# HOCHSCHULE FULDA
## UNIVERSITY OF APPLIED SCIENCES

**Global Distributed Software Development – AI5088 (WiSe24/25)**

**Master Team Project – Fall 2024**
## "Fulda Student Hub"

# Milestone 2

**November 21, 2024**

**Supervisor:**

**Prof. Dr. Todtenhöfer, Rainer**

| Team Members | | |
|---|---|---|
| **Member Name** | **Email** | **Role** |
| Huzaifa Khatri | Huzaifa.khatri@informatik.hs-fulda.de | Team Lead & Backend Affinity |
| Shafi Shaik | Shafi.shaik@informatik.hs-fulda.de | Github Master |
| Muhammad Hassan | Muhammad.hassan@informatik.hs-fulda.de | Backend Lead |
| Divyansh Dahiya | Divyansh.dahiya@informatik.hs-fulda.de | Backend Affinity |
| Devansh Negi | Devansh.negi@informatik.hs-fulda.de | Frontend Affinity |
| Aniq Ahmed | Aniq.ahmed@informatik.hs-fulda.de | Frontend Lead |

| Revision History | | | | |
|---|---|---|---|---|
| **Member Name** | **Date Submitted** | **Date Revised** | **Remarks** | **Version** |
| Huzaifa Khatri | 21.11.2024 | - | - | 1.0 |
| Huzaifa Khatri | 28.11.2024 | 27.11.2024 | Added missing components and updated some previous ones | 2.0 |

# Contents

# 1. Functional Requirements with Priority

(1 – must have, 2 – desire, 3 – opportunistic)

1. **(1) User Registration for Renters**
   Renters (students of Hochschule Fulda) can create an account using their university credentials for easy access to the platform. This simplifies the registration process and ensures secure user identification.

2. **(1) User Registration for Landlords**
   Landlords can register by submitting valid identification, enabling them to post property listings. This ensures that landlords are verified and can be trusted by renters.

3. **(3) Admin and Moderator Verification Access**
   Admins and moderators have the ability to verify user registrations and ensure that listings meet platform standards. This helps maintain the integrity of the platform by filtering unverified or inappropriate content.

4. **(1) Guest Access for Property Browsing**
   Non-registered users (guests) can browse available property listings without the need to create an account. This allows potential renters to explore options before committing to registration.

5. **(1) Property Listing Creation**
   Landlords can create detailed property listings by providing essential information, such as location, rent price, and availability. This function enables landlords to showcase their properties effectively.

6. **(1) Property Listing Editing and Deletion**
   Landlords can modify or remove their listings as needed. This gives landlords flexibility in managing their property details and ensuring that outdated information is promptly updated.

7. **(1) Property Photo and Detail Upload**
   Landlords can upload photos and detailed descriptions for each property, including room features, amenities, and neighborhood details. This enhances the attractiveness of the listing and provides a clear picture for potential renters.

8. **(2) Recommendation System for Listings**
   The platform uses a recommendation algorithm to suggest properties to renters based on their preferences, previous search history, and the freshness of listings. This helps renters discover suitable options more quickly.

9. **(1) Search Functionality for Property Listings**
   Renters can search properties based on various criteria such as location, rent, and availability. This streamlines the process of finding suitable listings for renters.

**10. (1) Filtering Options for Search Results**

Renters can apply multiple filters to narrow down search results based on specific preferences, such as pet-friendly, furnished, or proximity to public transportation. This helps renters find more personalized matches.

**11. (1) In-App Messaging System for Communication**

Renters and landlords can securely message each other within the platform to ask questions, clarify details, and schedule property viewings. This ensures secure, documented communication.

**12. (3) Digital Application Submission**

Renters can submit rental applications digitally through the platform, simplifying the process and reducing the need for paper documentation. Renters can also track the status of their application in real-time.

**13. (3) Digital Lease Signing**

Renters can review and digitally sign lease agreements on the platform. This feature eliminates the need for physical signatures, speeding up the rental process and maintaining security.

**14. (2) Review and Rating Submission**

Renters can leave reviews and ratings for landlords and properties, helping future renters make more informed decisions. This function promotes transparency and trust in the rental process.

**15. (1) Content Moderation by Admins**

Admins can edit or remove inappropriate listings, comments, or user-generated content to ensure the platform remains respectful and professional. This helps maintain a positive environment for all users.

**16. (2) Dispute Resolution Tools for Admins**

Admins have tools to handle disputes between landlords and renters, review complaints, and manage conflicts fairly. This ensures the platform runs smoothly and issues are addressed promptly.

**17. (1) Property Availability Tracking**

Landlords can mark properties as "available" or "unavailable" and update their status in real-time. Renters are notified of any changes to availability, reducing the risk of wasted time on outdated listings.

**18. (3) Lease Renewal Notifications**

Renters and landlords receive automatic notifications when a lease is approaching its renewal date. This feature ensures both parties are informed and can discuss terms well in advance.

**19. (3) Multi-Language Support**

The platform supports multiple languages to accommodate international students and

renters, improving accessibility and user experience. This expands the platform's usability to a wider audience.

20. **(3) Push Notifications for Important Updates**
Renters and landlords receive push notifications for critical updates such as new messages, lease reminders, or application status changes. This keeps users informed in real-time.

21. **(1) Customizable Rental Preferences for Renters**
Renters can set and save their preferred property filters and search criteria. This allows them to receive tailored results and notifications that match their specific needs.

22. **(1) Emergency Contact for Renters**
Renters can provide emergency contact information in case of urgent issues related to the property, ensuring prompt communication between renters, landlords, and emergency services.

23. **(1) Document Upload for Rental Applications**
Renters can upload required documents, such as identification or proof of income, directly through the platform. This streamlines the application process and ensures that landlords have all the necessary information.

24. **(1) Viewing History for Renters**
Renters can access a history of previously viewed properties and compare them. This helps renters stay organized and decide on the best options.

25. **(1) Property Description Translation**
Automatically translates property descriptions into the user's preferred language, ensuring clarity for non-native speakers. This feature is particularly useful for international students and renters.

26. **(1) Privacy Settings for Users**
Renters and landlords can manage their privacy settings, including who can view their profiles and contact them. This allows for control over personal information and communication preferences.

27. **(3) Bulk Property Listing Management for Landlords**
Landlord with multiple properties can manage all their listings in bulk, making it easier to update or remove several properties at once. This saves time and improves efficiency.

28. **(2) Notification System for Renters and Landlords**
Both renters and landlords receive push notifications and email alerts about important events, such as new listings matching their criteria or when a lease is due for renewal.

29. **(2) User Activity Tracking for Admins**
Admins can track user activity, including login history, messages, and listings viewed. This helps identify potential issues, monitor platform activity, and improve security.

**30. (1) Advanced Filtering for Renters**
   Renters can filter listings by specific features such as pet policies, type of heating system, or access to parking. This ensures renters find the property that best suits their needs.

**31. (2) Auction Listing Creation by Landlords**
   Landlords can create auction listings for properties they need to rent urgently. These auctions will allow students to bid on the property, setting a dynamic market-driven rental price.

**32. (2) Real-Time Bidding for Renters**
   Renters can place real-time bids on properties listed in the auction. This feature allows students to actively compete for properties that have urgent availability.

**33. (2) Live Auction Updates**
   Renters can view live updates on the current highest bid and the remaining time for the auction. This ensures transparency and allows students to adjust their bids accordingly.

**34. (2) Bidding Notifications for Renters**
   Renters receive push notifications if their bid is outbid or if the auction is nearing its end. This keeps students engaged and informed throughout the auction process.

## 1.1 List of Use Cases

1. Searching for a Property
2. Viewing Property Details and Photos
3. Contacting the Landlord for More Information or Scheduling a Viewing
4. Applying for Property
5. Signing the Lease Agreement Digitally
6. Leaving a Review for the Property
7. Creating a Property Listing
8. Accessing and Editing Property Listings
9. Responding to Tenant Inquiries
10. Filtering Applications to Find Suitable Tenants
11. Reviewing and Approving Maintenance Requests
12. Monitoring Listings for Inappropriate Content
13. Blocking Suspicious Users
14. Generating Monthly Site Analytics Reports
15. Encouraging Registration with Full Access Prompts
16. Scheduling Platform Maintenance and Notifications
17. Tracking Expired Listings for Removal

**1.2 List of Main Use Cases**

**1. Searching for a Property**

**Scenario:** Mia, the renter, is looking for a property that meets her requirements.

**Steps:**

1. Mia logs into the platform using her username and password.
2. She clicks on the "Search Properties" option on the main menu.
3. She enters her preferred criteria, including location near Hochschule Fulda or another specified area, a monthly budget cap that fits her finances, and additional requirements like furnished rooms, WiFi, heating, and laundry access.
4. Mia can further filter options by property type (studio, shared apartment, etc.) or lease duration.
5. The platform displays a list of properties that meet Mia's criteria.
6. Mia can save specific listings to her "Favorites" for easier comparison.
7. If there are too few results, Mia can modify her criteria, such as expanding the location radius or adjusting her rent limit.
8. Mia logs out after completing her search or leaves the results open for further browsing.


**2. Viewing Property Details and Photos**

**Scenario:** Mia wants to know more about a property before scheduling a visit.

**Steps:**

1. Mia clicks on one of the saved or recent property listings from her search results.
2. The platform shows a gallery of high-quality photos, allowing her to view each room and property features like the kitchen, bathroom, and common areas.
3. Mia reads a comprehensive property description, which includes dimensions and layout information, a full list of amenities, such as furniture, internet, heating, and key details about the neighborhood, such as nearby stores or public transportation.
4. She reviews specific rental terms, including move-in availability, security deposit, and lease duration.
5. If previous renters have left reviews, Mia reads them to assess the landlord's reliability and the property condition.
6. Mia decides if she wants to proceed with contacting the landlord or saving the listing for later.

### 3. Applying for Property

**Scenario:** After viewing the property, Mia decides to apply.

**Steps:**

1. Mia selects "Apply for this Property" from the listing page.
2. She provides details, including her name, student ID, contact information, and current address.
3. If required, Mia lists any rental history and references.
4. She uploads relevant documents, such as proof of student status, identification, and financial proof like bank statements or guarantor documents.
5. Mia reviews all information, ensuring accuracy, and submits her application.
6. The platform sends a confirmation that her application was successfully submitted.
7. Mia waits for a notification of acceptance, rejection, or a request for additional information from the landlord.


### 4. Leaving a Review for the Property

**Scenario:** After renting the property, Mia wants to share her experience.

**Steps:**

1. Mia logs in, navigates to her "Past Rentals," and selects the property to review.
2. She assigns a star rating based on overall satisfaction.
3. Mia writes a detailed review, covering topics such as landlord communication, property condition, neighborhood, and any issues she encountered.
4. She submits her review, which is visible to future prospective renters.
5. The platform sends Mia a confirmation, thanking her for her feedback.


### 5. Creating a Property Listing

**Scenario:** Mr. Schmidt, the landlord, wants to list a property for rent.

**Steps:**

1. Mr. Schmidt logs into his landlord account.
2. He clicks on "Create New Listing."
3. Mr. Schmidt fills out all required fields, including the exact location or approximate area, monthly rent and any additional costs, a detailed description highlighting property features, and a selection of available amenities like parking, internet, heating, and furniture.
4. He uploads high-quality photos showcasing the property's rooms and features.
5. Mr. Schmidt reviews all listing information for accuracy and submits it for publication.
6. The platform confirms that the listing is live, available for tenants to view.

## 6. Accessing and Editing Property Listings

**Scenario:** Mr. Schmidt wants to update an existing listing.

**Steps:**

1. Mr. Schmidt logs into his account.
2. He accesses the "My Listings" section to view his active properties.
3. Mr. Schmidt clicks on the specific property he wants to update.
4. He edits details such as rental price, availability, or updates new photos.
5. Once edits are complete, Mr. Schmidt saves the updated listing.
6. The platform confirms the listing is updated and live for tenant viewing.

## 7. Responding to Tenant Inquiries

**Scenario:** Mr. Schmidt receives an inquiry from a potential tenant.

**Steps:**

1. Mr. Schmidt receives a message notification from an interested tenant.
2. He reads the tenant's message and considers their questions.
3. Mr. Schmidt drafts a response, answering questions and, if applicable, proposing viewing times.
4. He sends the message through the platform.
5. If the tenant is interested, Mr. Schmidt schedules a viewing and adds it to his calendar.
6. Both Mr. Schmidt and the tenant receive a reminder for the scheduled viewing.

## 8. Filtering Applications to Find Suitable Tenants

**Scenario:** A property owner receives numerous applications for a rental property and needs to find the most suitable candidates.

**Steps:**

1. The owner logs into the platform and navigates to the "Applications Dashboard" for the listed property.
2. They apply filters such as "Student Status" and "Budget" to narrow down applications to those meeting their criteria.
3. The platform displays a refined list of applicants based on the chosen filters.
4. The owner reviews each applicant's profile, documents, and rental history.
5. They use the messaging feature to contact selected applicants for additional details or to schedule a viewing.
6. After selecting suitable candidates, the owner proceeds with scheduling viewings for the top applicants

**9. Encouraging Registration with Full Access Prompts**

**Scenario:** A non-registered user browsing properties receives prompts to register for full access to platform features.

**Steps:**

1. The guest opens the platform homepage and begins browsing available listings.
2. When they click on a listing, basic details like rent, location, and preview photos are visible.
3. On attempting to access additional details, a pop-up message encourages them to register for full access to messaging, favorites, and contact features.
4. Interested in the added features, the guest creates an account.
5. Once registered, they gain access to full listing details, messaging features, and the ability to save listings.

# 2. List of main data items and entities
**Data Entities**

| S.No. | Entities | Description |
|---|---|---|
| 1 | Owner | The individual or entity managing the property, responsible for creating listings, approving tenants, and handling maintenance requests. |
| 2 | Applicant | A potential tenant who expresses interest in renting a property by submitting an application to the owner for consideration. As per our use case, they would be limited to students at Hochschule Fulda. |
| 3 | Property | A real estate asset available for rent, including details like address, rent, and amenities. Properties are listed by owners and can be viewed by potential tenants. |
| 4 | Listing | An online advertisement for a property, providing information and images to attract student renters. Listings showcase available properties and key details. Interested applicants can apply to a listing. |
| 5 | Accommodation Request | Applicants can create their own Requests for searching accommodation which the Owners would be able to view. The applicants can include information and pictures about themselves and their requirements. |
| 6 | Lease | A formal rental agreement between the property owner and the applicant, detailing rental terms such as rent, duration, and obligations. Our platform would facilitate the process with a feature to sign a lease digitally. |
| 7 | Maintenance Request | A tenant's request for repairs or maintenance to address issues in the rented property, submitted to the owner. |
| 8 | Dashboard | A personalized interface for users (owners, applicants, or administrators) displaying key information such as property listings, applications, leases, and requests. |

| 10 | Trust Score | A score assigned to owners based on a number of factors including response time to a query, handling of maintenance requests and being reported by other users. |
|----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | Reported | A status indicating that a listing or owner has been flagged for review due to possible issues or violations, requiring further investigation by an administrator. |
| 12 | Bidding | A competitive process where potential tenants place offers on a property, with the highest or most favorable bid often winning the rental opportunity. |
| 13 | Chat | A messaging feature allowing direct communication between tenants and owners, facilitating questions, negotiations, and updates related to property rentals. |
| 14 | Portfolio | A collection of information and documents provided by a rental applicant, such as personal details, proof of financial means, and references, to demonstrate suitability for a property. |
| 15 | Verification | The process of validating an applicant's or property owner's information and credentials, ensuring authenticity and trustworthiness for secure rental transactions. Since applicants are limited to students their email addresses can be used for this. |
| 16 | Recommendation System | The algorithm to rank the order of the listings a user would see. It can be done on the basis of the following factors: trust score of the owner, overlapping between the user's searching criteria and the listing, and how old the listing is. |
| 17 | Admin | A high-level user with full control over the application, responsible for managing users, properties, reported content, and overall system settings to ensure smooth operation and compliance. |
| 18 | Moderator | A user with permissions to review and manage reported content, handle user disputes, and assist with maintaining community standards, but with limited access compared to an Admin. |
| 19 | Guest | An unregistered or limited-access user who can browse property listings but cannot interact fully with the system (e.g., no ability to apply for properties, chat, or submit requests). |

## Users and Privileges

| S.No. | User Type | Privileges |
|---|---|---|
| 1 | Applicant | 1. Create a User profile and upload photos and documents<br>2. Search and filter through the listings<br>3. Submit rental applications<br>4. Message the author of a listing<br>5. Review and sign a lease agreements<br>6. Submit and track a maintenance request<br>7. Add Favorites for listings<br>8. Create and manage Accommodation Requests |
| 2 | Owner | 1. Create, edit and delete their posted listings<br>2. Search and filter applications<br>3. Access a dashboard with details of all the properties they manage<br>4. Message the interested applicants<br>5. Track and sign a lease agreements<br>6. Review a maintenance request |
| 3 | Admin | 1. Able to manage and block users<br>2. Assist users with account recovery<br>3. Edit and Remove listings<br>4. Manage Moderators<br>5. Schedule application maintenance<br>6. Monitor site analytics and generate monthly/annual reports<br>7. Configure system settings<br>8. Manage in-app announcements and policy updates |
| 4 | Moderator | 1. Monitor listing description and images for inappropriate or inaccurate content |

| | | |
|---|---|---|
| | | 2. Able to report users and listings to the Admin |
| | | 3. Verifying listings through preliminary checks for inaccurate images or data |
| | | 4. Monitor expired listings |
| | | 5. Track suspicious activity |
| 5 | Guest | 1. Browse available properties with basic details and photos. |
| | | 2. Search and Filter Properties |
| | | 3. Access detailed property information, amenities, and availability. |
| | | 4. Receive prompts encouraging registration for full feature access. |

## 3. NEW: UI Mockups and Storyboards (high level only)

### 3.1 Use Case 1

**Welcome to Fulda Student Hub**  [Home] [Message] [Favorite] [Profile] [Logout]

Search for rooms... 🔍

**One room in a Shared apartment with private balcony.** ♡
Rent: 450 Euro    Area: 22 sq mtr
Posted by: Mr. Schidmt

**One room in a Shared apartment with private bathroom.** ♡
Rent: 300 Euro    Area: 16 sq mtr
Posted by: Mrs. Anna

**Private room in a studio apartment.** ♡
Rent: 700 Euro    Area: 30 sq mtr
Posted by: Mr. Roger

**One room in a Shared apartment.** ♡
Rent: 450 Euro    Area: 12 sq mtr
Posted by: Mr. Caeser

◀ [1] [2] [3] [4] [5] ▶

## 3.2 Use Case 2



**Reviews**

Roald Dahl posted...    ★★★★★
Mr. Schidmt is good person.
Room is fantastic
...more

**Requried Document**

1. **Enrollment Certificate**

2. **Residence Permit**

**Welcome to Fulda Student Hub**  [Home] [Message] [Favorite] [Profile] [Logout]

Beautiful room in a shared apartment, private balcony.

**Mr. Schidmt**
[Contact]  [Save]
[Apply for Property]

Size: 20m²  |  Total Rent: 450 €

Cost
Rent                    400 €
Extra Charges      20 €
Warm Rent           30 €
Transfer Agreement   N.A.

Address    Leipziger strasse
              30A 36039 Fulda
              Open maps

Available from    05.12.2024

[Reviews from tenants]

[Required Documents]

◀ ■ ■ ▶

[About]

**3.3 Use Case 3**

**Welcome to Fulda Student Hub** [Home] [Message] [Favorite] [Profile] [Logout]

Mr. Schmidt
Verified                **Beautiful room in a shared apartment, private balcony.**

**Application Form**
                                                                     Go Back

**Mr. Schidmt**               Please fill in your details.

[Contact]  [Save]            **Full Name:**        Mia Thomas

[Apply for Property]         **Student ID:**        16211890

                             **Contact Number:**    1630002893

Size: 20m²   Total Rent: 450 €   **Current Address:**  25, liepziger Str. 36037

Cost                         Please upload your documents.

Rent              400 €      **Enrollment Certificate:**  enrollment_cert.pdf    (Required)
Extra Charges     20 €
Warm Rent         30 €       **Government ID:**           passport_doc.pdf       (Required)
Transfer Agreement N.A.
                             **Financial Proof:**        [Upload]                (Required)

                             **Other Documents:**       [Upload]

**Address**   **Leipziger strasse 30A 36039 Fulda**
              Open maps       ☐ I agree that the details provided are authentic. If fail to certify the necessary actions are to be taken.

                             ☐ I agree with the Act 41 & 43 German resident law for residence for tenant.

**Available from**   05.12.2024

                                      [**Apply Now**]

---

**Welcome to Fulda Student Hub** [Home] [Message] [Favorite] [Profile] [Logout]

# You have successfully applied for the property.

[**Go Back to Searching**]

## 3.4 Accessing and Updating listing as Landlord

**Welcome to Fulda Student Hub**

### Login Page

Username Or Email:

Password:

Login

**Welcome to Fulda Student Hub** [Home] [Message] [My Ads] [Profile] [Logout]

**Welcome Mr Schmidt. What would you like to do today.**

| Create New Listing |
| My Listings |
| Raise an Issue |
| Register for Bidding |
| New Requests |
| View Tenants |
| Documents |
| View Past Tenants |
| See Your Properties |

**Welcome to Fulda Student Hub** [Home] [Message] [My Ads] [Profile] [Logout]

## My Listings

### Private Room near ZOB Fulda with balcony.
Active

Welcome to my apartment. This is a room for 1 person who prefers privacy. The room is 24 square meters and comes with a balcony. There is strictly no pet policy. In case of emotional support pets like dinosaurs, a legal permit is required.

34A,
Stadtscloss,
36037 Fulda

[Update]      [Delete]

Posted 1 month ago

### Sharing Apartment near Hochschule Fulda.
Active

Welcome to my apartment. This is a room for 1 person who prefers privacy. The room is 24 square meters and comes with a balcony. There is strictly no pet policy. In case of emotional support pets like dinosaurs, a legal permit is required.

35A,
Hochschule
Fulda, 36037
Fulda

[Update]      [Delete]

Posted 2 month ago

[Go Back]

[Try our Bidding System]

---

**Welcome to Fulda Student Hub** [Home] [Message] [My Ads] [Profile] [Logout]

# Thank You.
# Your Ad will be live shortly.

[Go Back to Listing]

# 4. NEW High-level Architecture and technologies used

**4.1 Technology Stack and High Level Architecture Diagram**

**Hosting:** Amazon Web Services
**Back-end Framework:** Node.Js
**Back-end Language:** Javascript
**Front-end Library:** React 18
**Front-end Language:** Javascript, HTML5, CSS3, Bootstrap
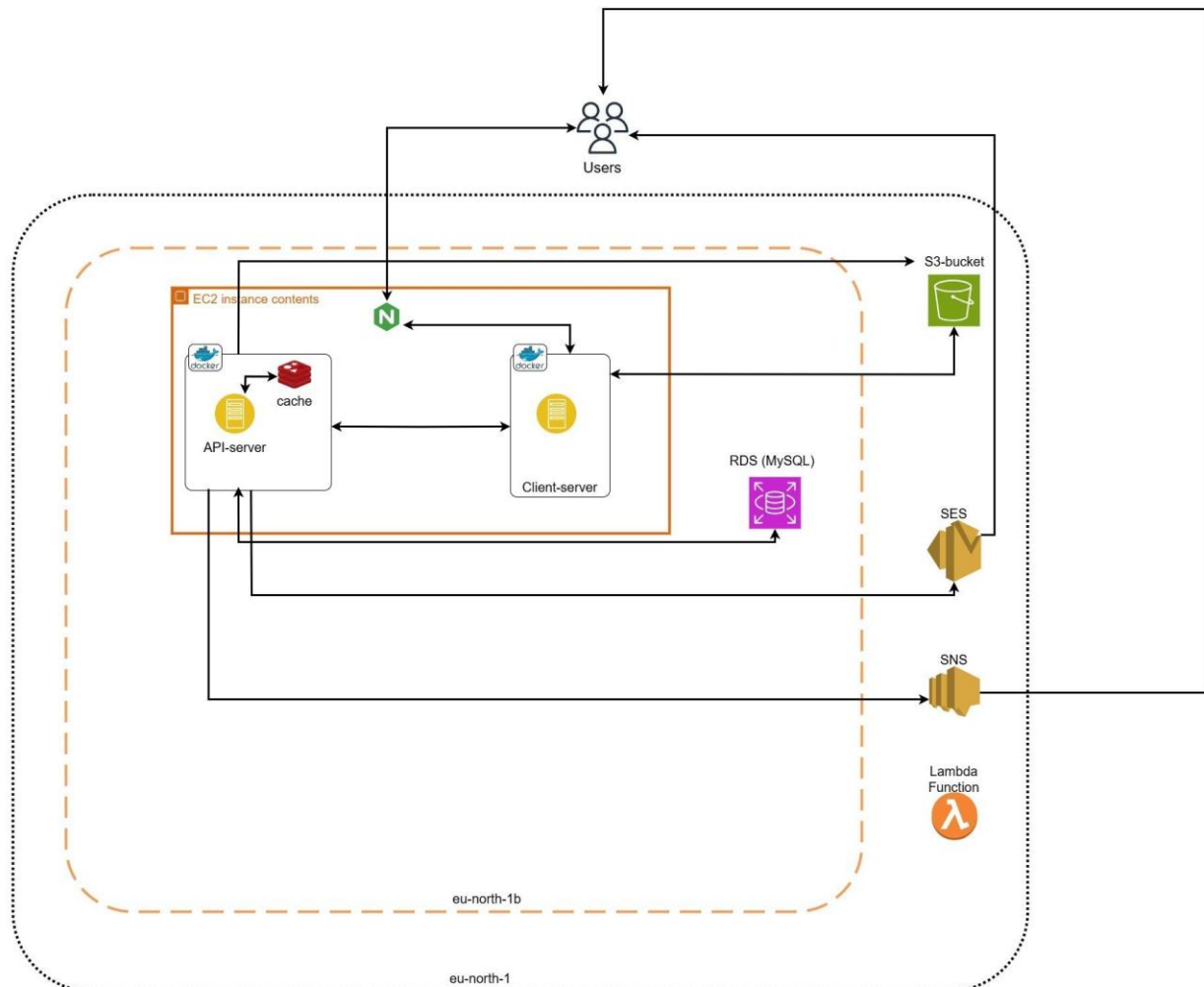**Code Editor:** Visual Studio Code
**Target Web browsers:** Google Chrome, Mozilla Firefox,
**Database:** MySQL
**Socket Framework:** Socket.io
**FaaS:** AWS Lambda
**Deployment Support:** Docker

**4.2 Database Organization**

**(PK = Primary Key, FK = Foreign Key)**

1. **User**
   - **PK:** user_id
   - Email
   - Password
   - user_type
   - created_at
   - updated_at

2. **Landlord**
   - **PK:** landlord_id
   - name
   - phone_number
   - address
   - trust_score
   - profile_picture
   - created_at
   - updated_at

3. **Student**
   - **PK:** student_id
   - first_name
   - last_name
   - student_id_number
   - profile_picture
   - university
   - created_at
   - updated_at

4. **Property**
   - **PK:** property_id
   - **FK:** landlord_id [Landlord.landlord_id]
   - address
   - rent
   - amenities
   - created_at
   - updated_at

5. **Listing**
   - **PK:** listing_id
   - **FK:** property_id [Property.property_id]
   - title
   - description
   - images
   - status
   - created_at
   - updated_at

6. **Application**
   - **PK:** application_id
   - **FK:** listing_id [Listing.listing_id]
   - **FK:** student_id [Student.student_id]
   - status
   - message
   - created_at
   - updated_at

7. **Accommodation_Request**
   - **PK:** request_id
   - **FK:** student_id [Student.student_id]
   - details
   - images
   - created_at
   - updated_at

8. **Lease**
   - **PK:** lease_id
   - **FK:** student_id [Student.student_id]
   - **FK:** property_id [Property.property_id]
   - start_date
   - end_date
   - rent_amount
   - status
   - created_at
   - updated_at

### 9. Maintenance_Request
- **PK:** request_id
- **FK:** lease_id [Lease.lease_id]
- description
- status
- created_at
- updated_at

### 10. Report
- **PK:** report_id
- **FK:** reported_by [User.user_id]
- **FK:** target_id [User.user_id]
- reason
- status
- created_at
- updated_at

### 11. Conversation
- **PK:** conversation_id
- **FK:** landlord_id [Landlord.landlord_id]
- **FK:** student_id [Student.student_id]
- created_at
- updated_at

### 12. Message
- **PK:** message_id
- **FK:** conversation_id [Conversation.conversation_id]
- **FK:** sender_id [User.user_id]
- content
- created_at

### 13. Portfolio
- **PK:** portfolio_id
- **FK:** student_id [Student.student_id]
- document_url
- created_at
- updated_at

## 14. Bidding
- **PK:** bid_id
- **FK:** listing_id [Listing.listing_id]
- **FK:** student_id [Student.student_id]
- bid_amount
- status
- created_at
- updated_at

## 15. Verification
- **PK:** verification_id
- **FK:** user_id [User.user_id]
- status
- created_at
- updated_at

**4.3 API Endpoints**

1. **Authentication and Authorization**
   - POST /auth/login
     i. Logs in a user by verifying their credentials (e.g., email and password) and returns an access token for further authenticated requests.
   - POST /auth/register
     i. Allows a new user to create an account by submitting necessary details such as name, email, and password.
   - POST /auth/logout
     i. Logs out the current user by invalidating their session or token.
   - POST /auth/refresh-token
     i. Generates a new access token using a valid refresh token, ensuring continued authentication without requiring login


2. **Resources: All the below resources can have GET, POST, PATCH, PUT and DELETE endpoints, based on the requirements.**
   - /users: Retrieves all types of users. Can be used to query for a particular id.
     i. /users/profile: Retrieves the profile of the currently authenticated user.
     ii. /users/roles: Retrieves a list of roles available for users (e.g., admin, applicant, owner, moderator).
   - /properties: Retrieves a list of all properties, with options for filtering (e.g., location, price, type)
   - /listings: Retrieves a list of all property listings, including their availability status.
     i. /listings/recommended: Returns a list of recommended property listings based on user preferences or past behavior.
     ii. /listings/status: Retrieves all available statuses for listings (e.g., available, sold, under contract)
   - /bookings: Retrieves all scheduled property viewings or appointments for both owners and applicants.
     i. /bookings/properties/:id: Retrieves bookings related to a specific property.
   - /favorites: Retrieves a list of all properties marked as "favorites" by the current user.
   - /applications: Retrieves all the applications submitted by the current user.
   - /accommodation-requests: Retrieves all the accommodation requests posted by the current user.
   - /documents: Retrieves a list of documents uploaded by the current user.


3. **Search**
   - /search/properties: Searches for properties based on user-specified filters.
   - /search/users: Searches for users by name or role (e.g., landlords, tenants)

4. **System and Configuration**
    - /settings: Retrieves system-wide or user-specific settings. For the Admin, it would also show app-wide settings.
    - /health: Checks the health status of the API to ensure the system is operational.

5. **Miscellaneous**
    - /analytics/properties: Retrieves analytics for properties, such as views, inquiries, or sales trends.
    - /analytics/applications: Retrieves analytics for the applications applied and response received by a student
    - /messages: Retrieves a list of all messages of the current user
    - /notifications: Retrieves all notifications for the current user (e.g., appointment reminders, offers).
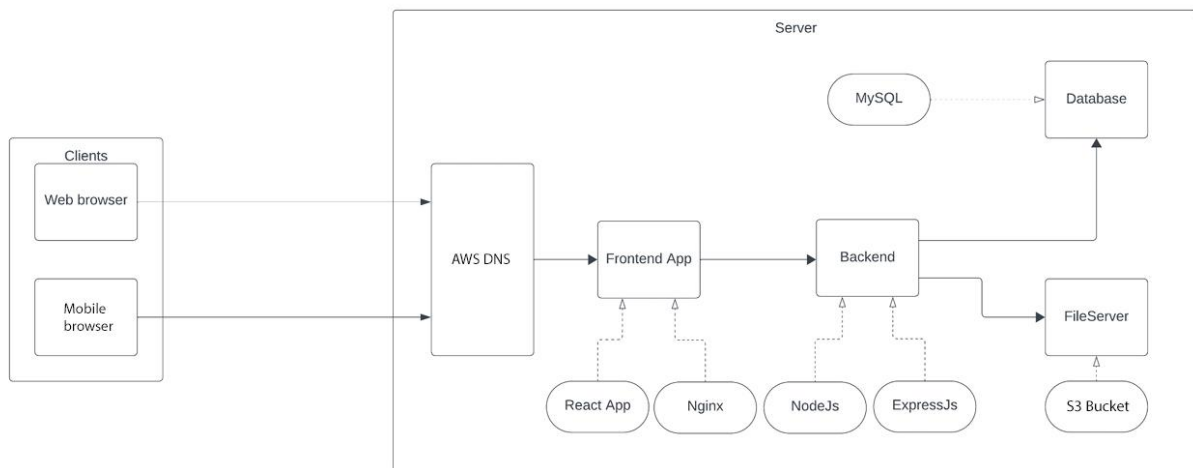
**Guidelines for the above endpoints**

- Pagination will be included for endpoints returning large datasets (e.g., GET /users?page=1&limit=10).
- JWT Authentication would be added for sensitive endpoints to improve security.

# 5. High Level UML Diagrams

## 5.1 Class Diagram
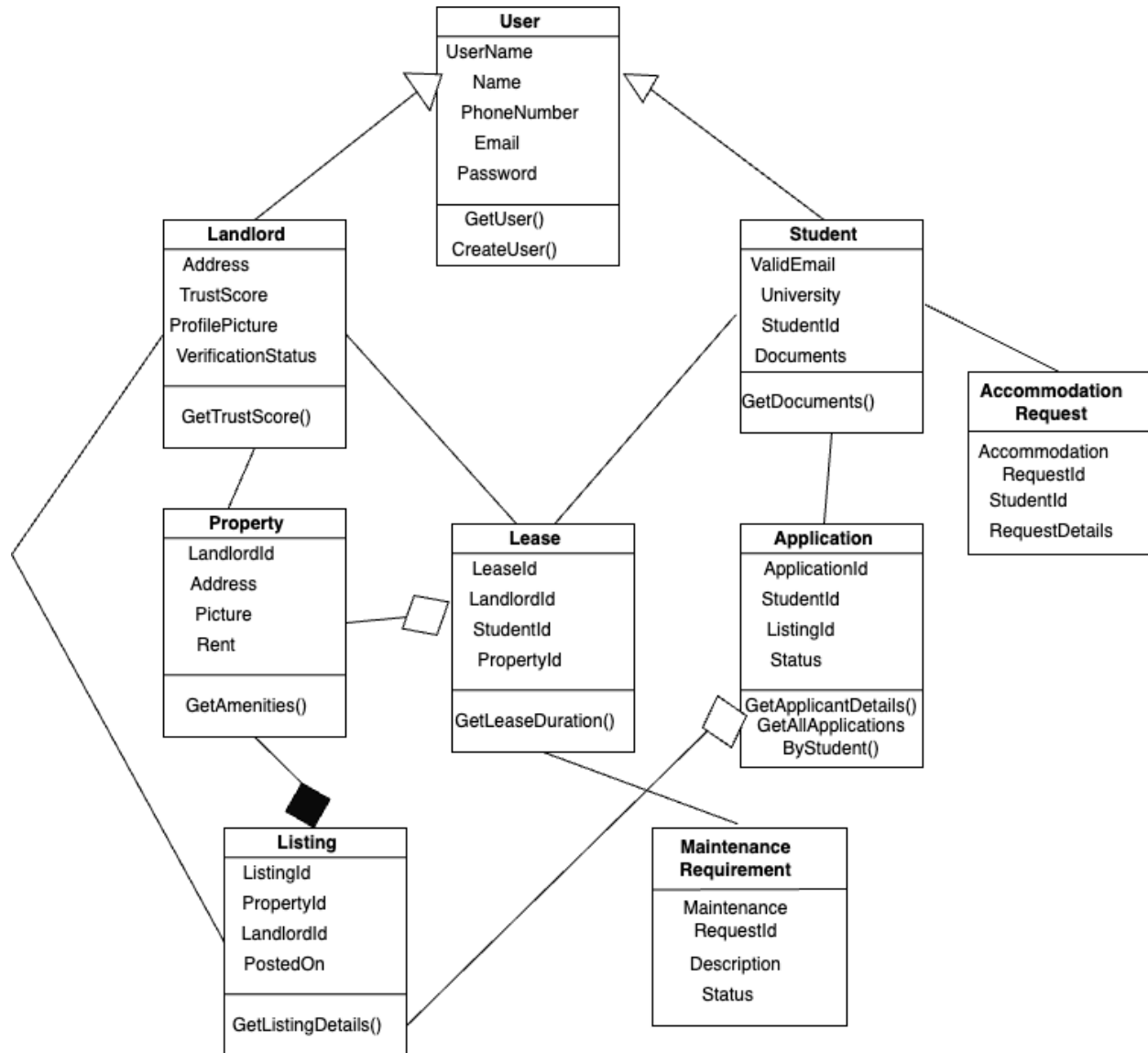
## 5.2 Deployment Diagram

# 6. Key Risks

**1. Skills Risks**:
While team members have prior experience in software development through academic projects and internships, there is a risk that our collective expertise may not fully cover all aspects of the chosen solution. To mitigate this, team members will actively acquire the required skills, including programming languages and frameworks, through online resources and knowledge sharing within the group.

**2. Schedule Risks**:
Improper estimation of tasks and deadlines can result in schedule risks, potentially leading to project delays or failure. These risks arise from inaccurate deadline predictions and insufficient resource tracking. To manage this, the team will rely on detailed planning documents, including specifications and project plans, breaking them into smaller components. Regular task analysis will help identify critical paths and dependencies for better schedule management.

**3. Technical Risks**:
The use of outdated or poorly maintained frameworks, plugins, or dependencies may affect the project's functionality and performance. To mitigate these risks, the team will use modern, well-maintained frameworks, tools, and plugins while adhering to official documentation to ensure consistency and reduce maintenance challenges.

**4. Teamwork Risks**:
Shared responsibilities among team members may lead to some individuals taking on extra work to compensate for those who underperform, potentially creating friction within the group. To prevent this, task responsibilities and individual accountability will be clearly defined to ensure equal contributions and maintain team cohesion.

**5. Legal/Content Risks**:
Incorporating advanced technologies requires proper acknowledgment of authors and developers of APIs, plugins, or software snippets to avoid copyright issues. To address this, the team will engage with open-source communities whenever possible and provide proper credits and acknowledgments as required.

# 7. Project Management

This document has been compiled and completed as a result of our daily meetings and contributions. We are using WhatsApp and Slack for our daily conversations; Google meet for our team meetings and Google documents for contributions. GitHub will be used as our project management tool and tasks will be divided as per the previous knowledge and experience of our team members. A deadline will be assigned to each task, and it will be easier to track which tasks are currently in progress, which of them have been completed and which are pending. This will help us achieve the entire project work with ease.