Software Requirements Analysis and Design

1.0 Introduction

The Introduction section provides an overview of the system using software requirements analysis and design for the scope of the system.

1.1 Purpose

This document describes the high level software requirements for the system. It describes the what, not how, of the capabilities of the system for the intended audiences.

The Bestimator web app will function as a tool for users to easily calculate the required materials for a specific construction job and then source the materials by nearby location, resulting in a streamlined estimate or quote. This will be valuable for both construction contractors and DIY homeowners as it will produce reliably accurate calculations and save them time by easing the process of finding and price-checking materials.

1.2 Scope

This explains what the proposed system will and will not do. Describe relevant benefits, objectives and goals. The description of scope should be consistent with the Project Plan.

First, a user must register or log into the app and then create a new project or they can view an existing project. When creating a new project, they will select the type of construction job (if available), such as drywalling, and then input each of the dimensions of the intended workspace. The app will calculate and then output the required amount of material.

Then, the app will search from a designated location the nearest suppliers of the listed materials and provide the name and address of the supplier, as well as the price per unit - saving the users time by easing the process of finding and price-checking materials, making the cost estimation and sourcing of a job quite simple.

Bestimator includes the calculation of required materials, material sourcing and cost estimation from a set list of materials . It will therefore aid in preparing a quote to be sent to the client. The design of the website will be responsive and have a user-friendly interface.

The Bestimator app will not be native to mobile devices at this time. There will not be integration with accounting software or CRM capabilities. It will not provide real-time communication between the contractor and their client.

2.0 System Overview

2.1 Project Perspective

Bestimator is a new, standalone web application developed to streamline the construction estimation process. It addresses the need for accuracy and efficiency in project estimation by automating calculations and optimizing material sourcing. This tool is especially useful for contractors who rely on precise estimates to minimize financial risk and increase workflow efficiency.

2.2 System Context

Bestimator fits within the construction project management domain, focusing on cost estimation for project planning. By automating material and labor cost calculations, it helps contractors provide more accurate, data-driven bids.

2.3 General Constraints

- Timeline: The project runs from September 12, 2024 to March 28, 2025, with specific milestones to achieve each phase
- Platform: Bestimator will be a web-based application with a responsive design

2.4 Assumptions and Dependencies

Assumptions

- Users have access to a stable internet connection
- Users possess a basic knowledge of project estimation
- Users have access to desktop or tablet device with sufficient screen size
- Contractors are willing to adopt new technology

Dependencies

Internal Dependencies

- Successful UI/UX and backend integration
- Successful completion of back-end API development
- Maintaining organized code repository

External Dependencies

- Access to reliable third-party APIs
- Willingness of established vendors to entertain Bestimator's service offerings
- Market willingness to adopt new technology

3.0 Functional Requirements

3.1 Functional Requirements/Features

User Registration

· Bestimator will take in the user's information and store it in a database.
· Inputs include the following input fields: first name, last name, password, phone number, email, company address.
· Email is validated and checked for uniqueness and proper formatting. Passwords are encrypted and stored securely.
· Confirmation email sent to newly registered users. Error message shown to user in event of incorrect format or user already existing.

Create New Project

· Users can create many different projects concurrently and update them later as desired.
· The user will need to input the project name, description, dimensions of project, type of material, location of build
· Validate that numbers are in correct format, and location is an actual place. Materials are sourced via API
· Returns an estimate based on materials and dimensions provided. Relevant error messages with caught exceptions are displayed.

Efficient Material Sourcing

· Bestimator will automatically source the closest materials crossed with the best prices and calculate an estimate based on that. This leverages cost efficiency and convenience which is the primary focus of the app.
· As part of the 'Create New Project' functionality, material sourcing will require type of material, location of build, and project dimensions.
· API is queried for closest and cheapest vendor, estimate is then processed based on those values. Inputs are validated as positive and not zero, same with dimensions.

- Price and distance for the estimate are returned to the user. Error handling messages are displayed if necessary.

3.2 Use Cases

3.2.1 Use Case #1: Register

Description

- The system allows a new user to register an account by providing necessary credentials

Actors

- User

Steps

- User navigates to the registration page
- User inputs email address
- System validates input data
- System creates new user account and provides user with confirmation

3.2.2 Use Case #2: Login

Description

- The system allows an existing user to log into the application

Actors

- User

Steps

- User navigates to the login page
- User inputs email address
- System validates input data
- System sends email for verification (login code)
- User enters code to log in

3.2.3 Use Case #3: Create New Project

Description

- The system allows a registered user to create a new project

Actors

- Bestimator, User

Steps

- User selects “Create New Project”
- User inputs project details, including necessary measurements
- System validates input data, makes necessary calculations, and saves project details
- System displays confirmation message to user

3.2.4 Use Case #4: View Existing Project

Description

- The system allows a registered user to view an existing project

Actors

- Bestimator, User

Steps

- User selects “View Existing Project”
- System displays a list of existing projects
- User selects project from the list
- System displays detailed information about the selected project

3.2.5 Use Case #5: Calculate Required Material

Description

- The system calculates the required materials for a project, based on user input

Actors

- Bestimator

Steps

- User inputs project details and measurements
- System processes data and performs calculations
- System displays required materials and quantities

3.2.6 Use Case #6: Output Required Material

Description

- The system outputs the calculated material results for the user

Actors

- Bestimator

Steps

- User selects “Output Required Materials”
- System generates a downloadable or printable report
- User views or saves report

3.2.7 Use Case #7: Find Nearest Supplier

Description

- The system identifies the nearest supplier based on material requirements and location

Actors

- Supplier, Bestimator

Steps

- System searches for nearby suppliers based on requirements and distance
- System displays a list of nearby suppliers sorted by distance

3.2.8 Use Case #8: Receive Estimate

Description

- The system allows a client to receive a cost estimate for a project

Actors

- Bestimator, Client

Steps

- User requests estimate by submitting necessary project details
- System generates an estimate based on user input
- System provides user with cost estimate to be sent to client
- User sends finalized estimate to client

3.2.9 Use Case #9: Aid in Preparing an Estimate

Description

- The system assists users in preparing detailed estimates

Actors

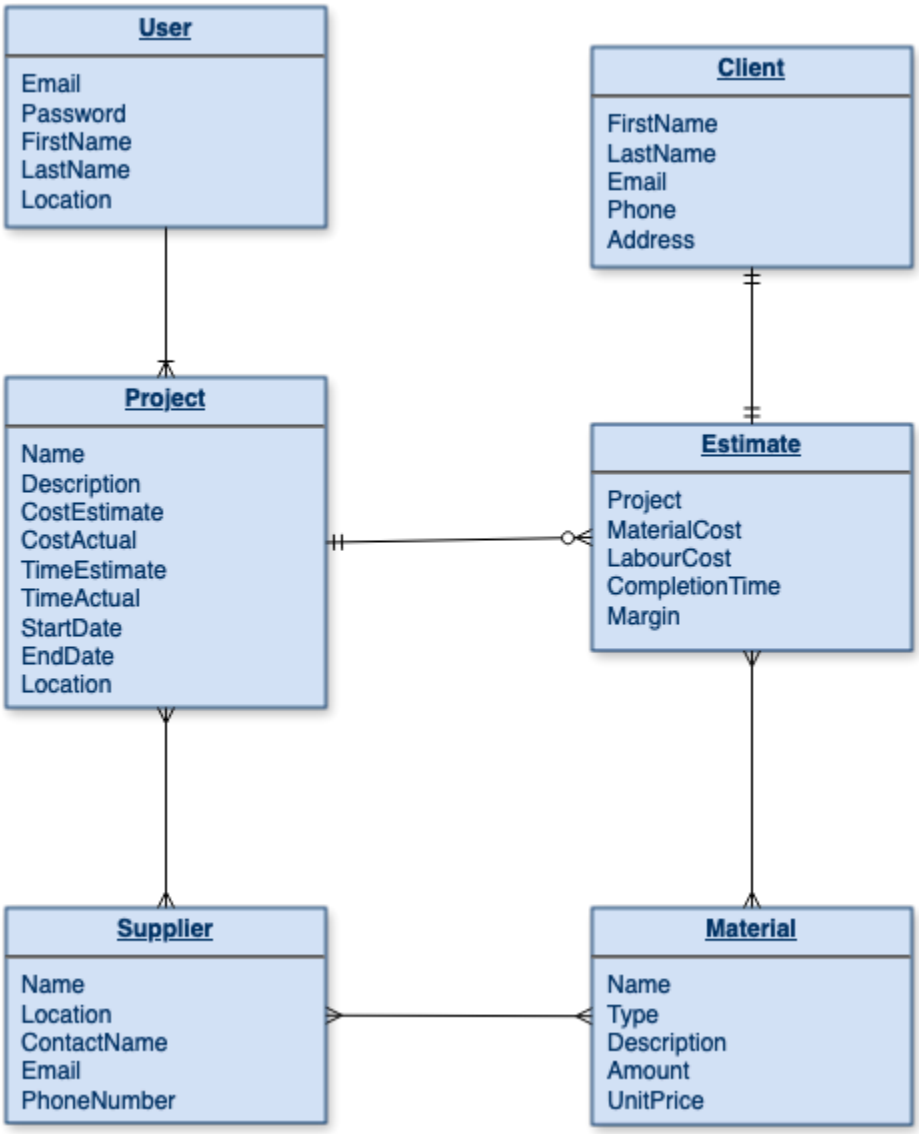
- Bestimator

Steps

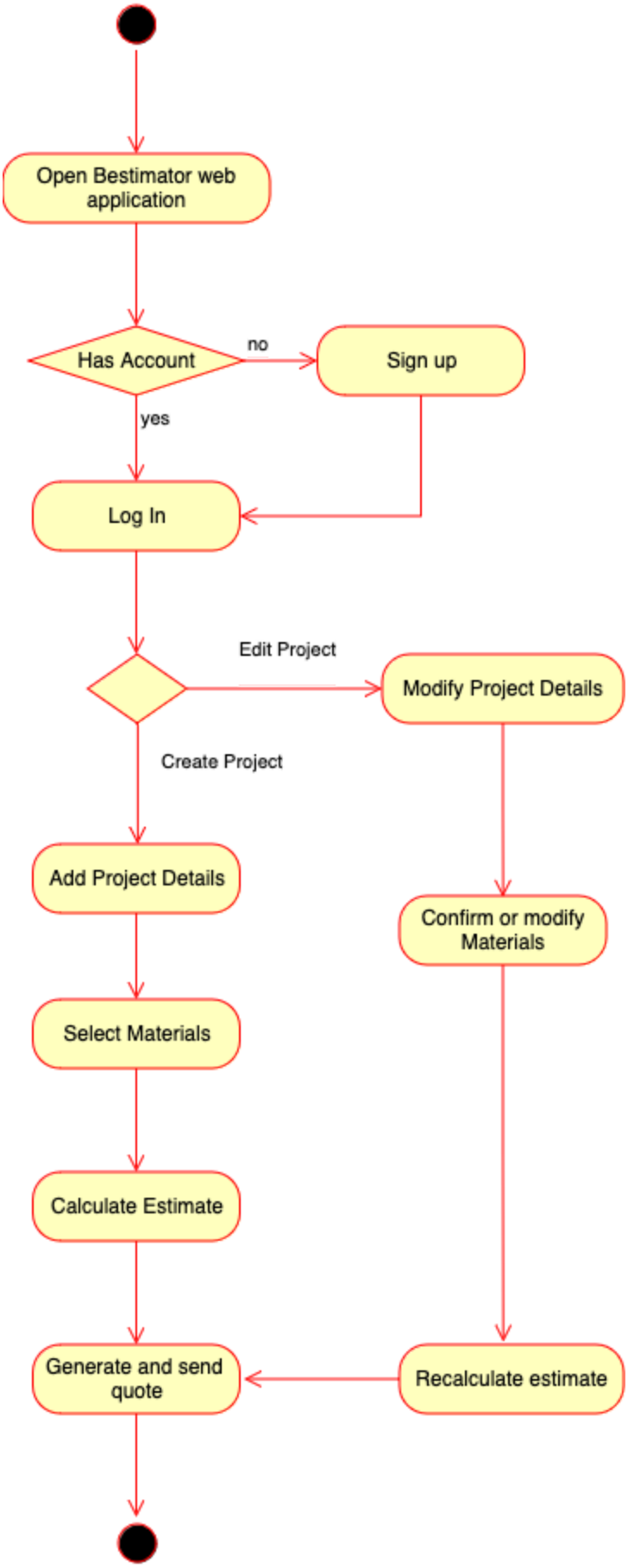
- User inputs project requirements, including measurements
- System generates detailed estimate
- User reviews and adjusts estimate as required
- System outputs finalized estimate to user

3.3 Data Modelling and Analysis

- Normalized Data Model Diagram

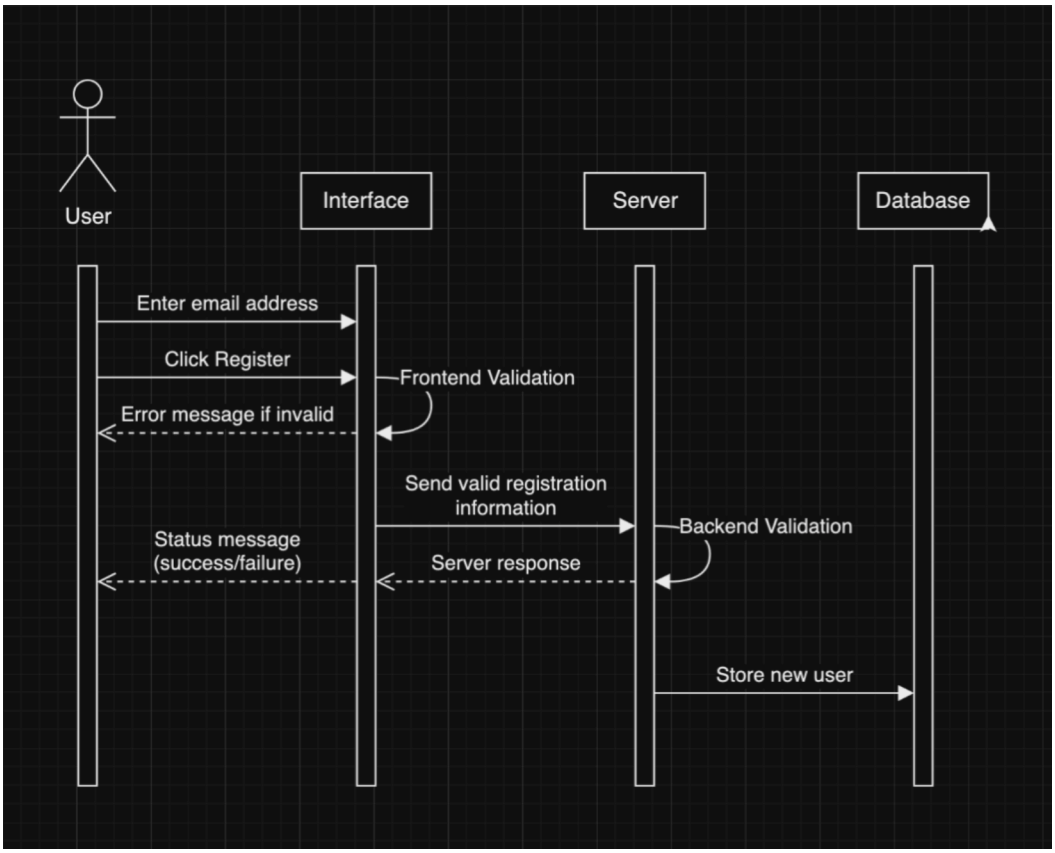


- Activity Diagram

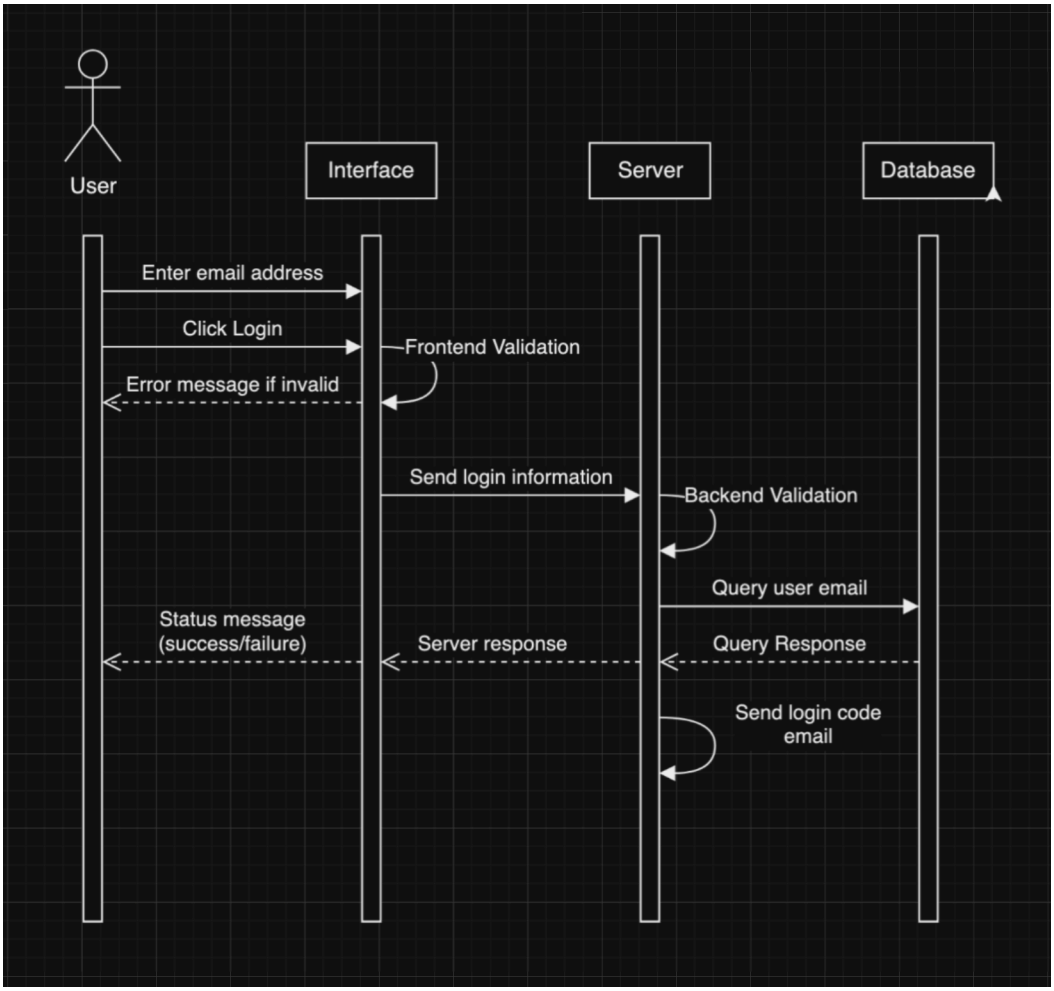

Open Bestimator web application
Has Account
no
Sign up
yes
Log In
Edit Project
Modify Project Details
Create Project
Add Project Details
Confirm or modify Materials
Select Materials
Calculate Estimate
Generate and send quote
Recalculate estimate

· Sequence Diagrams

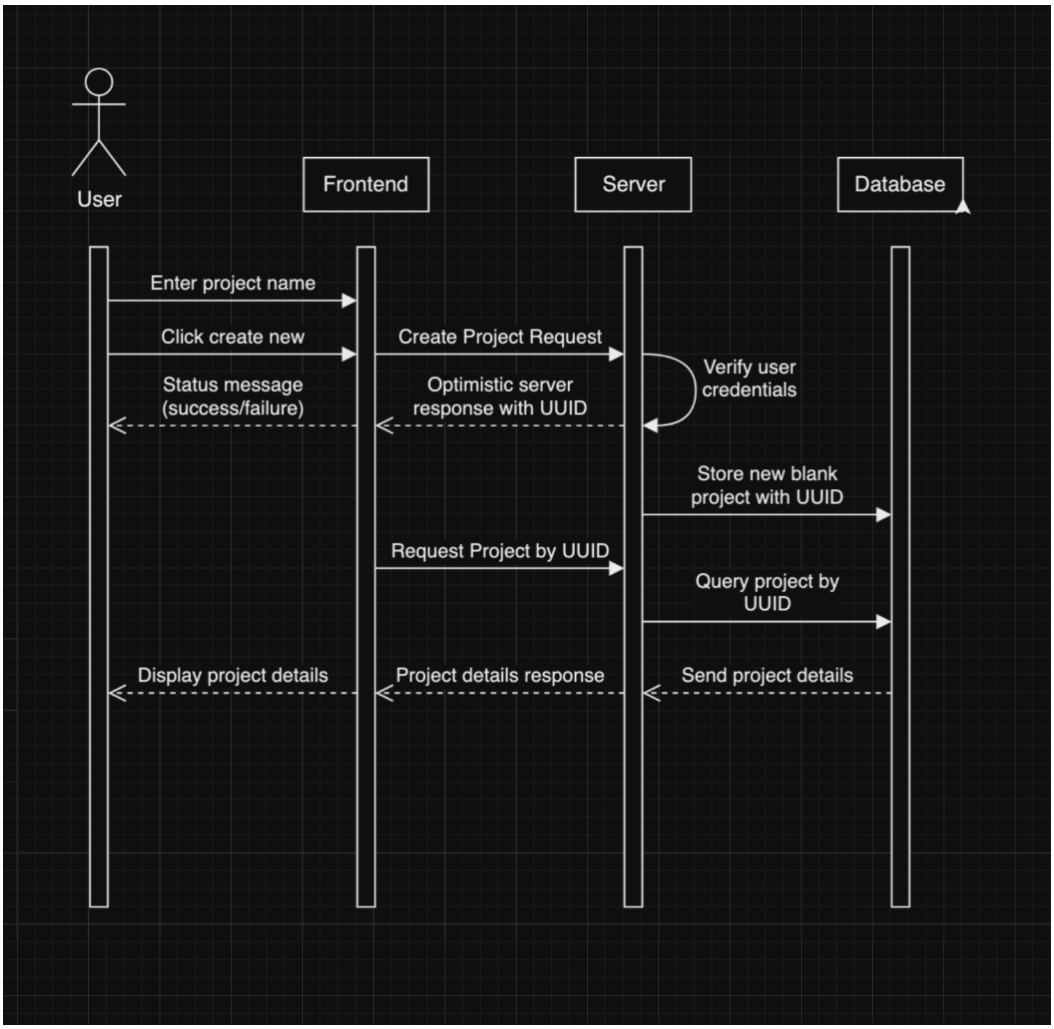
User Registration



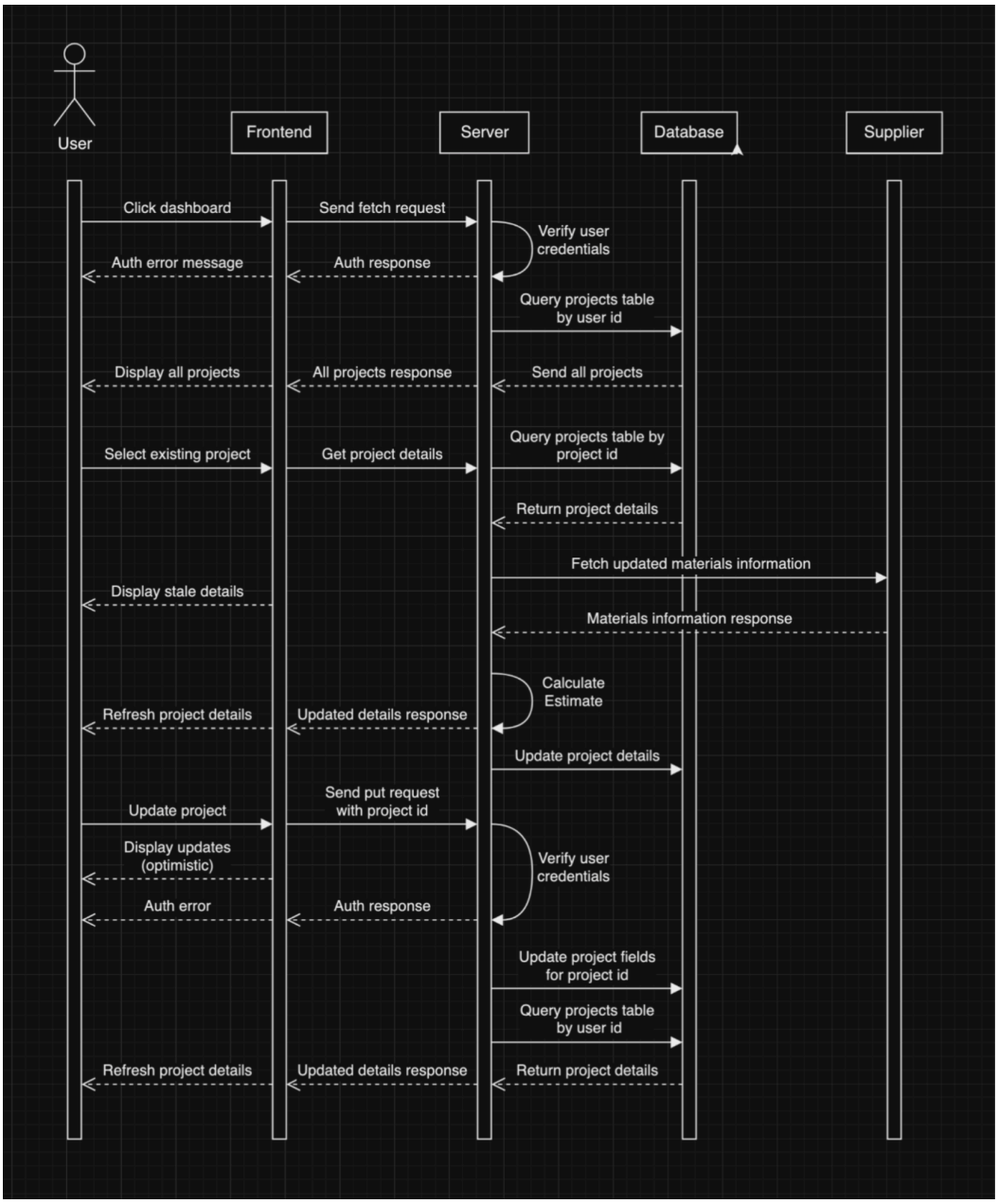
User Login



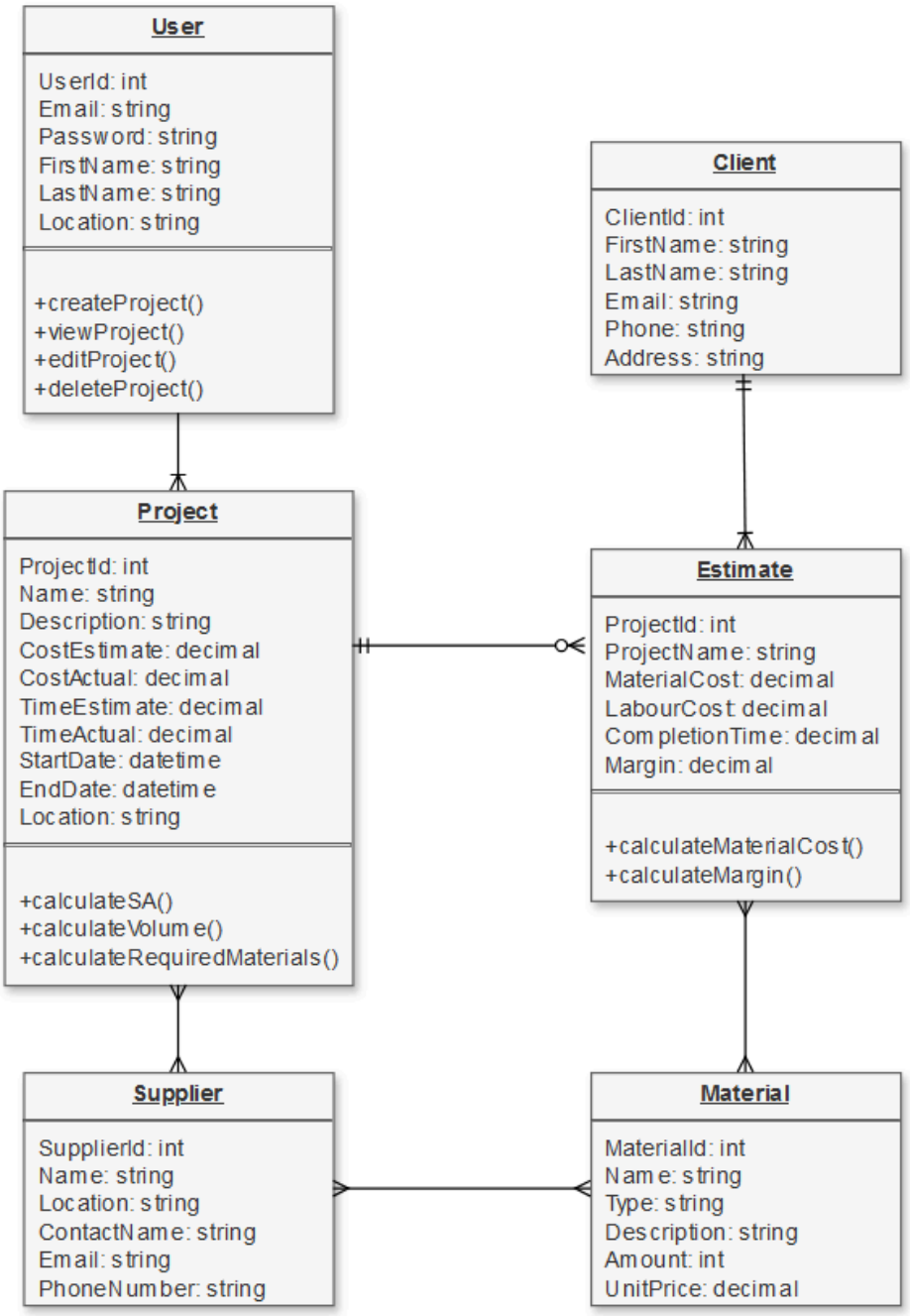
Create new project



Edit existing project

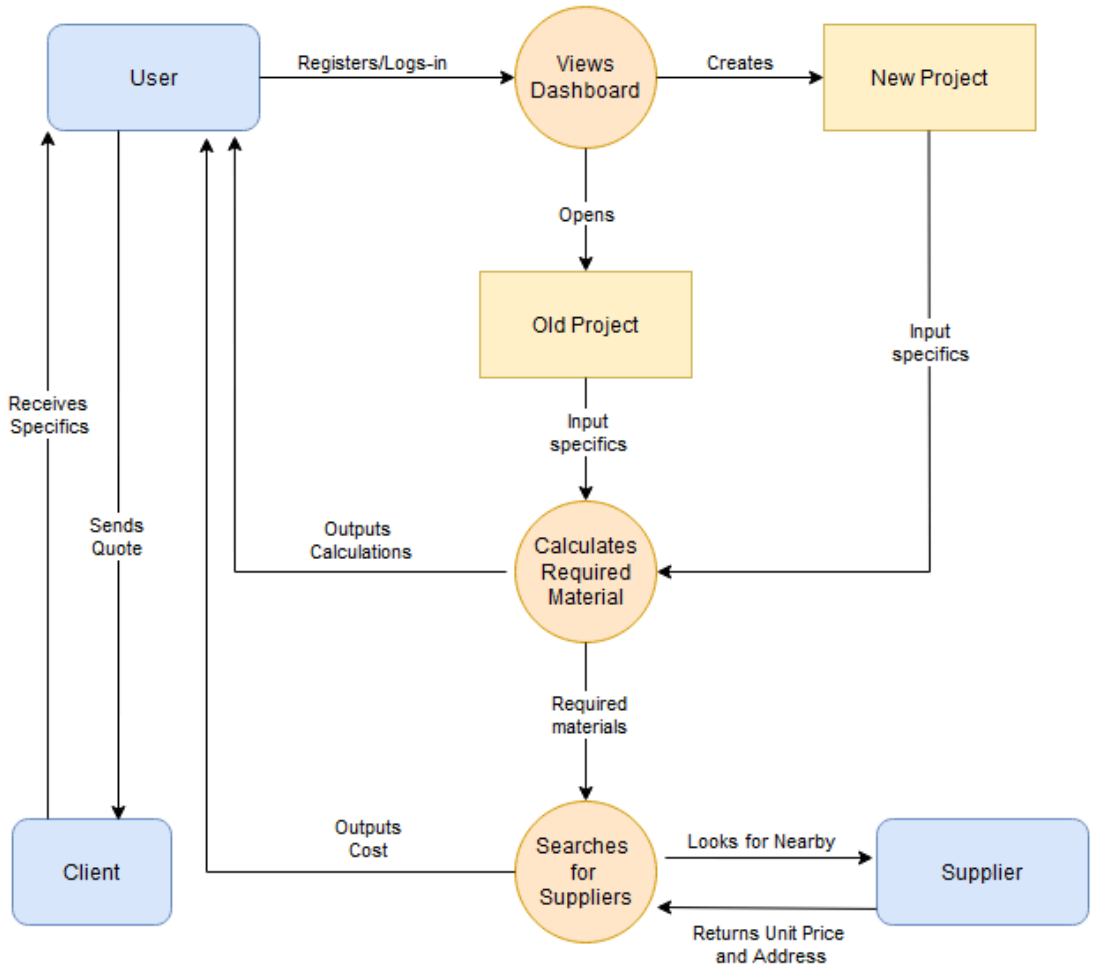


· UML Class Diagram



3.4 Process Modeling

- Data Flow Diagram



4.0 Non-Functional Requirements

Performance

- Responsiveness
  - 98% of all interactions through the app should be processed in under 2 seconds
- Loading time
  - All pages and modules will load in under 5 seconds

Reliability

- Informative Errors

        - 90% of possible errors will be handled graceful and provide informative feedback to the user
    - Session Timeout
        - User sessions will be persisted indefinitely, until manually removed by logging out

Availability
- Accessibility
    - The system will be accessible to all users, on up to 90% of all web-enabled devices
- Design
    - All pages and modules will maintain a consistent design throughout

Security
- Communication
    - All interactions between the client and server will be encrypted
- Data and Input Validation
    - All inputs from the user will be cleaned and validated before being sent to the server

5.0 Logical Database Requirements

Requirement Number	Requirement Type	Description
1	Data Formats	User information, project details, and supplier data will be stored in standardized formats (e.g., text, integers, dates). Cost estimates will be formatted as currency for accuracy in financial reporting.
2	Storage Capabilities	The database must accommodate large volumes of data, including historical records of projects and material stock levels. Scalability must support increased data as more users and projects are added to the system.
3	Data Retention	Project data will be retained for a minimum of five years to comply with industry standards and for auditing purposes. User activity logs will be stored for at least one year to monitor system usage and ensure security.
4	Data Integrity	Data validation checks will be in place to ensure the accuracy and consistency of information entered into the database. Referential integrity will

		be maintained between related tables, such as projects and material suppliers, to prevent orphaned records.
5	Backup and Recovery	Regular database backups will be performed to prevent data loss in case of system failure. A disaster recovery plan will be established, including data restoration procedures.

6.0 Other Requirements-

Bestimator will be designed to follow construction industry regulations and security standards.

-A training module will be provided to help users effectively use the system.
-A Frequently asked questions (FAQ) section will be created.
-As the user base grows, multi-language support will be added for broader accessibility.

7.0 Approval

The signatures below indicate their approval of the contents of this document.

Project Role	Name	Signature	Date
Front end developer	ONAT TURAN	OT	8-NOV-2024
Back-end Developer	Simon Kriksciunas	SK	8-NOV-2024
Front-end	Benn Graham	BG	8-NOV-2024
Back-end Developer	Pablo Arango Gomez	PA	8-NOV-2024
Back-end Developer	Justin Oskam	JO	8-NOV-2024