Online Auction System

Rıdvan Burak Ünal

2001405

1 Chapter 1

1.1 Definition of the Project

1.1.1 Project Purpose

The purpose of developing the Online Auction System is to create a comprehensive and user-friendly platform that facilitates secure and efficient online auctions. The system aims to provide tangible and intangible benefits to its stakeholders, including sellers, buyers, and administrators:

Sellers:

- Increased Reach: The system will allow sellers to reach a broader market of potential buyers, transcending geographical limitations.
- Higher Selling Prices: By enabling competitive bidding, sellers have the opportunity to achieve higher selling prices for their products or items.
- Convenience and Efficiency: Sellers can easily list their products, manage auction details, and monitor bidding activity through the user-friendly interface of the system.
- Transparent Transactions: The system will ensure transparency in the auction process, providing sellers with confidence in fair and equitable transactions.

Buyers:

- Diverse Product Range: The online auction system will offer buyers access to a wide variety of products and items from multiple sellers, providing a greater range of choices.
- Competitive Bidding: Buyers can engage in competitive bidding, potentially securing products at lower prices than traditional retail channels.
- Convenience and Accessibility: The system will be accessible 24/7, allowing buyers to participate in auctions at their convenience from anywhere with an internet connection.
- Secure Transactions: The system will provide a secure environment for buyers to place bids and complete transactions, instilling trust and confidence in the online auction process.

Administrators:

- Efficient Auction Management: The system will streamline the auction management process, allowing administrators to handle multiple auctions simultaneously with ease.
- Dispute Resolution: Administrators will have tools and mechanisms in place to address disputes between buyers and sellers, ensuring fair and satisfactory resolutions.
- User Management: The system will provide administrators with user management capabilities, including account verification, monitoring, and enforcing auction policies.
- Insights and Analytics: The system will generate valuable data and analytics that administrators can leverage to analyze trends, optimize operations, and make informed decisions.

By providing a robust and user-centric online auction platform, the system aims to enhance the overall auction experience for sellers, buyers, and administrators, ultimately fostering a reliable and efficient marketplace for online transactions.

1.1.2 Project Scope

To ensure flexibility and control over the system's operations, the Online Auction System project will require the construction of a number of components, some of which will be produced in-house. For example user registration and authentication, users can create accounts by providing necessary information and validating their email addresses. Registered users can securely log in to the system using their credentials, ensuring data privacy and account security.

Then Product Listing and Management, Sellers can create and manage their profiles, including adding product details such as title, description, images, starting bid price, and auction duration. Products will be categorized, allowing users to browse and search for specific items or filter products based on criteria such as price range, location, etc. Sellers can update product information, including modifying descriptions, images, or bid details during the auction period.

Then there is bidding and auction management: Registered users can place bids on desired products, either manually or by utilizing an auto-bidding feature that incrementally places bids on their behalf. Users will receive real-time updates on bid activity, including outbid notifications and bid history tracking. Auctions will have a specified duration, and the system will automatically close the auction at the end of the set time or when a predefined condition is met.

For payment and transactions: The system will integrate secure payment gateways to facilitate transactions between buyers and sellers. Users will have various payment options available, such as credit/debit cards, online wallets, or bank transfers. The system will maintain transaction records, providing a history of payments made and received for reference.

If we talk about notifications and massaging, users will receive notifications about their bid status, including outbid notifications and auction closure notifications. The system will include a messaging feature that allows communication between buyers and sellers for inquiries or negotiation purposes.

Lastly the administration: Administrators will have the ability to manage user accounts, verify seller identities, and handle user-related issues. The system will provide mechanisms for administrators to resolve disputes between buyers and sellers, ensuring fair and satisfactory resolutions. The backend will generate reports and analytics on auction performance, user activity, and other key metrics to aid in decision-making and system optimization.

1.1.3 Project Constraints

Time Constraint: The project must be completed within a specified timeframe. The development, testing, and deployment activities should be planned and executed accordingly to meet the project's deadlines.

Budget Constraint: The project should adhere to the allocated budget. The cost of resources, software licenses, infrastructure, and any other expenses should be managed within the predefined financial limitations.

Technology Constraint: The system must be developed using specific technologies or frameworks as mandated by the project stakeholders. These technology constraints may include programming languages, databases, development frameworks, or hosting platforms.

Security Constraint: The Online Auction System should ensure the security and protection of user information, financial transactions, and sensitive data. Compliance with relevant security standards and best practices should be considered throughout the development process.

Scalability Constraint: The system should be designed and implemented to handle an increasing number of users, products, and concurrent bidding activities. Scalability considerations should be taken into account to ensure the system can accommodate future growth and increased usage.

Performance Constraint: The Online Auction System should be responsive and perform efficiently to provide a smooth user experience. Response times, page loading times, and system throughput should meet predefined performance targets.

Compatibility Constraint: The system should be compatible with different web browsers, operating systems, and devices. It should be tested and optimized to ensure proper functionality and usability across various platforms.

Legal and Regulatory Constraints: The Online Auction System should comply with applicable laws, regulations, and industry standards, including data protection, privacy, and consumer protection laws. Legal constraints should be considered in areas such as bidding rules, payment processing, and user terms and conditions.

User Interface Constraint: The system should have a user-friendly and intuitive interface to facilitate easy navigation and interaction. It should consider usability guidelines and accessibility requirements to accommodate a wide range of users.

Integration Constraint: The Online Auction System may need to integrate with external systems or APIs for payment processing, shipping, or third-party services. The integration constraints include compatibility, data exchange formats, and security requirements.

1.2 Actor Glossary

User (Buyer/Seller):

- Description: Users are individuals who interact with the Online Auction System. They can have different roles, either as buyers or sellers, depending on their intentions within the platform.
- Responsibilities:

1. Buyers: Buyers browse through the website, search for products, place bids on desired items, and complete transactions upon winning auctions.
2. Sellers: Sellers create product listings, provide accurate and detailed information about the items for sale, manage auctions, monitor bidding activity, and fulfill transactions with winning buyers.

Administrator:

- Description: Administrators are responsible for overseeing and managing the Online Auction System, ensuring smooth operation and enforcing policies.
- Responsibilities:

1. Administrators verify user accounts, handle account-related issues, and ensure compliance with platform guidelines.
2. Administrators monitor auctions, resolve disputes between buyers and sellers, and enforce auction rules and policies.
3. Administrators perform routine system maintenance tasks, ensure data integrity and security, and handle technical issues that may arise.

System:

- Description: The system represents the technical infrastructure and software components that make up the Online Auction System.
- Responsibilities:

1. The system verifies user credentials and grants secure access to registered users.
2. The system provides features and tools for sellers to create and manage product listings, including updating product information during auctions.
3. The system facilitates bid placement, tracks bid activity, and automates auction closure based on predefined conditions.
4. The system integrates with secure payment gateways to handle transactions between buyers and sellers.
5. The system generates and delivers notifications to users regarding bid status, auction updates, and facilitates messaging between users.

1.3 Use Cases

1.3.1 User Registration:

- Description: This use case describes the process of user registration in the online auction system.
- Actors: User, System
- Basic Flow:

The user accesses the registration page. The user provides the necessary information, such as name, email address, and password. The system validates the information and creates a user account. The system sends a confirmation email to the user for account verification. The user verifies the account by clicking on the verification link in the email. The system confirms the account verification and allows the user to log in.

1.3.2 Product Listing:

- Description: This use case involves a seller creating a product listing in the online auction system.
- Actors: Seller, System
- Basic Flow:

The seller accesses the product listing page. The seller provides details of the product, including title, description, images, starting bid price, and auction duration. The system validates the information and creates the product listing. The product listing becomes available for potential buyers to view and bid on.

1.3.3 Bidding on a Product:

- Description: This use case allows a user to place a bid on a product listed in the online auction system.
- Actors: User, System
- Basic Flow:

The user searches for a desired product or selects a product from the listings. The user enters the bid amount and submits the bid. The system validates the bid and updates the bid status for the user and the product. If the bid is higher than previous bids, the system updates the highest bid and notifies other users. If the bid is outbid, the system sends an outbid notification to the user.

1.3.4 Payment and Transaction:

- Description: This use case involves the process of payment and transaction between the buyer and the seller.
- Actors: Buyer, Seller, System
- Basic Flow:

The buyer wins an auction and the system notifies both the buyer and the seller. The buyer and the seller agree on the payment method. The buyer submits the payment through the chosen payment method. The system verifies the payment and updates the transaction status. The seller confirms receipt of payment and initiates the shipment or delivery of the product. The buyer receives the product, and the transaction is considered complete.

1.3.5 Administrator Dispute Resolution:

Description: This use case involves the resolution of disputes between buyers and sellers by the system administrator. Actors: Administrator, Buyer, Seller Basic Flow: The buyer or seller reports a dispute to the system administrator. The administrator investigates the dispute, reviewing relevant information and communication between the parties. The administrator communicates with both the buyer and the seller

1.4 Project Effort Estimation

Weights:

- User Registration: 4
- Product Listing: 3
- Bidding on a Product: 5
- Payment and Transaction: 4
- Administrator Dispute Resolution: 3
- **TOTAL Use Case Points**: 4+3+5+4+3= 19

Productivity Factor: 5 person-days per Use Case Point

Estimated Person-Days = 19*5 =95

Effort Per Developer = 95/3= 32

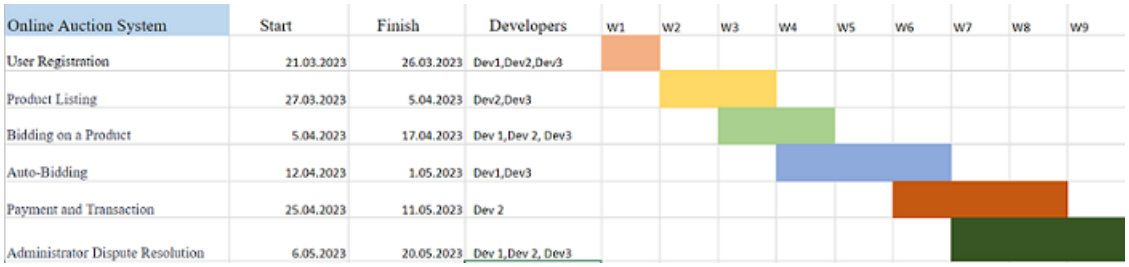


Figure 1: Gantt Chart

2 Requirements Analysis

2.1 1. Non-functional Requirements

2.1.1 Usability:

The user interface should be intuitive and user-friendly, allowing users to navigate, search, and place bids with ease. Clear instructions and help sections should be provided to assist users in understanding the auction process.

2.1.2 Reliability:

The system should be highly reliable, minimizing downtime and ensuring uninterrupted access for users. Data backup and recovery mechanisms should be in place to prevent data loss in the event of system failures.

2.1.3 Security:

The system should ensure secure user authentication, data privacy, and protection against unauthorized access. Secure payment gateways should be integrated to ensure safe and encrypted transactions.

2.2 2. Functional Requirements

2.2.1 Notifications and Messaging:

Users should receive notifications about bid status, outbid notifications, and auction closure notifications. A messaging system should be provided to facilitate communication between buyers and sellers for inquiries or negotiation purposes.

2.2.2 Administrator Backend:

Administrators should have user management capabilities, including account verification, monitoring, and handling user-related issues. Dispute resolution mechanisms should be in place for administrators to handle and resolve disputes between buyers and sellers. The backend system should generate reports and analytics on auction performance, user activity, and other key metrics.

2.2.3 User Registration and Authentication:

Users should be able to register for an account by providing necessary information. The system should verify and authenticate user credentials during login.

2.2.4 Product Listing and Management:

Sellers should be able to create product listings with detailed information, including title, description, images, starting bid price, and auction duration. Sellers should have the ability to update product information during the auction period. Users should be able to search for products based on categories, keywords, and apply filters.

3 Chapter 3

3.1 Use Case Diagram

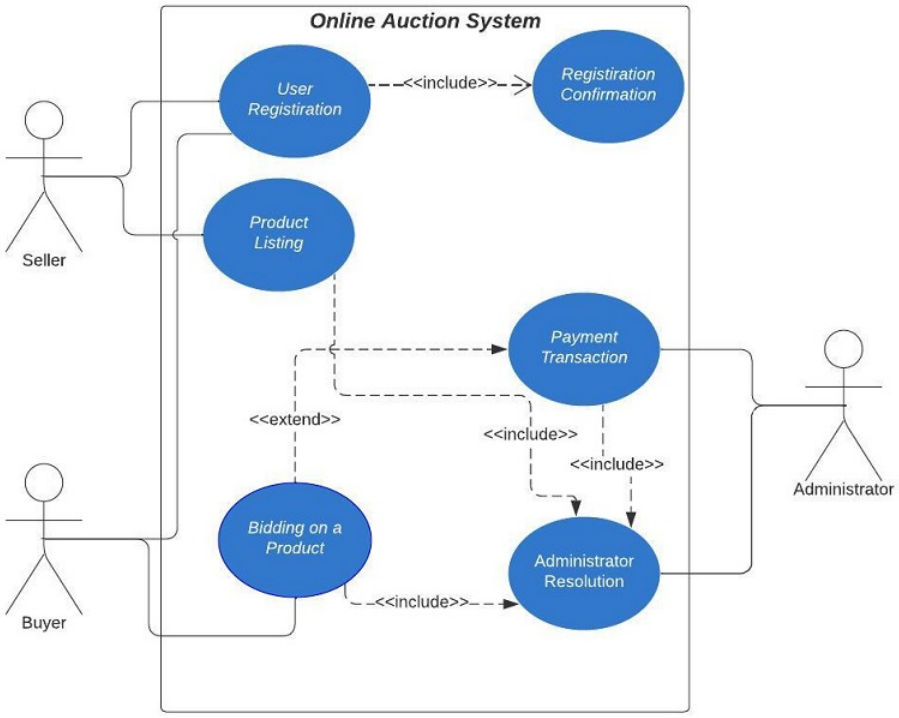
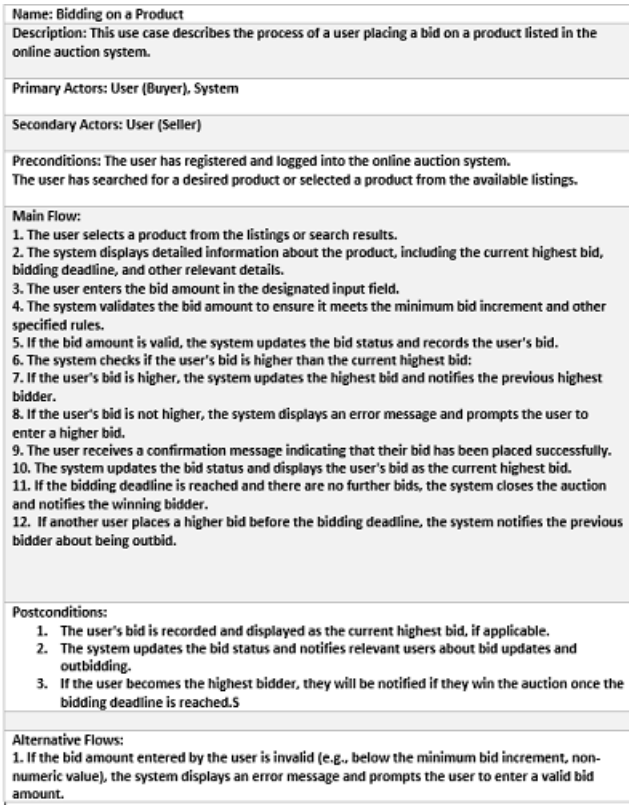


Figure 2: Use Case Diagram

3.2 Use-case Descriptors:

In the diagram, actors are seller, buyer and administrator. The seller and buyer must registirate first. Then registiration will direct to the confirmation. Then if it is seller he can list his product. And the product listing interacts with administrator resolution in case of any disagreement between the parties. Then if it is buyer, after he register he can bid on a product. If he buys the product it will transferred to

the payment section. Then the payment will completed. Again, in case of any disagreement between the parties the payment section and bid will transferred to administrator resolution system. The administrator is connected with payment transaction and administrator resolution. So he can check every step indirectly.



Name: Bidding on a Product

Description: This use case describes the process of a user placing a bid on a product listed in the online auction system.

Primary Actors: User (Buyer), System

Secondary Actors: User (Seller)

Preconditions: The user has registered and logged into the online auction system.
The user has searched for a desired product or selected a product from the available listings.

Main Flow:
1. The user selects a product from the listings or search results.
2. The system displays detailed information about the product, including the current highest bid, bidding deadline, and other relevant details.
3. The user enters the bid amount in the designated input field.
4. The system validates the bid amount to ensure it meets the minimum bid increment and other specified rules.
5. If the bid amount is valid, the system updates the bid status and records the user's bid.
6. The system checks if the user's bid is higher than the current highest bid:
7. If the user's bid is higher, the system updates the highest bid and notifies the previous highest bidder.
8. If the user's bid is not higher, the system displays an error message and prompts the user to enter a higher bid.
9. The user receives a confirmation message indicating that their bid has been placed successfully.
10. The system updates the bid status and displays the user's bid as the current highest bid.
11. If the bidding deadline is reached and there are no further bids, the system closes the auction and notifies the winning bidder.
12. If another user places a higher bid before the bidding deadline, the system notifies the previous bidder about being outbid.

Postconditions:
1. The user's bid is recorded and displayed as the current highest bid, if applicable.
2. The system updates the bid status and notifies relevant users about bid updates and outbidding.
3. If the user becomes the highest bidder, they will be notified if they win the auction once the bidding deadline is reached.$

Alternative Flows:
1. If the bid amount entered by the user is invalid (e.g., below the minimum bid increment, non-numeric value), the system displays an error message and prompts the user to enter a valid bid amount.

Figure 3: Use-Case: Bidding On A Product

3.3 Activity Diagram

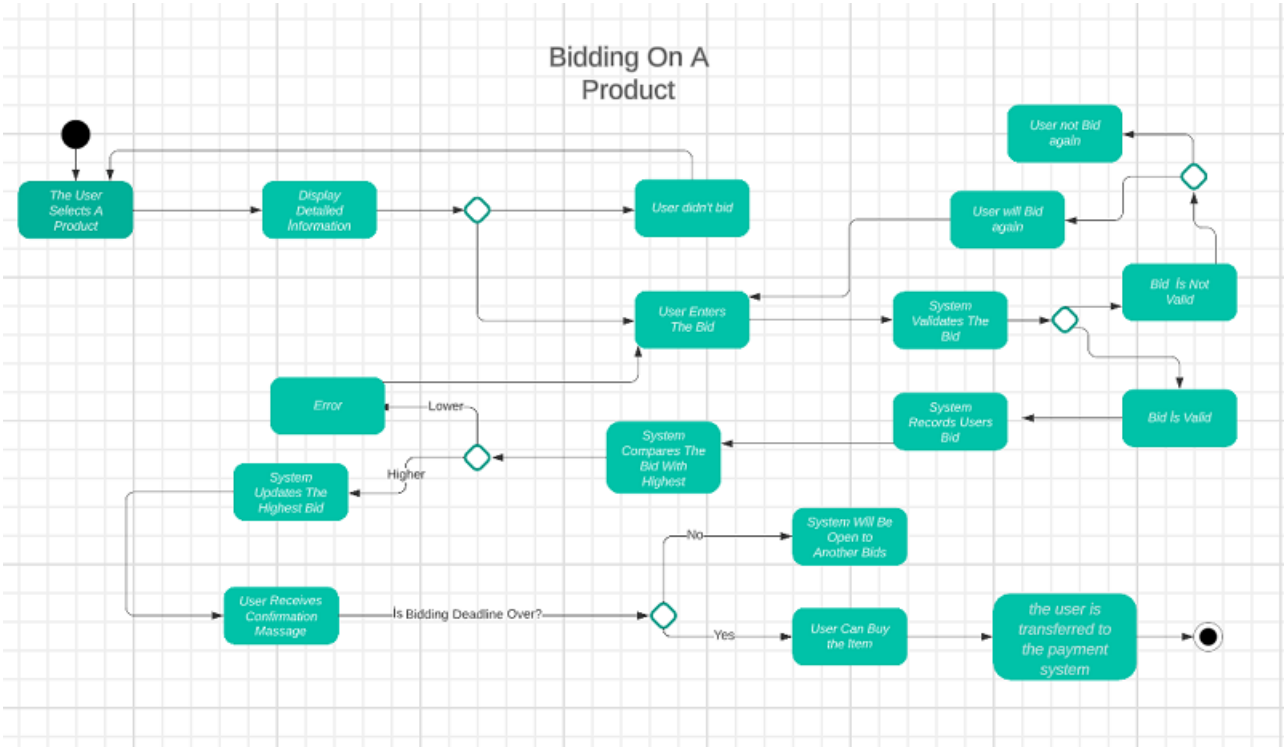


Figure 4: Activity Diagram

At the beginning, the user will select a product. Then the system will display detailed information to the user. İf the user doesn't want to bid go back to the first step. But if he enters the bid, system values the bid. Then decides it is valid or not. If its not, user will bid again or doesnt bid. If it is valid, the system records users bid and decides it is highest or not. If it is not highest system will error and the user is prompted to bid again. But if it is the highest, system sends the conformation massage to the user. And when deadline is over and it is still the highest bid, user can buy the item and transferred to the payment system. If its not, system will open for other bids.

4 Behavioral Modeling

4.1 1. Sequence diagram-1

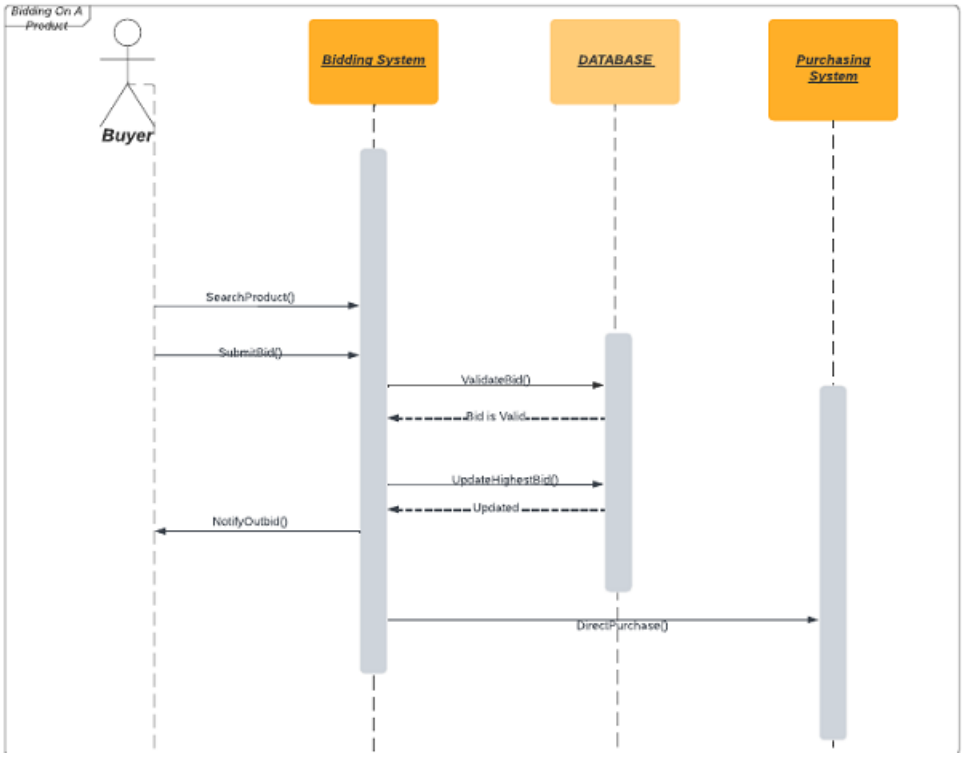


Figure 5: Sequence Diagram-1

In the diagram, the User actor interacts with the Selling System. The basic flow includes the user searching for a product or selecting from listings, entering a bid amount, and submitting the bid. The system validates the bid, and if it is valid, updates the bid status. If the bid is the highest, the system updates the highest bid and notifies other users. If the bid is outbid, the system sends an outbid notification to the user. If the bid is valid, system directs user to purchase system.

4.2 2. Sequence diagram-2

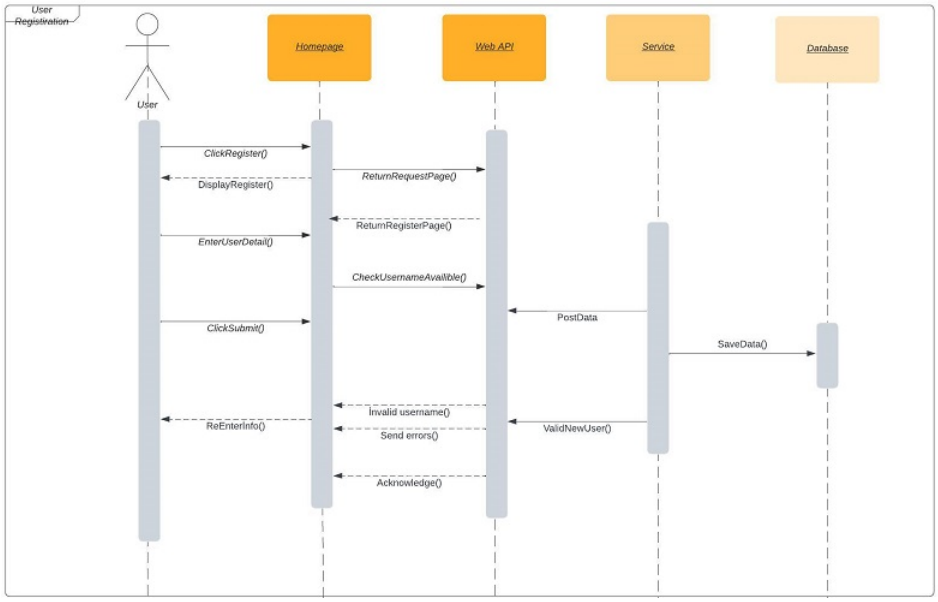


Figure 6: Sequence Diagram-2

In this diagram first user clicks the register button. Then homepage will display registiration page. In this step user will enter user details. Then user clicks submit button. Then WEB API checks username availible. If its not, directs homepage for invalid username or send errors. Then homepage tells user to reenter the submission. On the other hand, Service gives Web API datas and suggests valid usernames. Finally the data will save into the database.