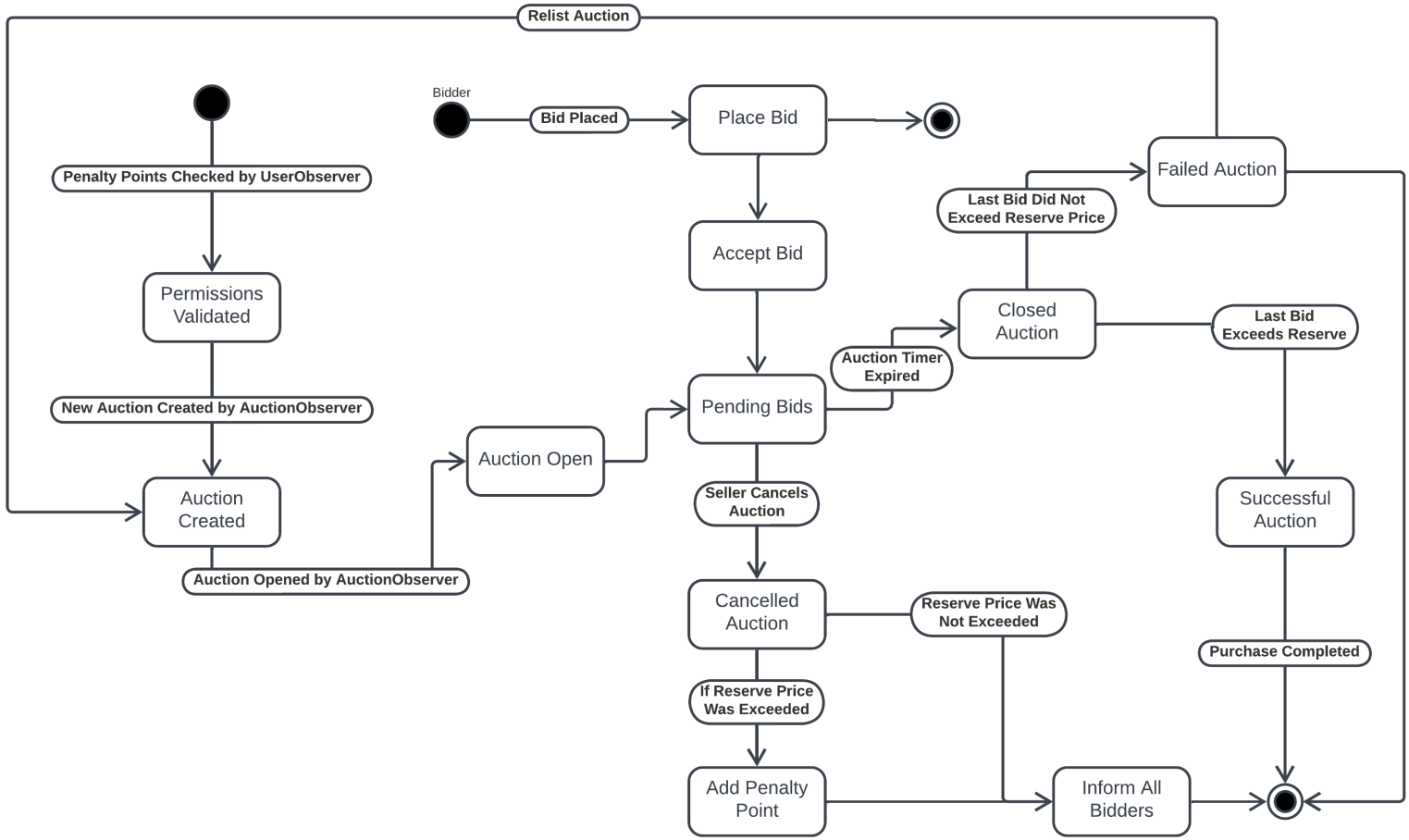

Figure 16: State Diagram of Auction Object