COMP9900 Information Technology Project

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Online Property Sales

Project Proposal

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Background

With the development of information technology, people prefer to deal with their daily routines online. Especially in the face of COVID-19, many different types of online services have achieved success, including online office, online learning, and online shopping. These online services provide opportunities for people to complete different missions remotely, as well as improve their life quality. The online economy is driving social development and making human life more and more convenient.

Recently, online real estate transactions have also developed rapidly to fit the customers' requirements. On these platforms, sellers are able to attract more bidders to participate in the auctions by posting detailed property information online. Meanwhile, buyers do not need to spend a lot of time on-site inspections and they can compare different properties online easily. There is no need to keep an eye on price trends at the auction site, thus saving time and transportation costs. Online auctions have made great achievements in the trading of second-hand items, such as eBay, but for properties and expensive artworks, the users are more special and targeted, which forces the platforms to consider more factors to give the customers the best experience.

Nowadays, some existing platforms which can provide the property auction service for online users have been developed, but most of them use Agents to help sellers sell properties, which makes the process cumbersome and inconvenient for the seller to some extent. This project is aiming to provide users with an online platform for property auctions, at which the sellers can independently upload the property information after being certified (i.e. verify the real estate certificate), and the bidder can bid the properties if they are interested in.

Some websites for online property auction are listed (https://www.openn.com.au/, https://anywhereauctions.com.au/, https://www.soldonline.com.au/buy-property-online-auctions.html/). These websites can provide auction service for users, but they still can be improved. The drawbacks of these websites are shown below.

1. They do not use real-name verification for sellers and buyers. It is unsafe because

some users can use a pseudonym to participate in the auction or sell the properties. It sometimes is uncertain whether the house is legal.

2. It is inconvenient to use the agent to conduct the auction. Both sellers and buyers need to pay a lot of fees to the agent.

3. The website cannot provide videos of the properties for customers to help them get more information about these properties.

4. The website is too complex. For example, as a seller, the process of finding out how to upload housing sales information is too complicated. It is not suitable for people who are not familiar with computers, such as the elderly.

5. The auctions are not smart enough. When a bid is placed close to the end of the auction, it should give chance for the former bidder and new bidder to place a new bid if they have high willing to buy this property.

6. Some websites cannot provide recommendations for users.

User Stories and Sprints

User types

There are 4 different types of potential users, including users, sellers, observers, and bidders, and the relationship is illustrated in Figure 1. The users only have access to the basic functions of this website, and they can choose to become a seller, observer, or bidder for different purposes. A seller is an initiator of an auction who can upload the information of his/her properties after verification. If a user is interested in some properties, he/she can become an observer of these properties, and get the up-to-date information of this auction. A bidder can place bids that are higher than the previous bid for the properties they like, and have opportunities to win the auction.
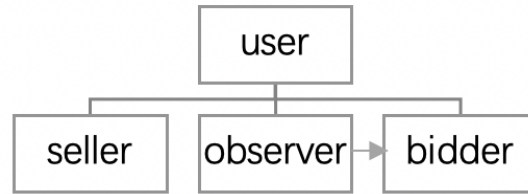
Figure 1. User type relationship

User Stories

The defined user stories are shown below, and the Backlog in Jira is shown in Figure 2.

As a user, I want to

1. Be able to register an account so that I can use the service of the website.

2. Be able to log in so that I can update my data.

3. Have a dashboard so that I can see the details and activities of my account.

4. Be able to log out so that I can protect my personal information on public computers.

5. Be able to search for properties using keywords so that I can get the properties I am interested in easily.

6. Be able to get details of the auctions including the starting and closing time and properties' information so that I can decide whether it is the property I want to be involved in.

7. Get recommendations for similar auctions based on my previous search history or registered auction so that I can find my interested properties in the future

8. Be able to choose to become a seller, observer, or bidder so that I can view the bid history and current highest bid.

As a seller, I would like to

9. Transact with a verified bidder, so that I can conduct property transactions safely.

10. Post the property details (property address, number of bedrooms, bathrooms,

garage features, photos, videos) on the advertisement so that I can attract potential buyers.

11. Delete the information of my auction which is in progress so that I can terminate the transaction.

12. Configure the starting and closing date of my advertisement so that I can get the result within my expected time.

13. Set a reserve price to the website which is hidden so that I can get a satisfying price of my property after the auction.

14. View the bid history and current highest bid so that I can get the real-time information of the auction.

15. Extend the auction for 2 min when a bid happened within 5 min of the closing time so that I could get higher bids of this property.

16. Get the contact details of the highest bidder if the highest bid is higher than the reserve price so that I can contact him/her personally and negotiate more details about the auction.

17. Get the outcome as well as the highest bid and bid history if the highest bid is lower than the reserve price so that I can be informed this auction is failed, and prepare for the next auction.

As an observer, I would like to

18. Follow my interested auction so that I can get the bid activity in time.

19. Become a registered auction bidder so that I can place a bid to compete for this property.

20. View the bid history and current highest bid so that I can get the real-time information of the auction.

21. Get a notification if a new bid is placed or the auction is completed so that I can monitor the auction.

As a bidder, I would like to

22. Transact with a verified seller, so that I can conduct property transactions safely.

23. Place a bid greater than the minimum bid price and last bid so that I have the possibility to buy this property.

24. Be able to continue bidding if a new bid happened within 5 min of the end of the auction so that I still have the opportunity to purchase this property.

25. Get a notification if a new bid is placed or the auction is completed so that I can monitor the auction.

26. View the bid history and current highest bid so that I can get the real-time information of the auction and reconsider my bid.

27. Get the contact details of the seller if I successfully bid the property so that I can contact the seller personally and negotiate more details about the auction.

Backlog 27 issues   Create sprint   •••

As a user, I would like to be able to register an account so that I can use the service of the website.	CWF-4	↑ -
As a user, I would like to be able to log in so that I can update my data.	CWF-6	↑ -
As a user, I would like to have a dashboard so that I can see the details and activities of my account.	CWF-7	↑ -
As a user, I want to be able to log out so that I can protect my personal information on public computers.	CWF-8	↑ -
As a user, I want to search for properties using keywords so that I can get the properties I am interested in easily.	CWF-9	↑ -
As a user, I want to be able to get details of the auctions including the starting and closing time and properties' information so that I can decide whether it is the property I war	CWF-10	↑ -
As a user, I would like to get recommendations of similar auctions based on my previous search history or registered auctions so that I can find my interested properties in the	CWF-11	↑ -
As a user, I want to be able to choose to become a seller, observer, or bidder so that I can view the bid history and current highest bid.	CWF-12	↑ -
As a seller, I would like to transact with a verified bidder, so that I can conduct property transactions safely.	CWF-37	↑ -
As a seller, I would like to post the property details (property address, number of bedrooms, bathrooms, garage features, photos, videos) on the advertisement so that I can at	CWF-13	↑ -
As a seller, I would like to delete the information of my auction which is in progress so that I can terminate the transaction.	CWF-39	↑ -
As a seller, I would like to configure the starting and closing date of my advertisement so that I can get the result within my expected time.	CWF-14	↑ -
As a seller, I would like to set a reserve price to the website which is hidden so that I can get a satisfying price of my property after the auction.	CWF-15	↑ -
As a seller, I would like to view the bid history and current highest bid so that I can get the real-time information of the auction.	CWF-16	↑ -
As a seller, I would like to extend the auction for 2 min when a bid happened within 5 min of the closing time so that I could get higher bids of this property.	CWF-17	↑ -
As a seller, I want to get the contact details of the highest bidder if the highest bid is higher than reserve price so that I can contact him/her personally and negotiate more det	CWF-18	↑ -
As a seller, I want to get the outcome as well as the highest bid and bid history if the highest bid is lower than the reserve price so that I can be informed this auction is failed,	CWF-19	↑ -
As an observer, I would like to follow my interested auction so that I can get the bid activity in time.	CWF-20	↑ -
As an observer, I would like to become a registered auction bidder so that I can place a bid to compete for this property.	CWF-21	↑ -
As an observer, I want to view the bid history and current highest bid so that I can get the real-time information of the auction.	CWF-22	↑ -
As an observer, I want to get a notification if a new bid is placed or the auction is completed so that I can monitor the auction.	CWF-23	↑ -
As a bidder, I would like to transact with a verified seller, so that I can conduct property transactions safely.	CWF-50	↑ -
As a bidder, I would like to place a bid greater than the minimum bid price and last bid so that I have the possibility to buy this property.	CWF-24	↑ -
As a bidder, I would like to be able to continue bidding if a new bid happened within 5 min of the end of the auction so that I still have the opportunity to purchase this property	CWF-52	↑ -
As a bidder, I want to get a notification if a new bid is placed or the auction is completed so that I can monitor the auction.	CWF-25	↑ -
As a bidder, I want to view the bid history and current highest bid so that I can get the real-time information of the auction and reconsider my bid.	CWF-26	↑ -
As a bidder, I want to get the contact details of the seller if I successfully bid the property so that I can contact the seller personally and negotiate more details about the aucti	CWF-28	↑ -

+ Create issue

**Figure 2. Backlog in Jira**

Sprints

We divided the whole project into four sprints. Since the tutorial is conducted on Wednesday and we need to finish phased work before the tutorial, we use these tutorial sessions as a kind of boundary of the sprints. The duration of each sprint is shown below, and the user stories for the first sprint in Jira is shown in Figure 3.

Sprint 1: week 4 – week 5 Wednesday (5th Oct – 14th Oct)

Sprint 2: week 5 Wednesday – week 6 (15th Oct – 25th Oct)

Sprint 3: week 7 – week 8 Wednesday (26th Oct – 4th Nov)

Sprint 4: week 8 – week 9 Wednesday (5th Nov – 11th Nov)
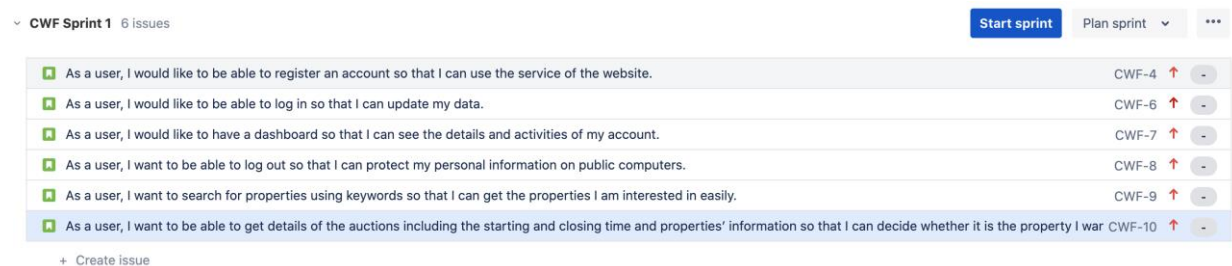
Figure 3. First Sprint in Jira

User stories analysis

This part is aiming to describe how the defined user stories satisfy all the project objectives, and what are the novel functionalities defined by these user stories.

The main objective of this project is to build a website where users can conduct property auctions. The detailed objectives for different user types and the corresponding user stories are shown as follows.

Table 1. Objectives and corresponding user stories

User Types	Objectives	User Stories
Sellers	The sellers upload or update the property	User stories 10, 12, 13

	information (address, number of bedrooms and bathrooms, outbound characteristics, photos), set the auction period, and set a reserve price that is invisible to the buyer.	
	The personal information is collected by the platform.	User stories 1, 2, 22
	The sellers view historical bid records and the current highest bid.	User story 14
	When the auction ends and the highest bid is higher than the reserve price, the result and the contact information of the highest bidder will be received.	User story 16
	When the auction ends and the highest bid is lower than the reserve price, the bid history and the current highest bid will be received.	User story 17
Observer	Potential buyers search for property based on property information and auction information.	User stories 5, 6
	Potential buyers view historical bid records, current highest bid and auction duration.	User story 20
	Potential buyers get recommendations based on search and auction history.	User story 7
Bidder	The personal information is collected by the platform.	User stories 1, 2, 9
	RABs make a bid for the property of	User stories 23

	interest, and the bid must be higher than the minimum bid and the last bid.	
	In the last 5 minutes of the auction duration, if there are still bidder bidding, the auction duration will be extended by 2 minutes.	User story 24
	RABs view historical bid records, current highest bid and auction duration.	User story 26
	When the auction ends and the highest bid is higher than the reserve price, the result and the contact information of the seller will be received.	User story 27
	Bidders get recommendations based on search and auction history.	User story 7

In section 1, some drawbacks of existing systems are listed. Compared to these existing systems, we add some novel functions in our system to give the customers a better experience.

1. In user stories 9 and 22, the seller and bidder must upload their identification information to prove their identity, and for sellers, the properties which will be advertised on the platform need to be verified that the properties belong to the seller. The certificates can be uploaded on the platform and reviewed by the staff. Once the identity and properties are verified, the sellers and bidders can use the relevant service.

2. In user stories 8, 10, 12, 13, 16, 17, our platform does not use an agent to promote the property transaction, which means the seller can sell their properties independently as they like. All the processes can be completed by the sellers themselves, and this also helps them monitor the auction.

3. In user story 10, the seller can choose to upload a video to help the potential

buyer have a better view of the property.

4. In user stories 21 and 25, the bidders and observers will be notified if the auctions they followed have a new bid, which helps them get updated information. This function also saves time since they do not need to spend a lot of time sitting in front of the computer and refresh the webpage.

5. In user story 24, the auction will be extended a few minutes if a new bid is placed with 5 min of the end, which gives chance for other bidders to compete with this property. This could also help the seller get a higher price of the property.

6. In user story 7, the potential buyers will get recommendations after they search and bid a property, which will increase the probability that the customer bid a new auction due to the recommendations.

Interface and Flow Diagrams

The user interface of the online property sales website is divided into three parts, which are user log in, user profile and messages, and property auction.

User Log In

Each viewer and user of the website can search for their interested property and view the property details through the home page.

As a user who is registered or is willing to register, the home page gives them access to log in. When a user clicks on the 'Log In' icon, it shows the information required to be filled in.

If a user is new to the website and would like to register, he can click on 'Register' and then fill in the basic sign up information. The newly registered user will receive a verification email with a validation code. After registering a new account, the website will go back to the login page.

If a user forgets his or her password, he can click on 'Forget password?' and there

will be a new page that helps him to reset the password. Firstly, send a reset password email with a validation code to the user's account email. Then, the user enters the validation code and set the new password of his account. After resetting the password, the website will go back to the login page.

If a user enters the correct information, he will enter the successful log-in homepage. After entering the log-in homepage, a user can choose to be a bidder, seller, or an observer.
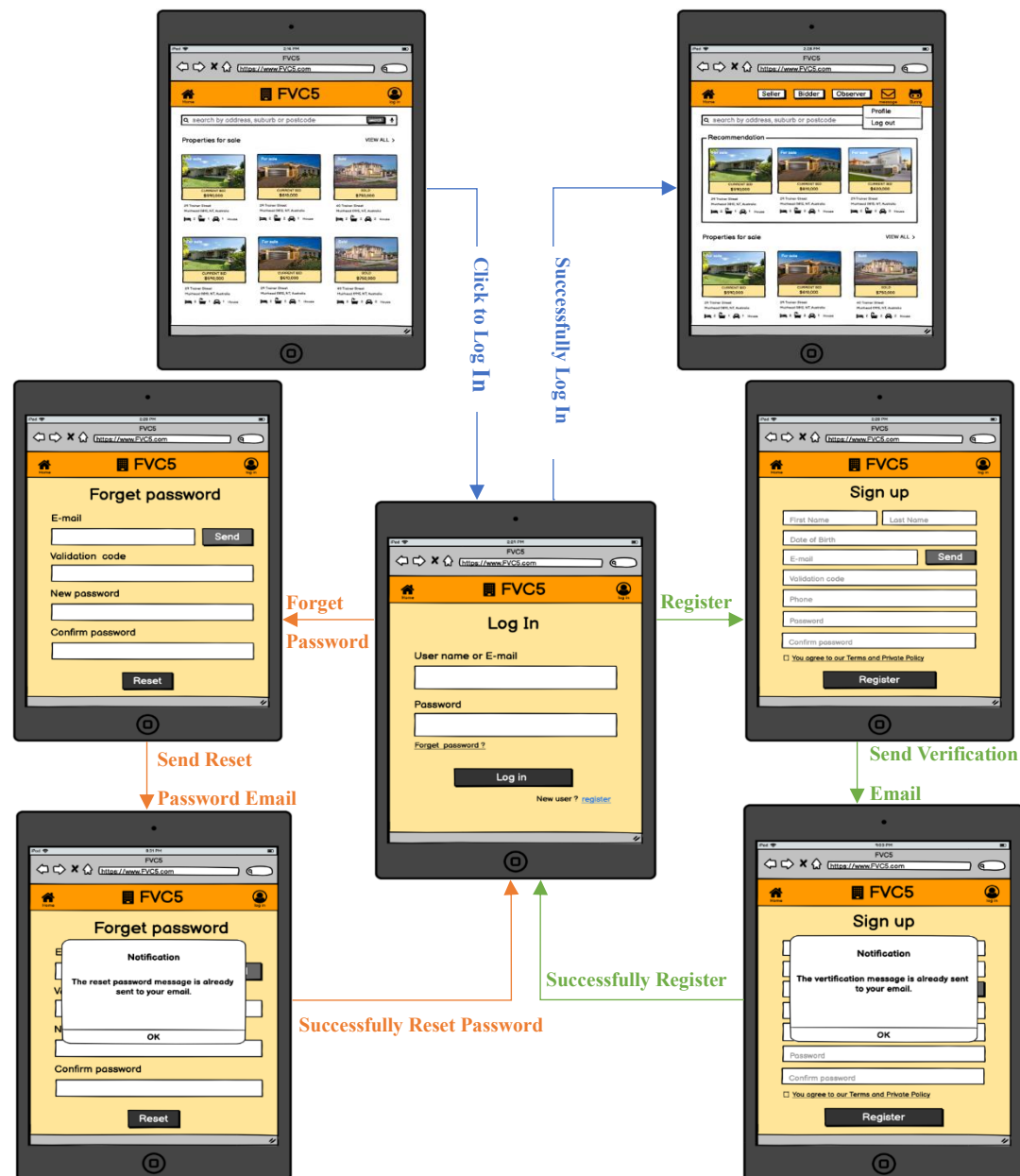

Figure 4. User Log in Flow Diagram

User Profile and Messages

After the user logged in successfully, besides the searching function, the log-in homepage can provide recommendations of the property based on the user's searching history.

A user can update his profile after clicking on 'Profile'. If a user would like to become a seller or bidder, he has to upload his ID information for back-end managers to manually check his identity. The user's identity information is private and safe on the website.

A user can also get messages from the website about property auction updates. If a user would like to read his messages, he can click on the 'Messages' icon. A user can filter the messages by 'Read', 'Unread', 'Starred', and 'Unstarred'. A user can also choose different messages to delete, mark as read, or flag.

Figure 5. User Profile and Messages Flow Diagram

Property Auction

A property auction involves a seller, bidders, and observers. A registered user cannot see the bid history of the property unless he chooses to become a bidder or observer when viewing his interested properties. When a user clicks on the 'Become an observer' button, he becomes an observer and can view the bid history of the current property. When a user clicks on the 'Become a Bidder' button, the website requires complete payment details and the verified identity of the user. If the user has complete personal information, he can become a bidder and make a new bid. If not, the website will ask him to complete his payment details first.
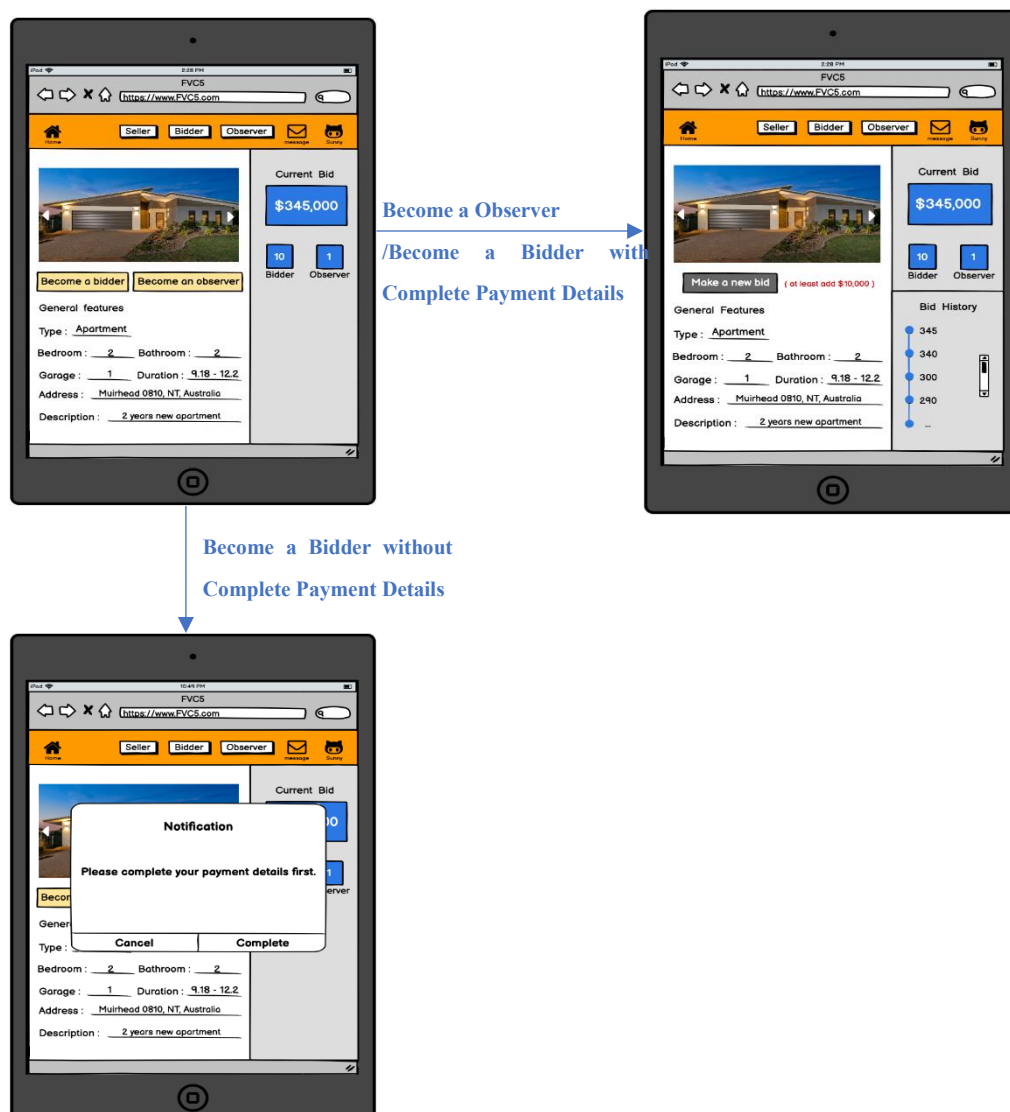
Figure 6. Registered Users Operations Flow Diagram

Once a user becomes an observer, he can click on the 'Observer' button to view his observed properties. The observer page has two parts: in progress properties and completed properties, which shows brief information about the properties. An observer can choose to cancel his observation by clicking on the 'Cancel observer' button if he is no longer interested in the in-progress property. An observer can click the property to view the detailed information. If the observer has complete payment details and verified identity, he can choose to become a bidder and make a new bid by clicking on the 'Make a New Bid' button. If the observer does not satisfy the requirement, the website will notify him to complete his payment details first.
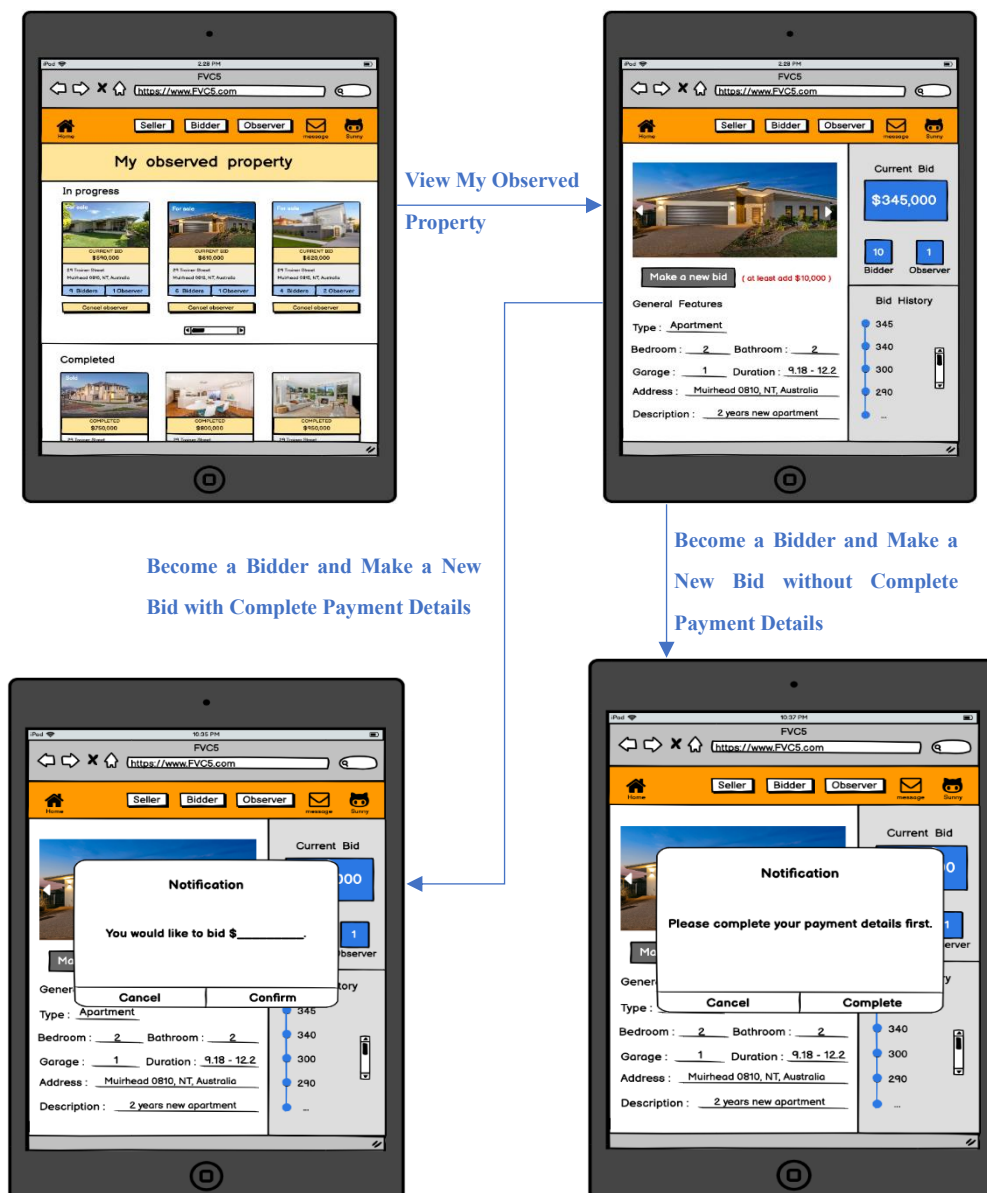
Figure 7. Observer Operations Flow Diagram

Once a user becomes a bidder, he can click on the 'Bidder' button to view the properties which he has placed bidders. The bidder page has two parts: in progress properties and completed/history properties, which shows brief information about the properties. Compared to an observer, a bidder cannot cancel his bid of the property. In the in progress section, besides the property information, the bidder can view his own bid price. When a bidder is viewing the detailed information of the property with bid history, he can choose to make a new bid by clicking on the 'Make a New Bid' button.
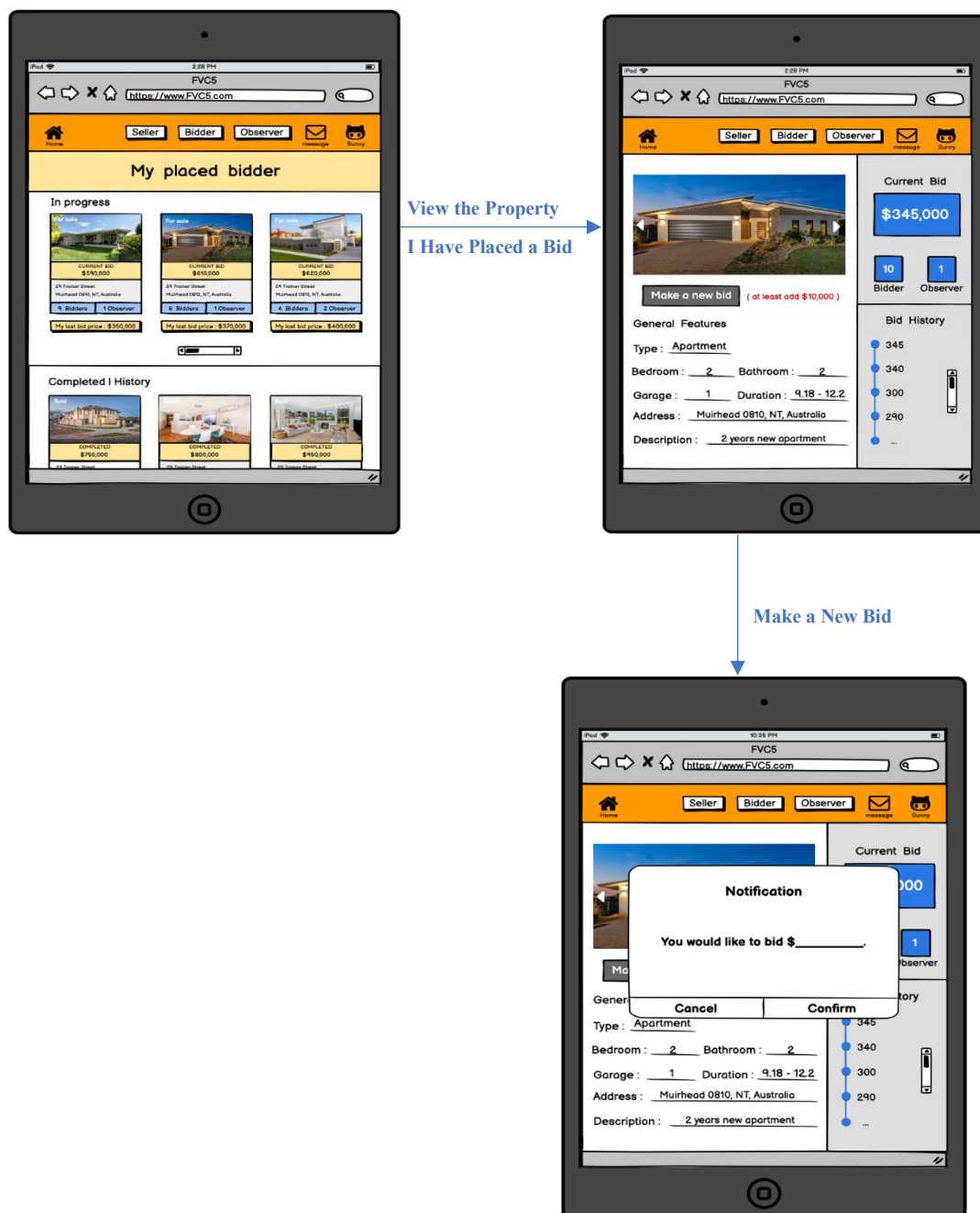
Figure 8. Bidder Operations Flow Diagram

A registered user can also choose to be a seller by posting properties on the website. Once a user wants to become a seller, he can click on the 'Seller' button. On the seller page, the user can click on the 'Post New Property' button to become a seller. To post a new property, a seller needs to fill in the required property details. Besides, the seller has to upload the property ownership certification for back-end managers to check property authenticity. For the auction, the seller has to provide a reverse price which is invisible to other users and set a starting and closing time.

After posting a new property, the seller can see the updated property on the seller page. If a seller filled with wrong information of the property or changes his mind, he can choose to delete the property auction. The website will require the seller to choose the deleting reasons in order to notify the seller that the deleted operation cannot be retrieved unless he posts the property again.

When a seller views the detailed information page of his posted property, he can see the reverse price while others cannot. The reverse price helps the website to judge if the auction can succeed.
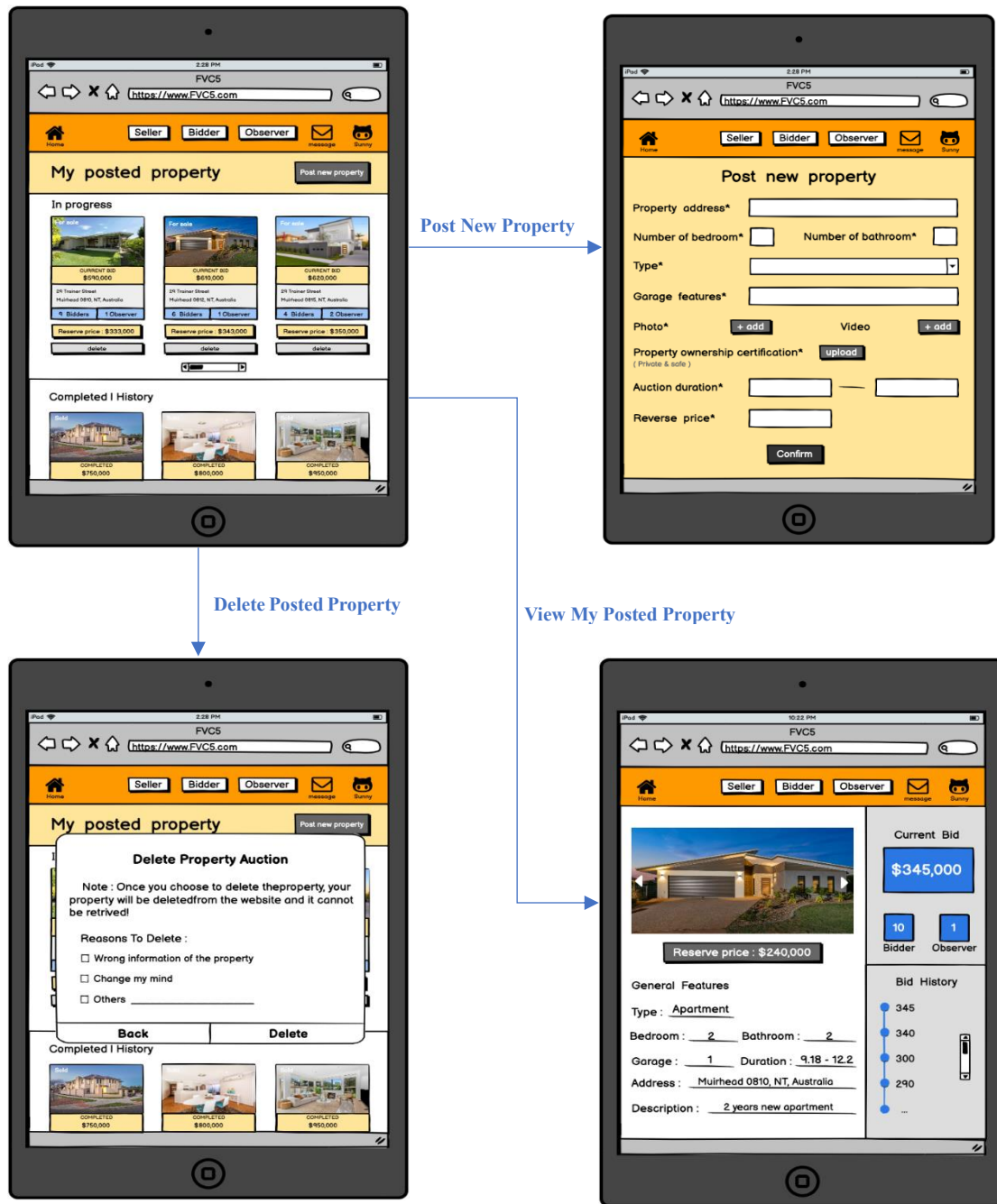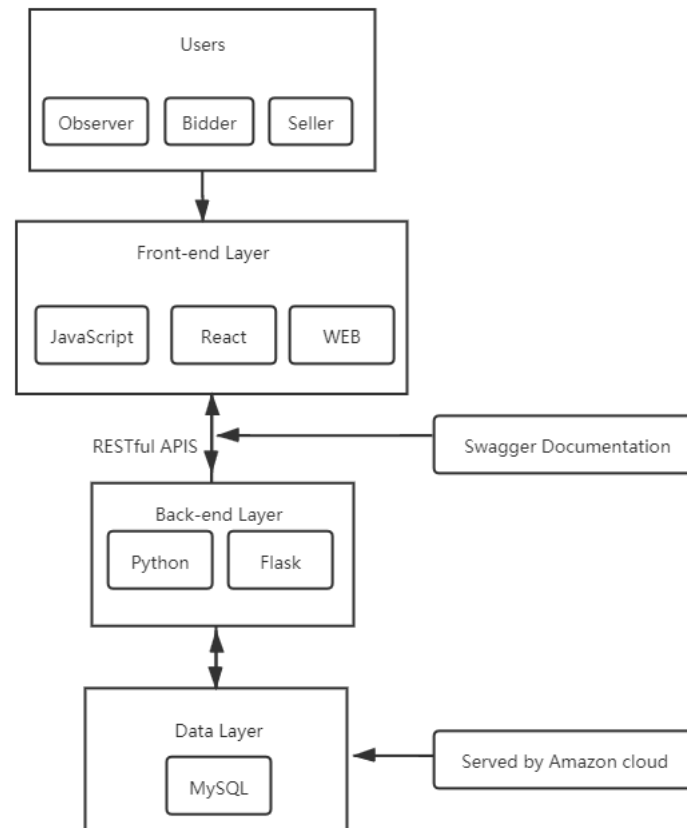
Figure 9. Seller Operations Flow Diagram

System Architecture

Software Architecture Diagram

Figure 10. System Architecture Diagram

External Actors (User Types)

We have four user types in the system. When a person logs in, he will become a user.

A user can be a seller if he posts an auction. The seller needs to update the complete property details including address, the number of bedrooms, bathrooms, garage features, the detailed photos or videos and the auction starting/ending time. The most important thing is the reserve price. At the same time, a seller needs to perform real-name authentication and upload the Certifications of Property Ownership for manual review. A seller can see the current bid in the seller dashboard and get a notification if there is

a new bid. After the auction is over, if the highest price is higher than the reserve price, the seller will conduct further transactions with the bidder. If the highest price is less than the reserve price, the auction will be closed. The seller can change the auction duration and reserve price and repost the property.

A user can be a bidder if he bids for some properties after finishing real-name authentication and uploading payment details. A bidder can see his bids in progress with the current bid price and his/her last bid price and previously completed bids in the bidder dashboard. The bidder can also see the bid history of a property. If the bidder wins an auction, he will conduct further transactions with the seller.

A user can be an observer if he observes some properties. An observer can see the bid history of a property. And the observed bids in progress and completed observed bids can be seen in the observer dashboard. If the observer is not interested, he can unfollow the bid.

For these four user types, some recommendations based on their search history or bidding history will be given for further bid.

Technical Description

For the front-end layer, we know that JavaScript is the most common front-end language, so we use a JavaScript library called React [1], which will make it painless to create interactive UIs. React can provide maximum flexibility and responsiveness. And it allows browsers to arrange documents in HTML, XHTML or XML format friendly because it is based on the Document Object Model. All in all, it can slightly improve performance.

For the back-end layer, we use Python as our main programming language. Because it is easy to use and provides a lot of useful libraries. And we use Flask [2] as the Web Framework, which is a lightweight tool and the swagger library in Python to develop a restful API backend. We use swagger documentation [3] because it is a better API specification communication between frontend and backend teams.

For the date Layer, we would like to use MySQL as our database management system, which is the most popular Relational Database Management System in WEB application. And we are tending to use Amazon RDS to make it easy to set up, operate and scale MySQL deployment in the cloud.

Reference

[1] Reactjs.org. React – A JavaScript Library For Building User Interfaces. [online] Available: https://reactjs.org/.

[2] Flask.palletsprojects.com. Welcome To Flask — Flask Documentation (1.1.X). [online] Available: https://flask.palletsprojects.com/en/1.1.x/.

[3] Swagger.io. Swagger Documentation. [online] Available: https://swagger.io/docs/.