Construction Link

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Final Approval

This is to certify that we have read the report submitted by **M Huzaifa Khan** (46878), **M Hamza Ali** (46897) and **Safiullah Mukarram** (35807) for the partial fulfillment of the requirements for the degree of the Bachelors of Science in Software Engineering (BSSE). It is our judgment that this report is of sufficient standard to warrant its acceptance by Riphah International University, Islamabad for the degree of Bachelors of Science in Software Engineering (BSSE).

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Declaration

We want to make it clear that our document, "**Construction Link**" is entirely our own work, and we haven't copied it from anywhere. We've put in our personal efforts to complete this project along with the report. Our teachers, especially our supervisor **Mr. Awais Nawaz** and Co Supervisor **Mr. Abu Zhar**, guided us throughout the process. We promise that none of the content in our system is taken from any other source or copied from another project. If it's proven otherwise, and any part is found to be a reproduction of someone else's work, we're ready to face the consequences. This declaration reflects our commitment to honesty and accountability in our academic endeavors.

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Dedication

Our heartfelt dedication reaches out to the pillars of our journey – our cherished family, steadfast friends, and dedicated teachers. Their unwavering encouragement and invaluable support have been the bedrock of our success in bringing "**Construction Link**" to life. A special shout-out goes to our parents for their supreme encouragement, laying the foundation for our endeavors. We extend sincere gratitude to our teachers for their exceptional support, guiding us with wisdom and care on our academic path. In genuine appreciation, we dedicate this work to our esteemed supervisor and co supervisor, "**Mr. Awais Nawaz**" and "**Mr. Abu Zhar**". His unwavering commitment, continuous guidance, and transformative mentorship played a pivotal role in turning our ideas into a tangible reality. With deep thanks, we acknowledge the profound impact of these wonderful individuals on our journey. Their collective influence has not only shaped our success but has also added a rich dimension to our academic pursuits, making this endeavor all the more meaningful and fulfilling.

Acknowledgement

Foremost, we express our gratitude to Allah Almighty, the Merciful and the source of all knowledge, for endowing us with the courage and wisdom to bring this project to fruition. In His infinite mercy, we acknowledge the divine guidance that has been instrumental in our journey. Our heartfelt thanks extend to our family, friends, and teachers for their unwavering support, and to our supervisor and co supervisor, "**Mr. Awais Nawaz**"and "**Mr. Abu Zhar**", for his transformative guidance. Together, these influences have shaped our success and made this endeavor a manifestation of shared dedication and divine blessings.

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Abstract

This project focuses on creating a web-based platform to connect the customers, material providers, and construction companies in the house construction industry. The platform allows customers to estimate costs, create houses design in 2D visualize it in 3D, and connect with relevant stakeholders. It also enables construction companies and material providers to provide their services, manage profiles, and increase their business. The system Focuses on user friendliness, security, and responsiveness. This project aims to streamline house construction processes, making them more efficient and accessible.

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Chapter 1: Introduction

Introduction

In this chapter we discuss about the overview of project, opportunities and stake holders, Motivation and challenges and motivation of the construction link. All these things are discussed in this chapter

1.1   Overview

This project Construction Link aims to create a user friendly web platform that connects customers, construction companies, and material providers in the house building process. Customers can design their house, estimate costs, and easily find construction services and building materials. The platform also allows material providers to list their material products, while construction companies offer the services and manage customer requests. Main features include 2D and 3D house designing, cost estimation, payment integration, and feedback systems. By making all these services together in one platform, the Construction Link simplifies the construction process and helps users save their time and efforts.

1.2   Opportunity & Stakeholders

Here are the main reasons for doing this project.

- Personal Experience
- Searching
- Supervisor Consultation and Feedback
- Continuous Demand in Construction

Our Project is about the construction of houses. We notice that there is opportunity in Pakistan for such a system that connects customer who want to build the house, material providers and construction companies. We can get the rough idea by personal experience of one our team member name 'Muhammad Hamza Ali' he can take part in the work and dealing of their house building process. After this we have such idea then we start searching about the idea we check different platforms and try to mature our idea. We also consult with our supervisor and co- supervisor and get their comments on our idea. By searching we also know that the construction work is very vast there is continues demand in this field so we finalize our idea and started working.

1.2.1 Stakeholders

1. Customers
2. Construction Companies
3. Material Providers

1.3 Motivation and Challenge

In this section, we will discuss what motivated this project and how it can be benefit for society. After that we will also discuss the challenges that we may face while implementation of our project idea.

1.3.1 Motivations of Construction Link

The main goal of this project is to create a platform that connects customers interested in building a house with material providers and construction companies. By connecting these groups together, this project has the potential to increase business for both construction companies and material providers. Customers can also design their homes, visualize them in 3D, and get cost and material estimates from companies. This process can motivate customers for planning and building a home easier and manageable.

1.3.2 Challenges of Construction Link:

While implementing this project idea we may face such a challenges:

1. Technical Complexity
2. To keep information, correct and update
3. Stakeholder engagement
4. User adoption

1.4   Goals and Objectives

The objective of this project is to reduce the communication gap between customers, material providers and construction companies. The main objective is to provide a complete solution so that stakeholder involved found no chance to divert to another solution to fulfil its needs. Another main objective of this project is to provide a platform for construction companies and material providers to increase their business.

1.5   Solution Overview

We are providing our users (customers, material providers and construction companies) web based solution that will be easy to use and will have a good number of functionalities. The several key modules are given below:

1. Cost Estimation Module
2. Material Provider Module
3. Company Registration
4. 2D House Modeling Module
5. Request
6. Manage users
7. Feedback
8. Client Communication
9. Ratings
10. View/Upload Pictures
11. Payment

1.6   Report Outline

In the remaining chapters this report will cover the literature review and the detailed analysis of currently available solutions will be made and we will try to establish ground that why we need a platform for customers. After that we will discuss the functional and non- functional requirements of the proposed solution in detail. After that we will move further towards system design where different diagrams and artifacts would be discussed. After that in implementation chapter we will cover all the issues related to the implementation of this project. After the implementation section we will focus on testing of this solution. In that section we will focus on to make the system error free. In the last chapters we will conclude all the discussion and tries to give some results out of that.

Chapter 2:

literature review

2.1 Introduction

In this chapter we will discuss about the existing systems related to house construction over the world and also we will discuss about the systems which are currently running in Pakistan and in other countries and how they are different from our system. We reviewed some systems which are being used for this purpose.

2.2 Literature Review

We search various online systems on the internet that were relevant to our system. To compare these systems, we selected different features from each system and create a detailed analysis. We identified common features that were present in all systems, as well as unique features that were only present in few systems. Literature review of the existing systems is below:

2.2.1 Existing System Table

Existing Systems					
Features	**Procore**	**Graana.com**	**Bricks.pk**	**TeamOverc's**	**The Constructor**
Construction Cost Estimation	✓	✓	✗	✓	✓
Material Provider Listings	✓	✗	✗	✗	✗
Company Registration	✓	✓	✗	✓	✗
2D Modeling	✓	✗	✗	✗	✗
Login	✓	✓	✓	✓	✓
Manage users	✓	✓	✓	✓	✓
Profile	✓	✓	✓	✓	✓
Feedback	✓	✗	✓	✗	✓

Table 1: Table of Existing Systems

2.3 Summary

Based on our survey of different systems and meetings, we have concluded that there are existing systems in place. There are some features and functionalities that need to be added or improved, especially the 2d design and visualize it in 3d after that the estimation of material and cost. This finding gives us more confidence that we can introduce new and innovative elements to our system, making it unique and different and better meeting the needs of our customers.

Chapter 3: Requirement Engineering

3.1 Introduction:

In this chapter of requirement analysis, we will dig down the functional and non-functional requirements for the '**Construction Link'**. We will also discuss the needs and problem statement due to which we are developing this system.

3.2 Problem Statement

We identified that people face challenges when purchasing construction materials. There is no platform that allows them to buy materials from multiple shops or providers. Even on existing online platforms, they are restricted to buying from a single company or provider. Furthermore, there is no such platform in which the system gives the detail of how much material will used according to the design of the house they have. Also in Pakistan there is no online system which gives cost estimation, material estimation and 2d and 3d model same time for user.

3.3 Functional Requirements

In this part we discuss about our functional and nonfunctional requirements for our system this help us in building our project.

3.3.1   Common for all stake holders

FR.01: User shall be able to sign up by filling their credentials (Email, Password).

FR.02: User shall be able to sign up by using google account.

FR.03: User shall be able to pay or receive the payment.

FR.04: User shall be able to create design of the house.

FR.05: User shall be able to save design of the house in editable form.

FR.06: User shall be able to update and delete the saved design of the house.

FR.07: User shall be able to download the design of house in pdf and jpg form.

FR.08: User shall be able to give feedback by filling form.

3.3.2 Customer

FR.09: Customer shall be able to maintain his profile.

FR.10: Customer shall be able to filter the material providers as highest rating by customers.

FR.11: Customer shall be able to calculate the cost of material.

FR.12: Customer shall be able to view how much material is required (Material estimation).

FR.13: Customer shall be able to view the cart and update item quantities and delete items.

FR.14: Customer shall be able to add materials to a shopping cart before checkout.

FR.15: Customer shall be able to view the construction companies.

FR.16: Customer shall be able to request construction companies for house building project.

FR.17: Customer shall be able to send/share design of house to construction companies.

FR.18: Customer shall be able to see the ratings of material providers and construction companies.

FR.19: Customer shall be able to communicate with construction companies.

FR.20: Customer shall be able to confirm the order delivery.

3.3.3 Construction Companies

FR.21: Construction companies shall be able to build their profile.

FR.22: Construction companies shall be able to update their profile.

FR.23: Construction companies shall be able to delete their profile.

FR.24: Construction companies shall be able to upload their work of previous constructions of buildings.

FR.25: Construction companies shall be able to review the request of customer.

FR.26: Construction companies shall be able to accept or decline the request of customers.

FR.27: Construction companies shall be able to save the design of house sent by customer.

FR.28: Construction companies shall be able to provide construction cost.

3.3.4 Material Providers

FR.29: Material Providers shall be able to build their profile.

FR.30: Material Providers shall be able to update their profile.

FR.31: Material Providers shall be able to delete their profile.

FR.32: Material Providers shall be able to list their material items.

FR.33: Material Providers shall be able to update material items.

FR.34: Material Providers shall be able to delete material items.

FR.35: Material Providers shall be able to add their prices of material items.

FR.36: Material Providers shall be able to update, delete the price of material items.

FR.37: Material Providers shall be able to add new material items.

FR.38: Material Providers shall be able to see all the sales.

FR.39: Material Providers shall be able to see the payments which are on hold.

FR.40: Material Providers shall be able to confirm the order of customer.

3.4 Nonfunctional requirements

NFR.01: Usability

NFR.1.1: Responsiveness: The platform should be fully responsive, ensuring a seamless user experience across various devices, including desktops, tablets, and smartphones. It should automatically adjust the layout and design to fit different screen sizes without compromising usability.

NFR.02: Security

NFR.2.1: Authentication and Authorization: The platform should allow secure login using Google or email. Important actions such as making payments or managing user profiles must be protected using security measures like Single Sign-On (SSO), session management, and secure login methods. Additionally, user credentials should be encrypted using strong encryption techniques to ensure data protection and privacy.

NFR.03: Portability

NFR.3.1: Browser Compatibility: The system should work on major browsers, including Chrome, Firefox, Safari, and Edge, without loss of functionality.

Chapter 4:
System Design

4.1 Introduction

In this chapter of system design we make software architecture diagrams, ERD, context diagrams, use case diagrams and data flow diagrams that are applied to the system. The software design follows requirement analysis in the Software Development Lifecycle. For a better understanding and implementation of the system, software design is critical. In the form of a user interface, design pattern, and software architecture, software design explains how the software will work.

4.2 Architectural Design

The architecture we used is Micro Services.
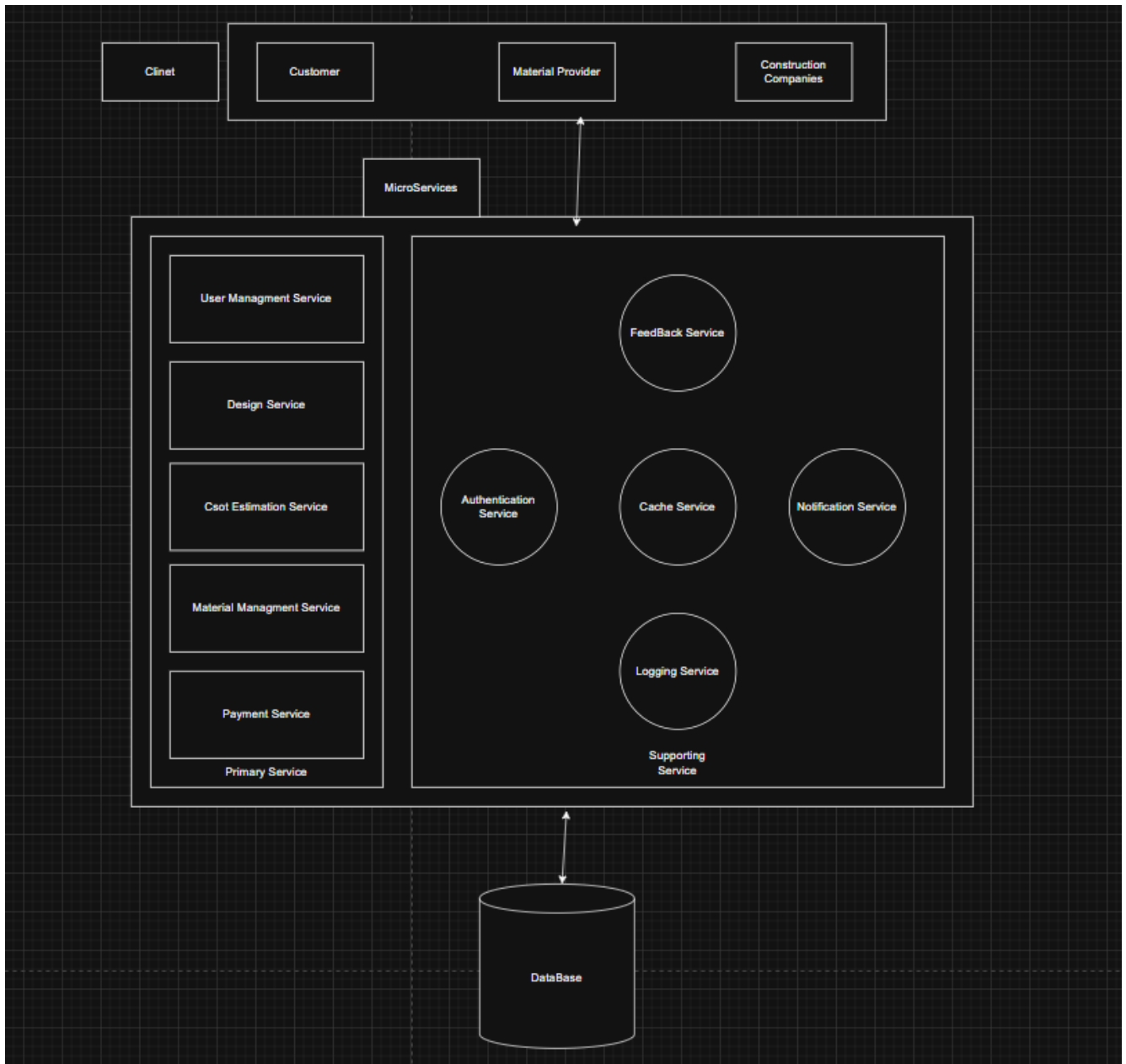
Figure 4. 1: Architectural Diagram

4.3 Detailed Design

4.3.1 Use Case Diagram

4.3.1.1 Use Cases Common for all Stake Holders:

The system allows all stakeholders to easily sign up, log in, make agreements, send payments, design houses, and provide feedback. It supports additional features like password recovery, email verification, and saving designs in different formats. Each stakeholder interacts with the system based on their role to complete their tasks smoothly.
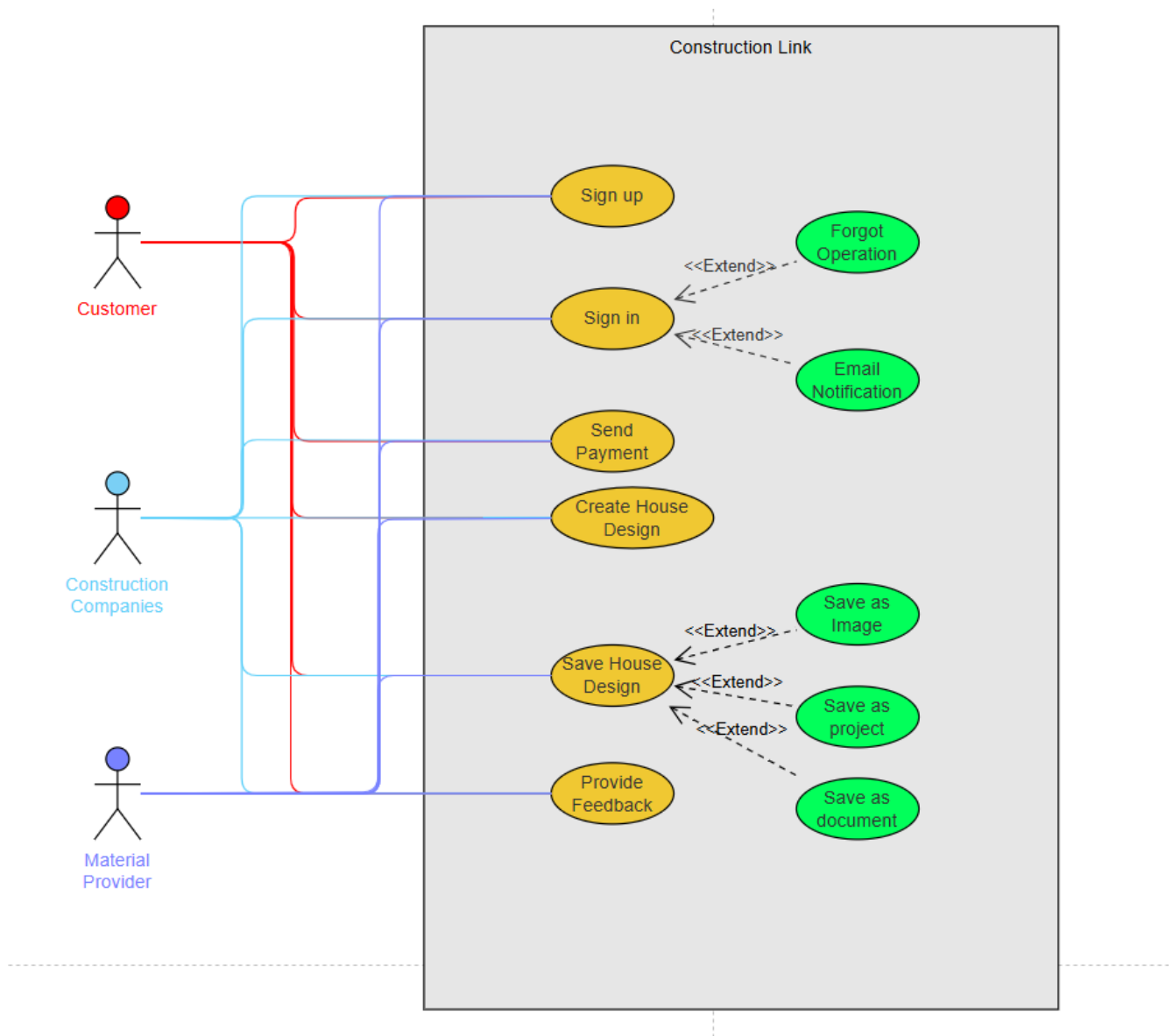
Figure 4. 2:Usecase Diagram for Stakeholders

4.3.1.2 Customer:

This use case diagram shows the main actions a customer can perform, such as maintaining their profile, searching for material providers or construction companies, sharing house designs, and requesting building projects. It also highlights cost estimation features and flexible search options like searching by rating, price, or location.
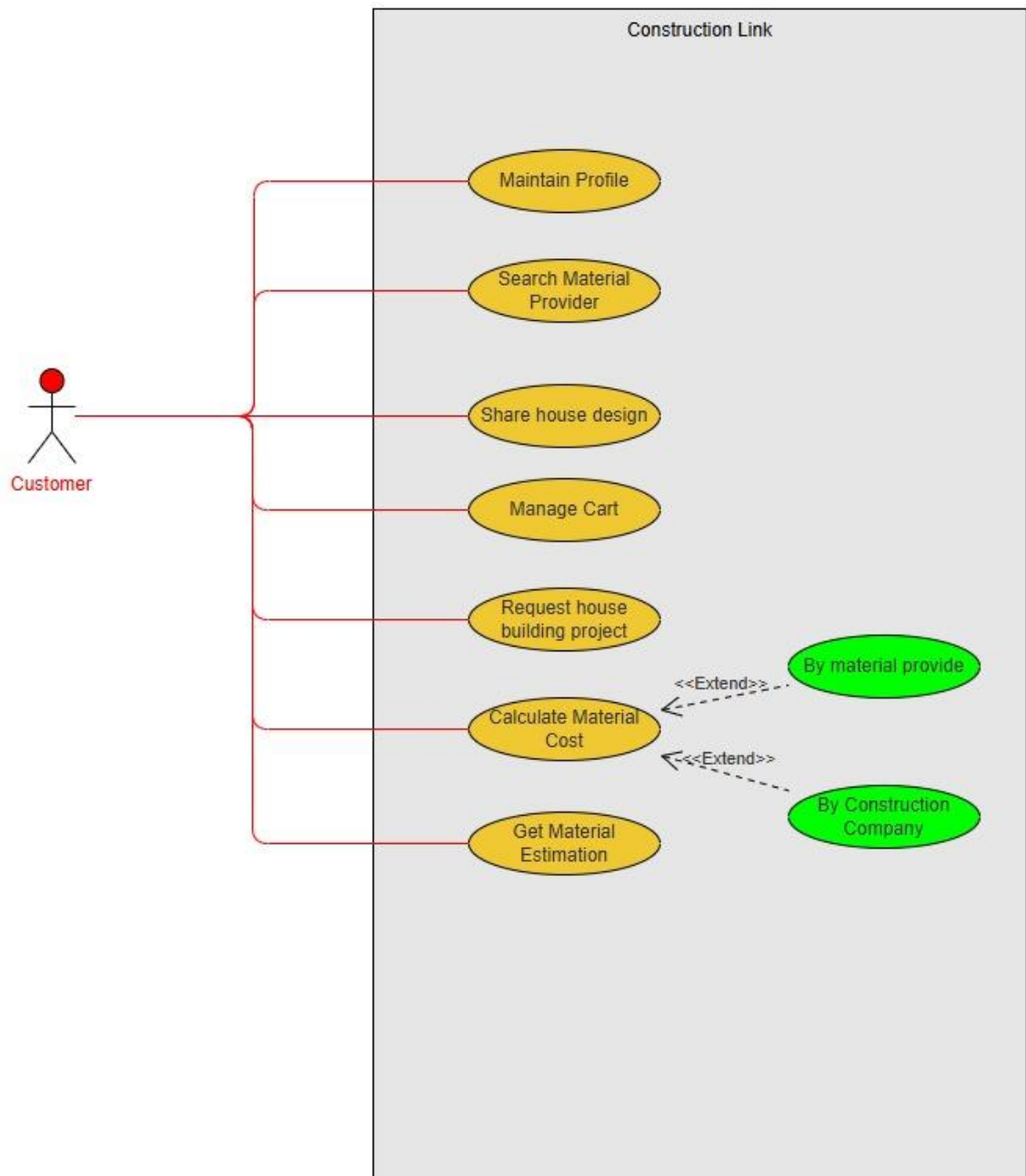
Figure 4. 3:Usecase diagram for Customer

4.3.1.3 Construction Company:

This use case diagram outlines the key activities a construction company can perform, such as building a profile, managing material items, reviewing and responding to customer requests, saving house designs, and providing construction costs. It also includes actions like uploading work, managing prices, and updating material details (add, update, delete).
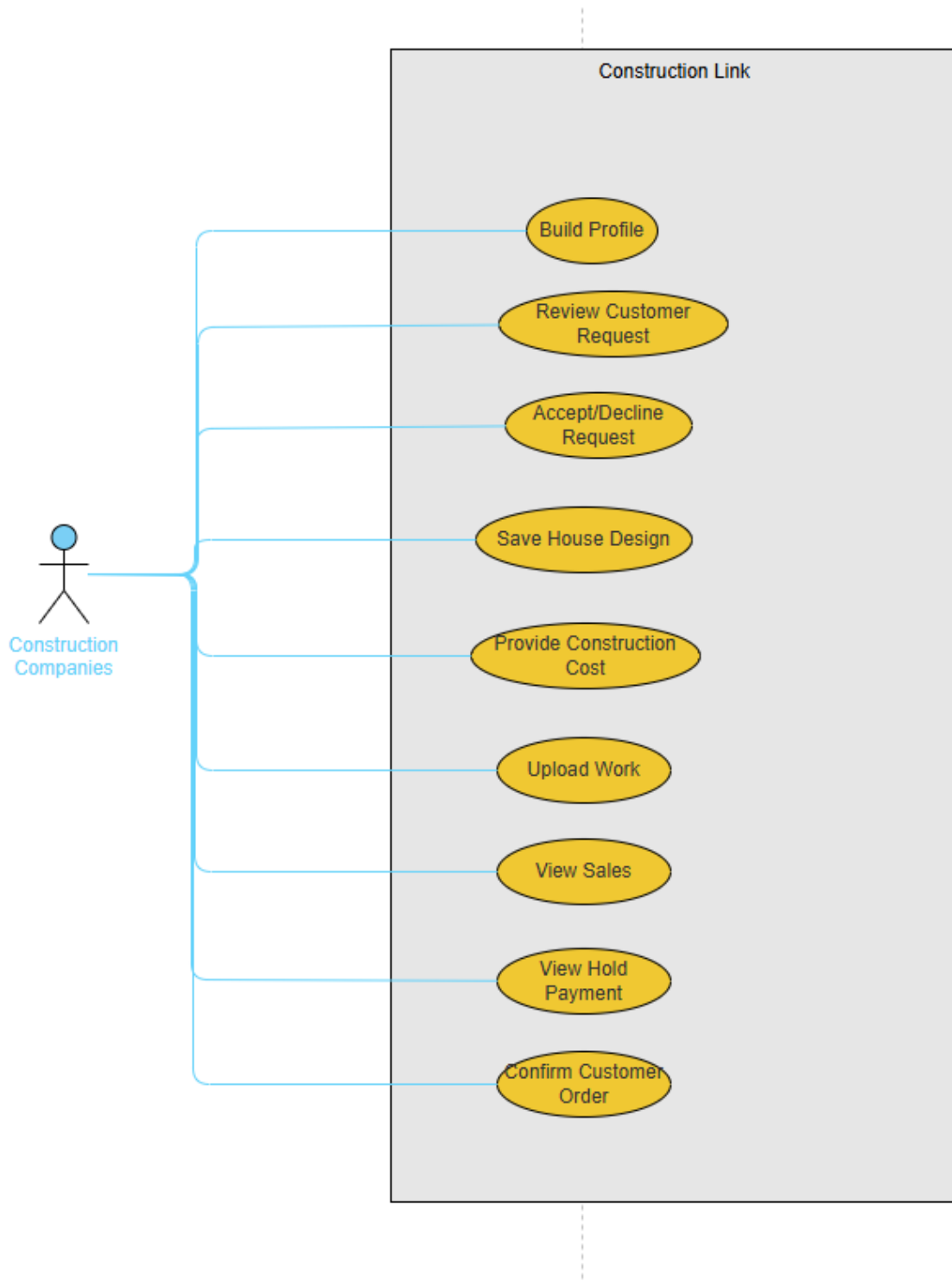
Figure 4. 4:Usecase diagram for Construction Companies

4.3.1.4 Material Provider:

This use case diagram describes the actions a material provider can perform, including building a profile, listing material items, and managing material prices (adding, updating, and deleting). It also covers updating or deleting listed items to keep their offerings current.
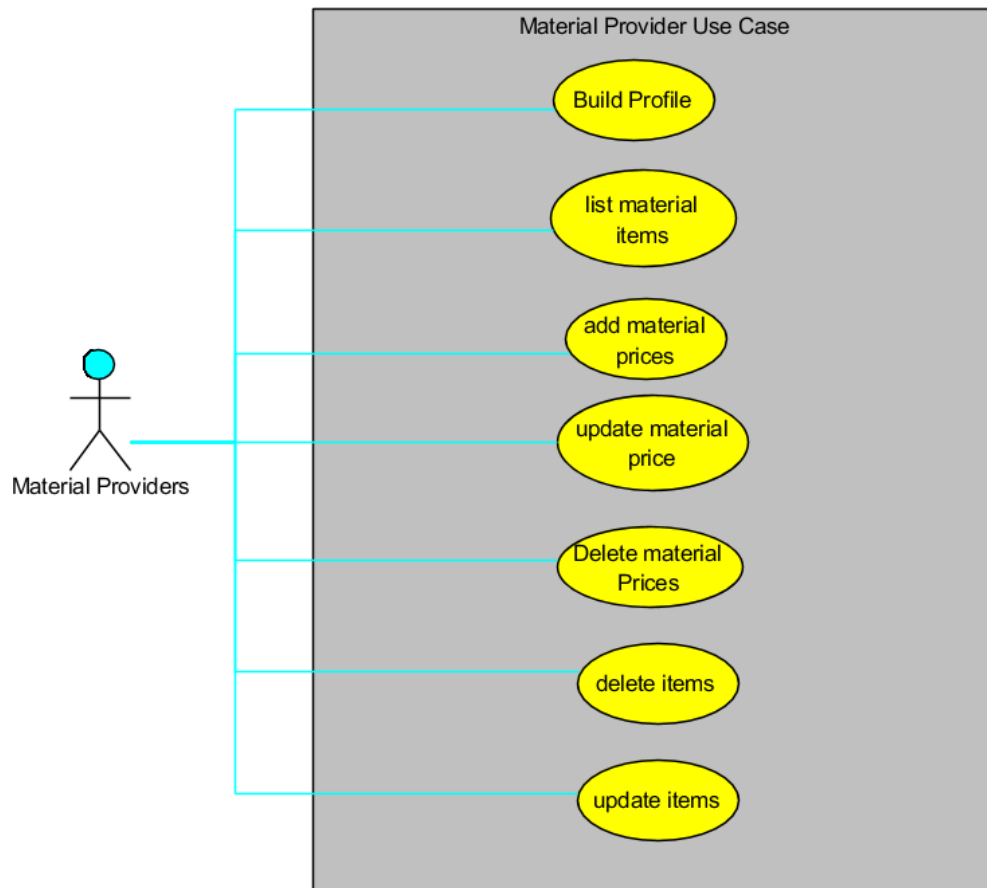
Figure 4. 5:Usecase diagram for Material Providers

4.4.2 Fully Address Use Cases

In this section we will discuss about the fully dressed use cases for our project to check the flow of the system how system flows. Further if the flow is not clear we create the activity diagram.

4.4.2.1 Descriptive Use case for customer, Construction Companies, Material Providers

Use Case 1: Sign Up

USE CASE	1	
USE CASE NAME	Sign Up	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	Users must have a valid email.	
POSTCONDITION	An account is created and user details are stored in database.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User clicks on sign up button.	
		2. System display sign up form.
	3. User fills in the required details (email, password, name, role selection).	
	4. User Click on Sign up Button.	
		5. System Sends Verification email to user.
		6. System saves data in database.
		7. System display message asking user to verify email.
	8. User Open email.	
	9. User Click on verification Link.	
		10. System verifies the email and redirects the user to the login page.
Exceptional flow	**5.1 Email already exist:** 5.1.1 System shows error for email is already in use. 5.1.2 System allow user to enter another email. **5.2 Wrong Email:** 5.2.1 System shows error for invalid email. 5.2.2 System allow user to enter another email.	

Alternate Flow	**5.1 User choose to sign in with google**
	5.1.1 User clicks "Sign Up with Google."
	5.1.2 System redirects to Google authentication.
	5.1.3 User selects an account.
	5.1.4 System verifies and registers the user.

Table 2:Fully Dressed Use Case for Sign Up

Use Case 2: Sign In

USE CASE	2	
USE CASE NAME	Login	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	User must have a registered account.	
POSTCONDITION	User is authenticated and granted access to the system.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User clicks on the login in button.	
		2. The System display the login form.
	3. User fills in the required details (email, password, name).	
		4. System validates the credentials.
	5. User Click on the log in Button.	
		6. System authenticates the user and redirects to the dashboard.
Exceptional flow	**4.1 Invalid credentials:**	
	4.1.1 System shows error "Invalid email or password."	
	4.1.2 System allows the user to retry or reset password.	
Alternate Flow	**5.1 User choose to login with google**	
	5.1.1 User clicks "login with with Google."	
	5.1.2 System redirects to Google authentication.	
	5.1.3 User selects an account.	
	5.1.4 System verifies and logs in the user.	

Table 3:Fully Dressed Use Case for Sign In

Use Case 3: Forgot Password

USE CASE	3	
USE CASE NAME	Forgot Password	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	User must have a registered account with a valid email.	
POSTCONDITION	User receives a password reset link and can set a new password.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User clicks "Forgot Password" on the login page.	
		2. System displays a password reset form (email input).
	3. User enters their registered email and submits.	
		4. System validates the email and sends a reset link to the email.
	4. User opens the email and clicks the reset link.	
		5. System redirects user to a "New Password" page.
	6. User enters and confirms a new password.	
		8. System validates and updates the password in the database.
		9. System confirms success and redirects to the login page.
Exceptional flow	**4.1 Email not registered:** 4.1.1 System shows error: "Email not found." 4.1.2 System prompts user to retry or sign up. **4.2 Expired/invalid reset link:** 4.2.1 System shows error: "Link expired or invalid." 4.2.2 System offers to resend the reset link. **8.1 Weak password:** 8.1.1 System shows error: "Password does not meet requirements." 8.1.2 System prompts user to re-enter a stronger password.	
Alternate Flow	**5.1 User does not receive the email:** 5.1.1 User clicks "Resend Link." 5.1.2 System sends a new reset link.	

Table 4:Fully Dressed Use Case for Forgot Password

Use Case 4: Build Profile

USE CASE #	4	
USE CASE NAME	Build Profile	
ACTORS	Construction Companies, Customer, Material Providers	
PRECONDITION	The user must be registered in the system.	
POSTCONDITION	The user profile is created or updated successfully.	
NORMAL FLOW	**Actor Action** 1. User click on profile button 3. User enter profile information into the form 4. User click on save button	**System Response** 2. System display profile page 5. System notify and save the record

EXCEPTIONAL FLOW	**1.1 Profile Page Not Displayed:**
	    1.1.1 System fails to load profile page.
	    1.1.2 System shows an error message, prompting user to retry or contact support.
	
	3.1 Invalid Profile Information:
	    3.1.1 User enters incomplete or invalid information.
	    3.1.2 System highlights missing or incorrect fields and prompts user to correct them.	

Table 5: Fully Dressed Use Case for Buuild Profile

Use Case 5: Send Payment

USE CASE #	5	
USE CASE NAME	Send Payment	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	User must have a valid payment method registered.	
POSTCONDITION	Payment is processed and confirmation is sent.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User click on payment button	
		2. Display Payment page
	3. User enters Payment information	
		5. System send an OTP to easypaisa number
	4. User click on proceed payment	
	5. User enters OTP	
		6. System verifies the OTP and proceed payment
		7. User receive Payment done Notification
Exceptional flow	**1.1 Payment Button Not Functional:** 1.1.1 User clicks the payment button, but the system doesn't respond. 1.1.2 System shows an error message and asks the user to retry later. **3.1 Invalid Payment Information:** 3.1.1 User enters incorrect or incomplete payment details. 3.1.2 System highlights the errors and prompts the user to correct the information. **5.1 OTP Verification Failure:** 5.1.1 User enters an incorrect OTP. 5.1.2 System prompts the user to enter the correct OTP, with an option to resend it.	

Table 6:Fully Dressed Use Case for Send Payment

Use Case 6: Create House Design

USE CASE #	6	
USE CASE NAME	Create House Design	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	User must have access to design tools.	
POSTCONDITION	A house design is created and ready for saving.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User click on create design.	
		2. System Navigates to design page.
		3. System display design tools and options.
	4. Choose options to design.	
	5. User start designing in canvas.	
		6. System display results in real time.
Exceptional flow	**1.1 Design Page Not Accessible:** 1.1.1　　User clicks on "create design," but the system fails to navigate to the design page. 1.1.2　　System shows an error and prompts the user to try again. **3.1 Design Tools Fail to Load:** 3.1.1　　Design tools and options fail to display on the page. 3.1.2　　System shows an error message, asking the user to refresh or contact support.	

Table 7:Fully Dressed Use Case for Create House Design

Use Case 7: Save House Design

USE CASE #	7	
USE CASE NAME	Save House Design	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	A house design must be created.	
POSTCONDITION	The design is saved as an image, project or document.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User complete creation of design.	
		2. System display results.
	3. User click on save.	
		4. System display save options (save as document, save as project and save as image).
		6. System Save Design.

	5. User choose option.	
Exceptional flow	**1.1 Design Not Completed:** 1.1.1 User tries to save the design before completing it. 1.1.2 System notifies the user that the design must be completed before saving. **5.1 Save Options Not Displayed:** 5.1.1 System fails to display the save options (document, project, image). 5.1.2 System prompts the user to refresh and try saving again.	

Table 8:Fully Dressed Use Case for Save House Design

Use Case 8: Provide Feedback

USE CASE #	8	
USE CASE NAME	Provide Feedback	
ACTORS	Customer, Construction Companies, Material Providers	
PRECONDITION	User must have access to feedback feature.	
POSTCONDITION	Feedback is submitted and saved for review.	
NORMAL FLOW	**Actor Action** 1. User Click on feedback button. 3. Enter feedback details. 4. Submit feedback.	**System Response** 2. Display feedback form. 5. Validate Feedback. 6. Store feedback and sends confirmation.
Exceptional flow	**1.1 Feedback Form Not Accessible:** 1.1.1 User clicks on the feedback button, but the form doesn't load. 1.1.2 System shows an error message and prompts the user to try again later. **3.1 Invalid Feedback Details:** 3.1.1 User enters incomplete or inappropriate feedback. 3.1.2 System notifies the user to correct or complete the feedback.	

Table 9:Fully Dressed Use Case for Provide Feedback

4.4.2.2. Descriptive use cases of Customers

Use Case 1: Maintain Profile

USE CASE #	1	
USE CASE NAME	Maintain Profile	
ACTORS	Customer	
PRECONDITION	The Customer must be logged into the system.	
POSTCONDITION	The profile information is updated successfully in the system.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User Click on Profile button.	
		2. Display the Profile Page
	3. User enter his information	
	4. User click on Update profile button	5. system stores updated information in database
Exceptional flow	**1.1 Profile Button Not Working:** 1.1.1 User clicks on the profile button, but the page doesn't load. 1.1.2 System shows an error message prompting the user to retry later. **3.1 Invalid Profile Information:** 3.1.1 User enters invalid or incomplete details. 3.1.2 System highlights the incorrect fields and asks the user to correct them.	

Table 10:Fully Dressed Use Case for Maintain Profile

Use Case 2: Search Material Providers

USE CASE #	2	
USE CASE NAME	Search Material Providers	
ACTORS	Customer	
PRECONDITION	The Customer must have access to the search feature.	
POSTCONDITION	A list of material providers is displayed.	
NORMAL FLOW	**Actor Action** 1. Customer Click on Search for material providers. 3. search keywords.	**System Response** 2. Display Search bar. 4. Display Results.
Alternative Flow	**Actor Action** 1. Customer click on Search for material providers. 6. Customer choose option.	**System Response** 2. System display options for search. 3. Search by location. 4. Search by ratings. 5. Search by price. 7. System display results.

Exceptional flow	**1.1 Search Bar Not Displayed:**
	   1.1.1 User clicks on search for material providers, but the search bar doesn't appear.
	   1.1.2 System shows an error and prompts the user to try again.
	
	3.1 Invalid Search Results:
	   3.1.1 User enters search keywords, but no results are found.
	   3.1.2 System notifies the user that no providers match the search criteria.	

Table 11:Fully Dressed Use Case for Search Material Providers

Use Case 3: Share House Design

USE CASE #	3	
USE CASE NAME	Share House Design	
ACTORS	Customer	
PRECONDITION	The Customer must have a house design to share.	
POSTCONDITION	The house design is shared successfully.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User click on Share Design button	
		2. System ask to search the user to share design
	3. User search the appropriate person	
	4. User click on send design button	
		5. System notify design share successfully.
Exceptional flow	**1.1 Design Button Not Working:** 1.1.1 User clicks on the "Share Design" button, but the system doesn't respond. 1.1.2 System shows an error message and prompts the user to try again later. **3.1 User Not Found:** 3.1.1 User searches for an individual to share the design but the person is not found. 3.1.2 System notifies the user that no results match the search query. **5.1 Design Share Failure:** 5.1.1 User clicks on "Send Design," but the system fails to share the design. 5.1.2 System shows an error and asks the user to retry or contact support.	

Table 12:Fully Dressed Use Case for Share House Design

Use Case 4: Request House Building Project

USE CASE #	4	
USE CASE NAME	Request House Building Project	
ACTORS	Customer	
PRECONDITION	The Customer must provide project requirements.	
POSTCONDITION	The project request is submitted for review.	
NORMAL FLOW	**Actor Action** 1. User click on appropriate company 2. User click the request button	**System Response** 3. System notify the user
Exceptional flow	**1.1 Company Not Available:** 1.1.1 User clicks on a company, but the company is unavailable or no longer active. 1.1.2 System shows an error message, prompting the user to select another company. **3.1 Request Submission Failure:** 3.1.1 User clicks the "Request" button, but the request doesn't go through. 3.1.2 System displays a message that the request was not submitted and asks the user to try again.	

Table 13:Fully Dressed Use Case for Request House Building Project

Use Case 5: Calculate Material Cost

USE CASE #	5	
USE CASE NAME	Calculate Material Cost	
ACTORS	Customer	
PRECONDITION	Customer must have a list of materials.	
POSTCONDITION	An estimated cost is provided.	
NORMAL FLOW	**Actor Action** 1. Click on cost estimation. 3. Search for Material Provider. 4. Select Material Provider.	**System Response** 2. Display Material Providers. 5. Display Cost of Material.

Exceptional flow	**1.1 Cost Estimation Not Available:**
	1.1.1 User clicks on "Cost Estimation," but no estimation option appears.
	1.1.2 System shows an error message, prompting the user to check if they have added materials.
	3.1 Material Provider Not Found:
	3.1.1 User searches for a material provider, but no providers are available.
	3.1.2 System notifies the user that no providers were found for the search query.
	5.1 Material Cost Calculation Error:
	5.1.1 System fails to calculate the material cost.
	5.1.2 System shows an error message, asking the user to try again or contact support.

Table 14:Fully Dressed Use Case for Calculate Material Cost

Use Case 7: Get Material Estimation

USE CASE #	7	
USE CASE NAME	Get Material Estimation	
ACTORS	Customer	
PRECONDITION	The Customer must specify project details.	
POSTCONDITION	A detailed material estimation is provided.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. Customer create design.	
	2. Click on material estimation.	
		3. System calculate Material from design.
	4. Check Material Estimation.	
		5. Display total material Required.
Exceptional flow	**1.1 Design Not Created:** 1.1.1 User attempts to get a material estimation but hasn't created a design. 1.1.2 System prompts the user to create a design before proceeding with the material estimation. **4.1 Material Estimation Error:** 4.1.1 System fails to calculate the material from the design. 4.1.2 System shows an error message and asks the user to try again later. **5.1 Material Estimation Failure:** 5.1.1 System fails to display the total material required. 5.1.2 System shows an error and requests the user to check the design for accuracy or retry.	

Table 15:Fully Dressed Use Case for Get Material Estimation

Use Case 8: Manage Cart

USE CASE	8	
USE CASE NAME	Manage Cart	
ACTORS	Customer	
PRECONDITION	The customer has browsed or selected items	
POSTCONDITION	Cart is updated (items added/removed/updated).	
NORMAL FLOW	**Actor Action**	**System Response**
	1. Customer navigates to the cart section.	
		2. System displays cart contents
	3. Customer selects an action: Add, Update, or Delete	
		4. System loads the relevant interface for that action.
	5. Customer performs the chosen action.	
		6. System validates and processes the action.
	7. Customer confirms the change.	
		8. System updates the cart and recalculates the total amount.
		9. Cart is updated and shown to the customer.
Alternate Flow	**5.1.** Add Item to Cart	
	5.1.1. Customer clicks "Add to Cart" from a product/material page.	
	5.1.2. System checks stock availability and adds the item to the cart.	
	5.2. Update Item Quantity	
	5.2.1. Customer changes quantity of an existing item.	
	5.2.2. System validates if the new quantity is in stock.	
	5.2.3. System updates cart and totals.	
	5.3. Delete Item from Cart	
	5.3.1. Customer clicks "Remove" on an item in the cart.	
	5.3.2. System prompts for confirmation.	
	5.3.3. Upon confirmation, item is removed.	
Exceptional Flow	**5.1.** Item Out of Stock	
	5.1.1. While adding/updating, item stock is insufficient.	
	5.1.2. System shows: "Requested quantity not available."	
	5.2. Cart is Empty	
	5.2.1. Customer accesses cart but hasn't added anything yet.	
	5.2.2. System shows: "Your cart is empty. Start shopping!"	

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	5.3. Session Timeout
	      5.3.1. Customer's session expires while managing the cart.
	      5.3.2. System logs out the user and redirects to login page.

Table 16:Fully Dressed Use Case for Get Manage Cart

7.4.2.2. Descriptive Use cases for Construction Companies

Use Case 1: Review Customer Request

USE CASE #	1	
USE CASE NAME	Review Customer Request	
ACTORS	Construction Companies	
PRECONDITION	The company must have pending customer requests.	
POSTCONDITION	The request is reviewed and ready for action.	
NORMAL FLOW	**Actor Action** 1. Company click on request button 3. Company check the request	**System Response** 2. System display request page
Exceptional flow	**1.1 Request Button Not Working:** 1.1.1 Company clicks on the "Request" button, but the page does not open. 1.1.2 System shows an error message and prompts the company to try again later. **3.1 Request Not Found:** 3.1.1 Company attempts to check the request, but no pending requests are found. 3.1.2 System notifies the company that no requests are available to review.	

Table 17:Fully Dressed Use Case for Review Customer Request

Use Case 2: Accept/Decline Request

USE CASE #	2	
USE CASE NAME	Accept/Decline Request	
ACTORS	Construction Companies	
PRECONDITION	The company must have reviewed the customer request.	
POSTCONDITION	The request status is updated to accepted or declined.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. Company click on request button	
		2. System display request page
	3. Company check the request	
		4. System notify the user
	5. Company accept/decline request	
Exceptional flow	**1.1 Request Button Not Working:** 1.1.1 Company clicks on the "Request" button, but the page does not open. 1.1.2 System displays an error message and prompts the company to try again later. **3.1 Request Not Found:** 3.1.1 Company checks the request, but the request does not load. 3.1.2 System notifies the company that the request could not be found or is no longer available. **5.1 Accept/Decline Failure:** 5.1.1 Company attempts to accept or decline the request, but the action fails. 5.1.2 System displays an error message and prompts the company to retry the action.	

Table 18:Fully Dressed Use Case for Accept/Decline Request

Use Case 3: Provide Construction Cost

USE CASE #	3	
USE CASE NAME	Provide Construction Cost	
ACTORS	Construction Companies	
PRECONDITION	The company must have project details.	
POSTCONDITION	A detailed cost estimate is provided to the customer.	
NORMAL FLOW	**Actor Action**	**System Response**
	1 use case starts when user wants to estimate construction cost	
		2 System shows all available construction companies and material providers.
	3 User selects required construction company for cost estimation	
	4 User selects area wise, city wise or all available.	
		5 System check all parameters for calculating the construction cost.(length, height, & width of wall)
		6 System shows the calculated cost required by the company according to the user selection.
Exceptional flow	**1.1 Estimate Not Available:** 1.1.1　　User attempts to estimate construction cost, but the system doesn't respond. 1.1.2　　System shows an error message and asks the user to try again later. **3.1 Company Not Found:** 3.1.1　　User selects a company for cost estimation, but the company is unavailable. 3.1.2　　System notifies the user that no companies are available for the requested estimation. **5.1 Parameter Calculation Error:** 5.1.1　　System fails to calculate construction cost due to missing or incorrect parameters (e.g., length, height, or width of the wall).	

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	5.1.2 System displays an error and prompts the company to verify the parameters before proceeding. **6.1 Cost Calculation Error:** 6.1.1 System fails to display the construction cost. 6.1.2 System shows an error message and asks the company to retry or check the parameters.

Table 19:Fully Dressed Use Case for Provide Construction Cost

Use Case 4: Upload Work

USE CASE #	4	
USE CASE NAME	Upload Work	
ACTORS	Construction Companies	
PRECONDITION	The company must have work files ready to upload.	
POSTCONDITION	Work files are uploaded and accessible.	
NORMAL FLOW	**Actor Action** 1. Company click on upload button 3. Company choose the file 4. Company upload the file	**System Response** 2. System ask to choose the file 5. System save the record in database
Exceptional flow	**1.1 Upload Button Not Working:** 1.1.1 Company clicks on the "Upload" button, but no file upload window appears. 1.1.2 System shows an error message and asks the company to try again later. **3.1 File Selection Error:** 3.1.1 Company attempts to choose a file, but the system fails to open the file explorer. 3.1.2 System displays an error and prompts the company to try again. **5.1 File Upload Failure:** 5.1.1 Company uploads the file, but the upload fails. 5.1.2 System shows an error message and prompts the company to retry uploading the file.	

Table 20:Fully Dressed Use Case for Upload Work

7.4.2.3. Descriptive Use cases for Material Providers

Use Case 1: List Material Items

USE CASE #	2	
USE CASE NAME	List Material Items	
ACTORS	Material Providers	
PRECONDITION	The provider must have access to the inventory module.	
POSTCONDITION	A list of materials is displayed to the provider.	
NORMAL FLOW	**Actor Action** 1. User click on Material button	**System Response** 2. System displays list of materials
Exceptional flow	**1.1 Material Button Not Working:** 1.1.1 Material provider clicks on the "Material" button, but the page does not load. 1.1.2 System displays an error message and asks the provider to try again later. **2.1 No Materials Available:** 2.1.1 System displays the list of materials, but no materials are shown. 2.1.2 System notifies the provider that there are no materials in the inventory to list.	

Table 21:Fully Dressed Use Case for List Material Items

Use Case 2: Add Material Prices

USE CASE #	3
USE CASE NAME	Add Material Prices
ACTORS	Material Providers
PRECONDITION	The provider must have materials listed.
POSTCONDITION	Prices are added to the material items.

NORMAL FLOW	Actor Action	System Response
	1. User click on material button	
		2. System display material page
	3. User click on add button	
	4. User enter material price and information	
		5. System notify and update the database
Exceptional flow	**1.1 Material Button Not Working:** 1.1.1 User clicks on the "Material" button, but the page does not load. 1.1.2 System shows an error message, asking the provider to try again later. **3.1 Add Button Not Responding:** 3.1.1 User clicks the "Add" button, but no action occurs. 3.1.2 System displays an error and prompts the provider to retry. **4.1 Invalid Price Entry:** 4.1.1 User enters an invalid price (e.g., non-numeric value). 4.1.2 System shows an error message and asks the provider to enter a valid price. **5.1 Database Update Failure:** 5.1.1 User successfully adds material price, but the system fails to update the database. 5.1.2 System displays an error and prompts the provider to try again.	

Table 22:Fully Dressed Use Case for Add Material Prices

Use Case 3: Delete Items

USE CASE #	6
USE CASE NAME	Delete Items
ACTORS	Material Providers
PRECONDITION	The provider must have items listed.
POSTCONDITION	Items are deleted from the list successfully.

NORMAL FLOW	Actor Action	System Response
	1. User click on item button	
		2. System display list of items
	3. User select the appropriate item	
	4. User click on delete button	
		5. System notify and update the database
Exceptional flow	**1.1 Item Button Not Working:** 1.1.1 User clicks on the "Item" button, but the page does not load. 1.1.2 System displays an error and asks the provider to try again later. **3.1 Item Not Found:** 3.1.1 User selects an item, but the item is unavailable in the list. 3.1.2 System notifies the provider that the item cannot be found or is no longer listed. **4.1 Delete Button Not Responding:** 4.1.1 User clicks the "Delete" button, but no action occurs. 4.1.2 System displays an error and asks the provider to retry. **5.1 Database Update Failure:** 5.1.1 User deletes an item, but the database fails to update. 5.1.2 System shows an error and prompts the provider to retry the deletion.		

Table 23:Fully Dressed Use Case for Delete Items

Use Case 4: Update Items

USE CASE #	7	
USE CASE NAME	Update Items	
ACTORS	Material Providers	
PRECONDITION	The provider must have items to update.	
POSTCONDITION	Item details are updated successfully.	
NORMAL FLOW	**Actor Action**	**System Response**
	1. User click on item button	
		2. System display list of items
	3. User perform the updating	
	4. User click on update button	
		5. System notify and store updated data in database
Exceptional flow	**1.1. Item Button Not Working:** 1.1.1 User clicks on the "Item" button, but the page does not load. 1.1.2 System displays an error and asks the provider to try again later. **3.1 Update Error:** 3.1.1 User attempts to update item details, but the system fails to apply the changes. 3.1.2 System displays an error message and asks the provider to check the details and retry. **4.1 Update Button Not Responding:** 4.1.1 User clicks on the "Update" button, but no action occurs. 4.1.2 System displays an error and prompts the provider to retry. **5.1 Database Update Failure:** 5.1.1 User successfully updates item details, but the database fails to reflect the changes. 5.1.2 System shows an error and prompts the provider to retry the update.	

Table 24:Fully Dressed Use Case for Update Items

4.4.3 Activity Diagrams:

4.4.3.1 Sign up
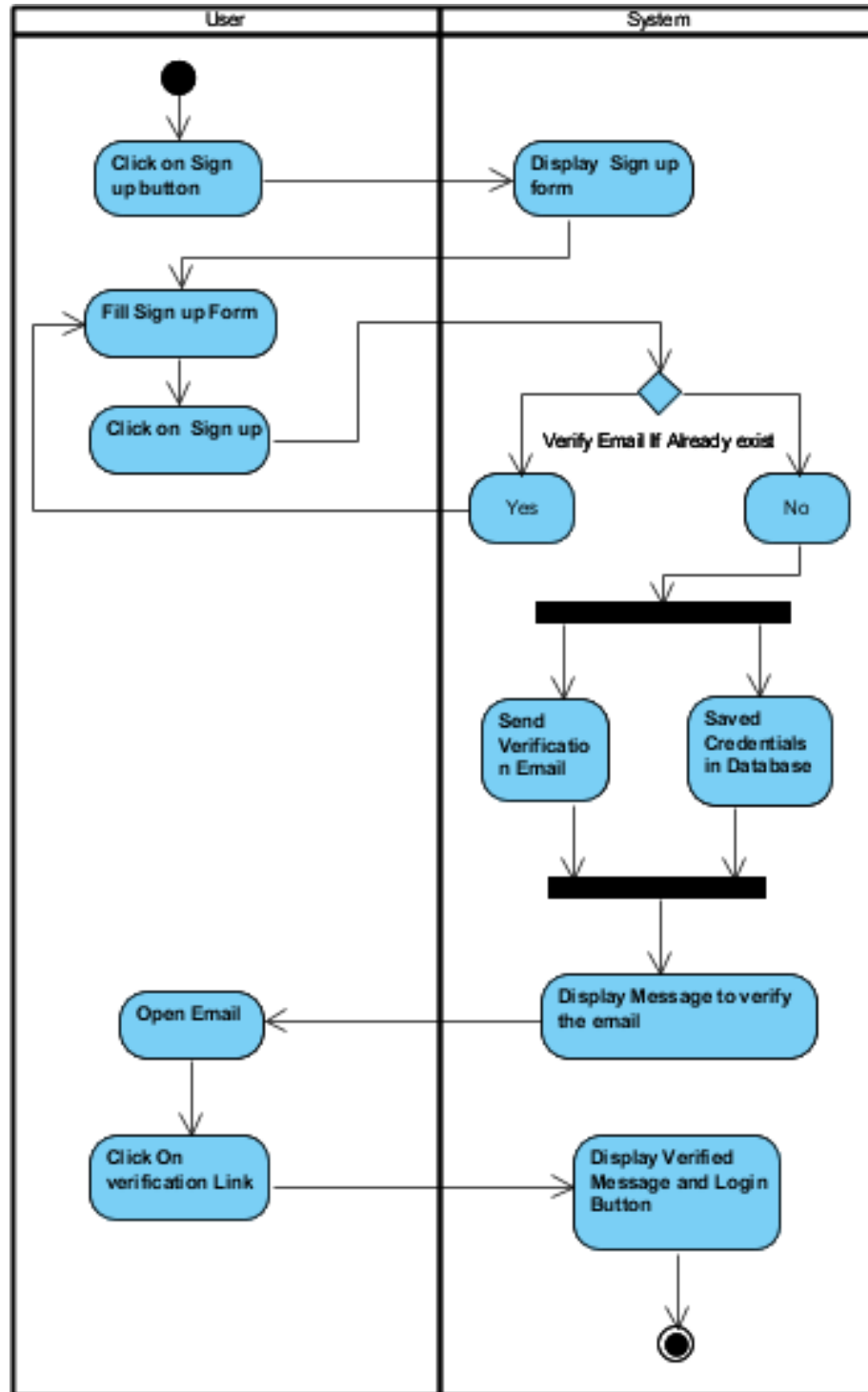
Figure 4. 6: Activity diagram for Signup

4.4.3.2 Login
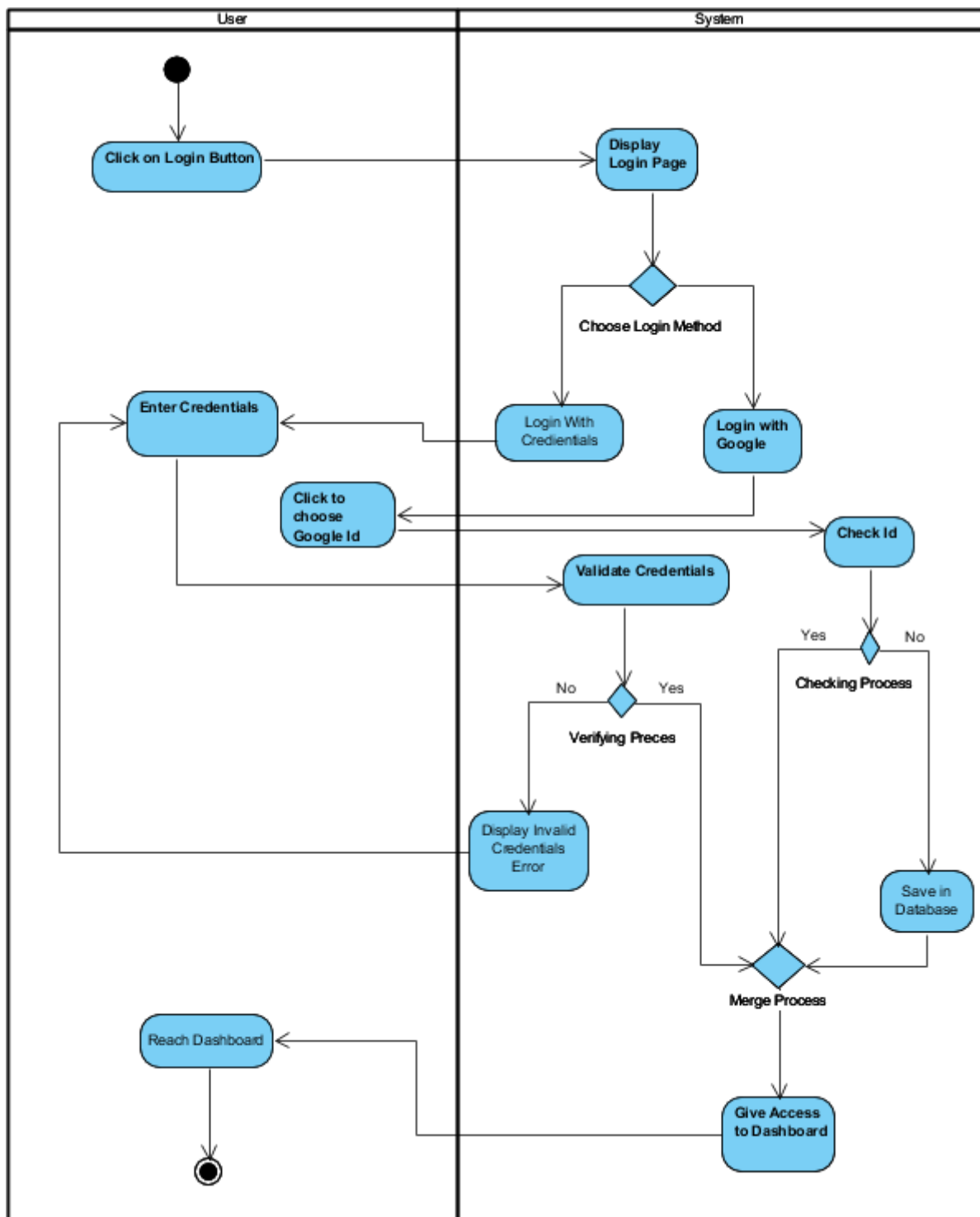
Figure 4. 7: Activity diagram for Login

4.4.3.3 Create Design
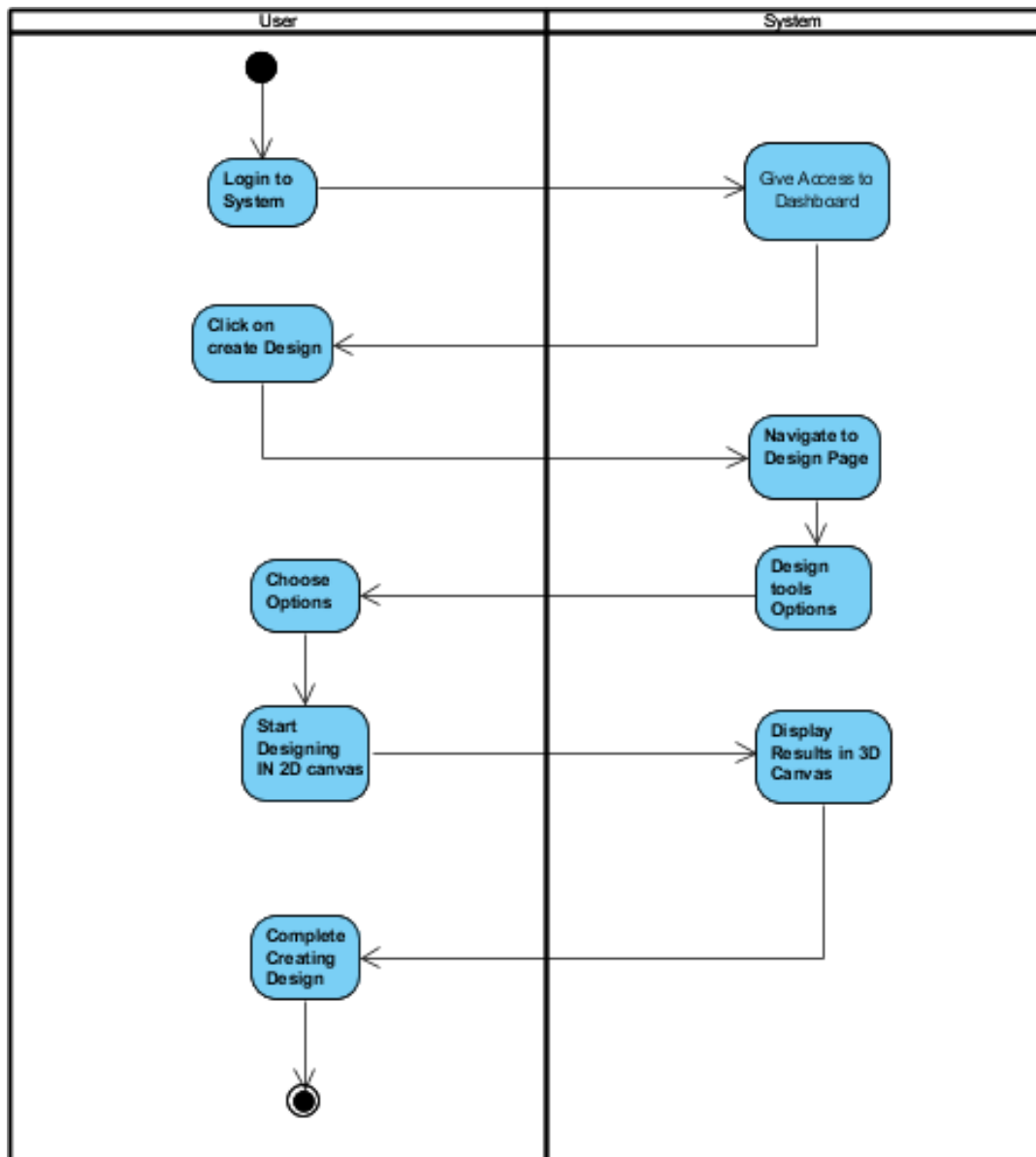
Figure 4. 8:Activity diagram for Create Design

4.4.3.4 Save Design
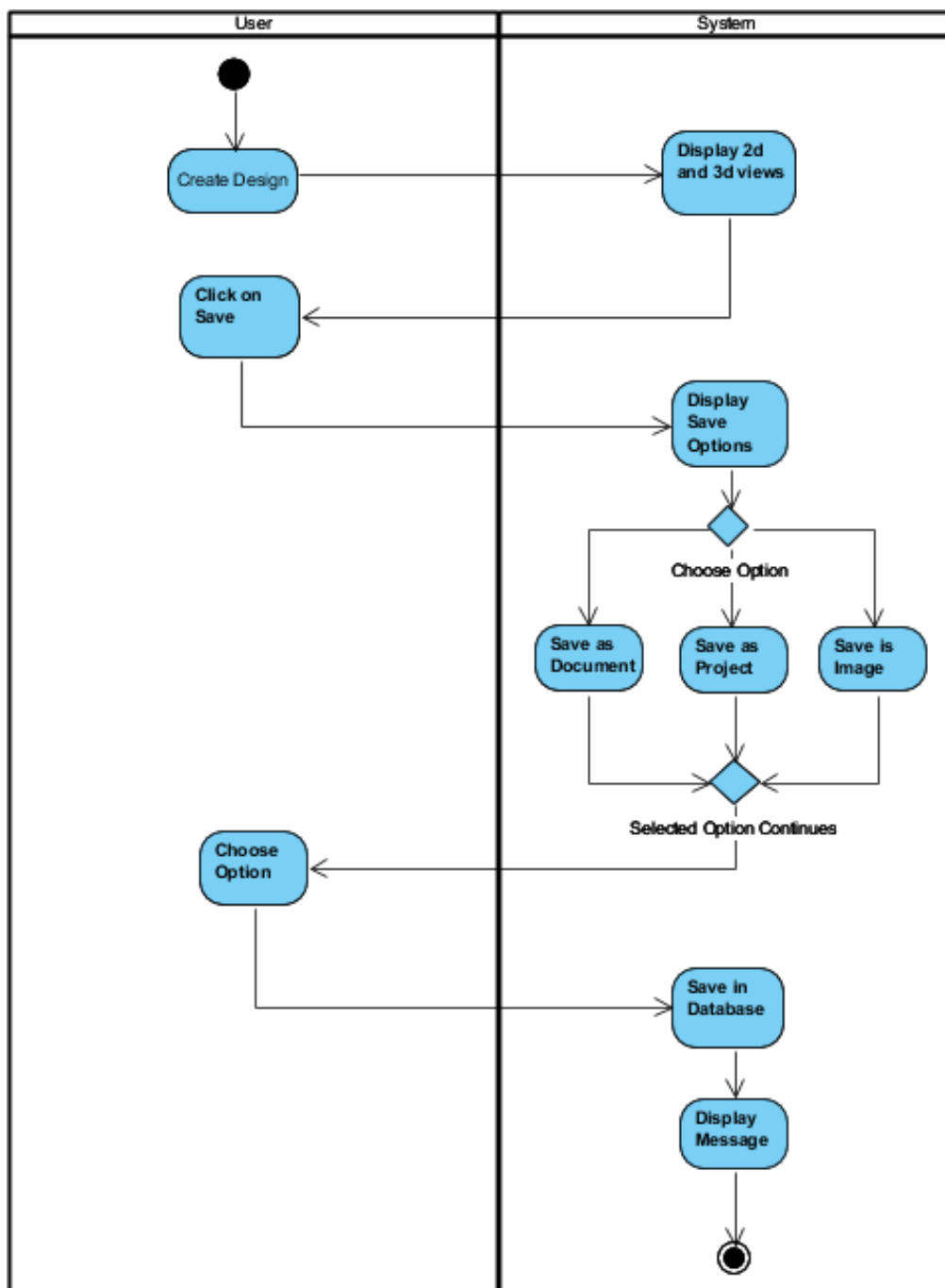
Figure 4. 9:Activity Diagram for Save Design

4.4.3.5 Provide Feedback
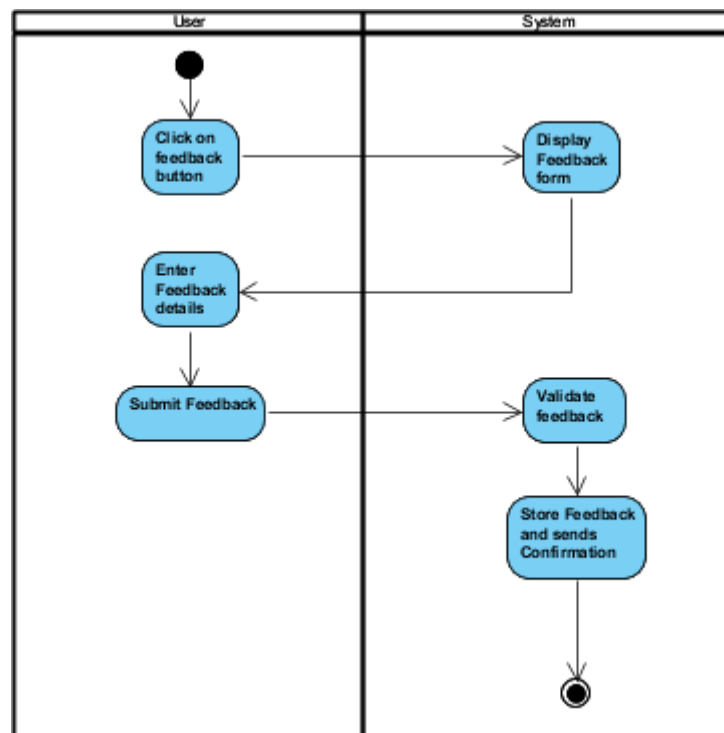
Figure 4. 10:Activity diagram for Provide Feedback

4.4.3.6 Material Estimation
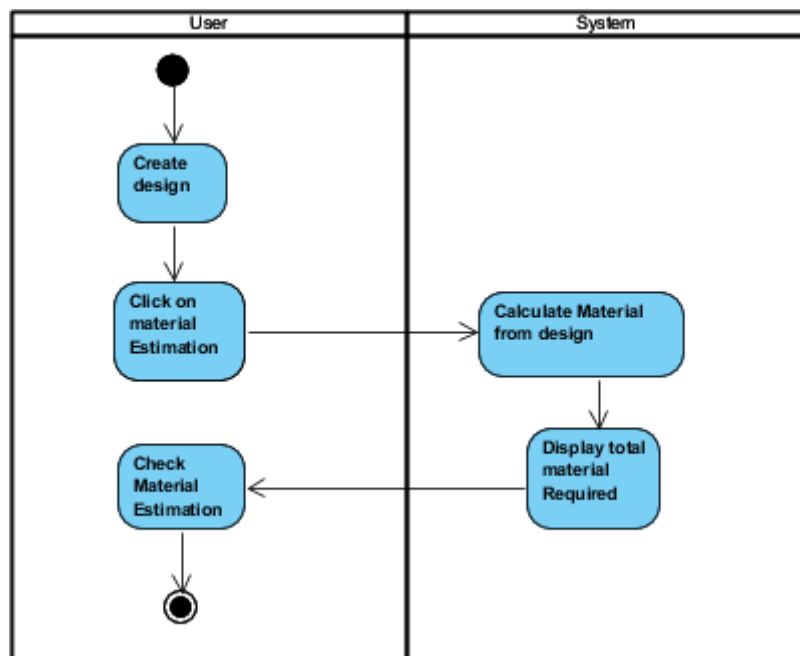
Figure 4. 11:Activity diagram for Material Estimation

4.4.3.7 Search for Material Providers
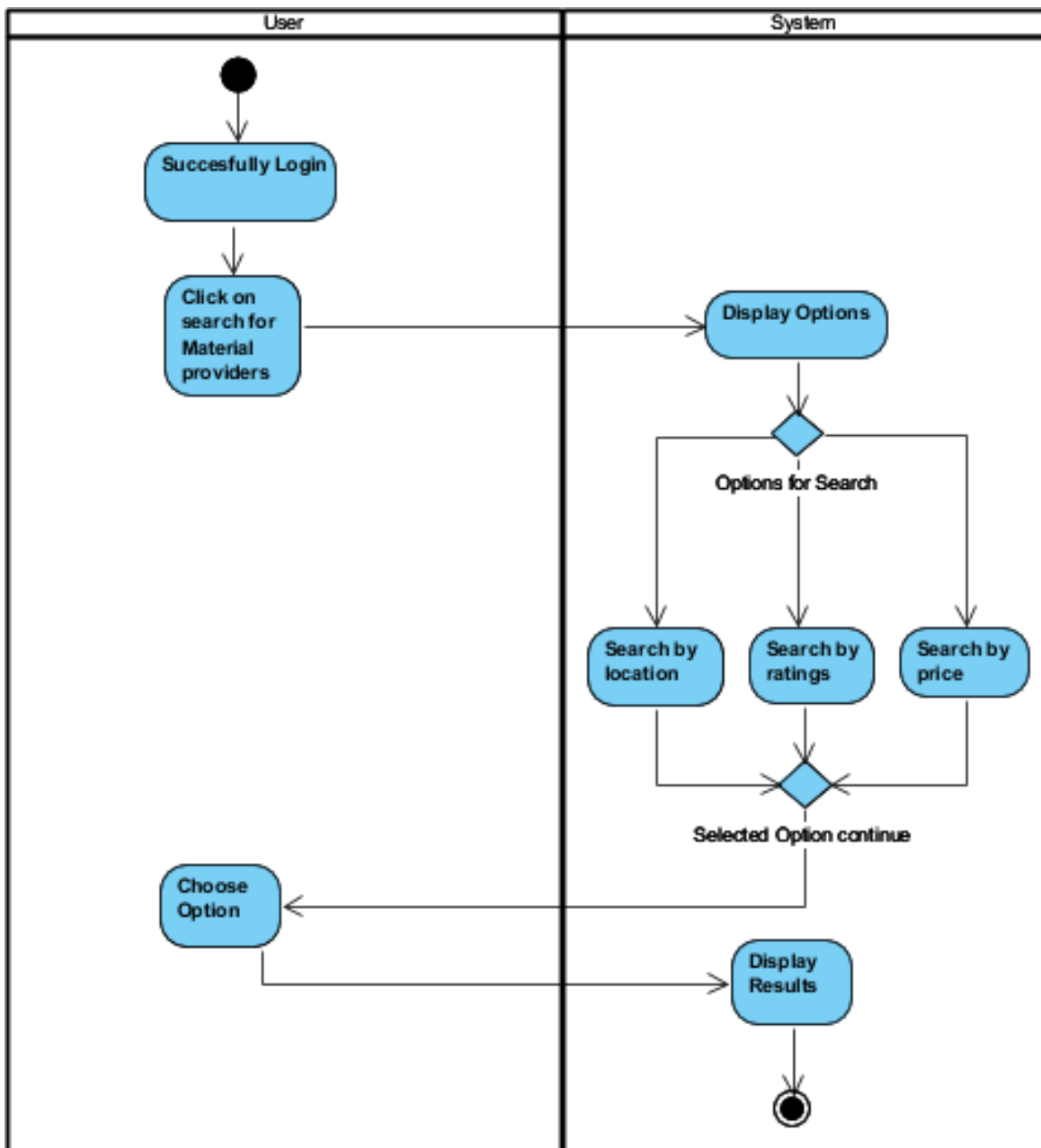
Figure 4. 12:Activity diagram for Material Providers

4.4.3.8. Cost Estimation
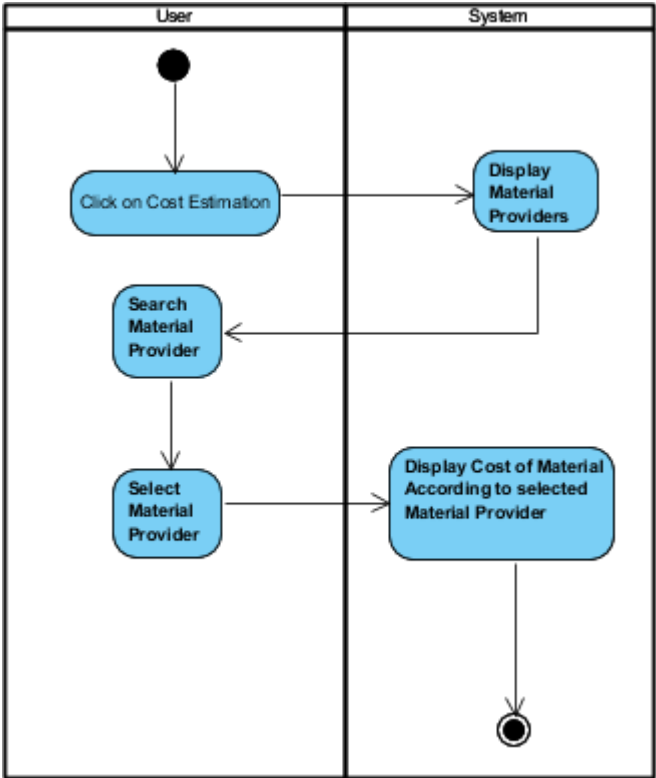
Figure 4. 13:Activity diagram for Cost Estimation

4.4.3.8 Add, Delete, Update Material Items
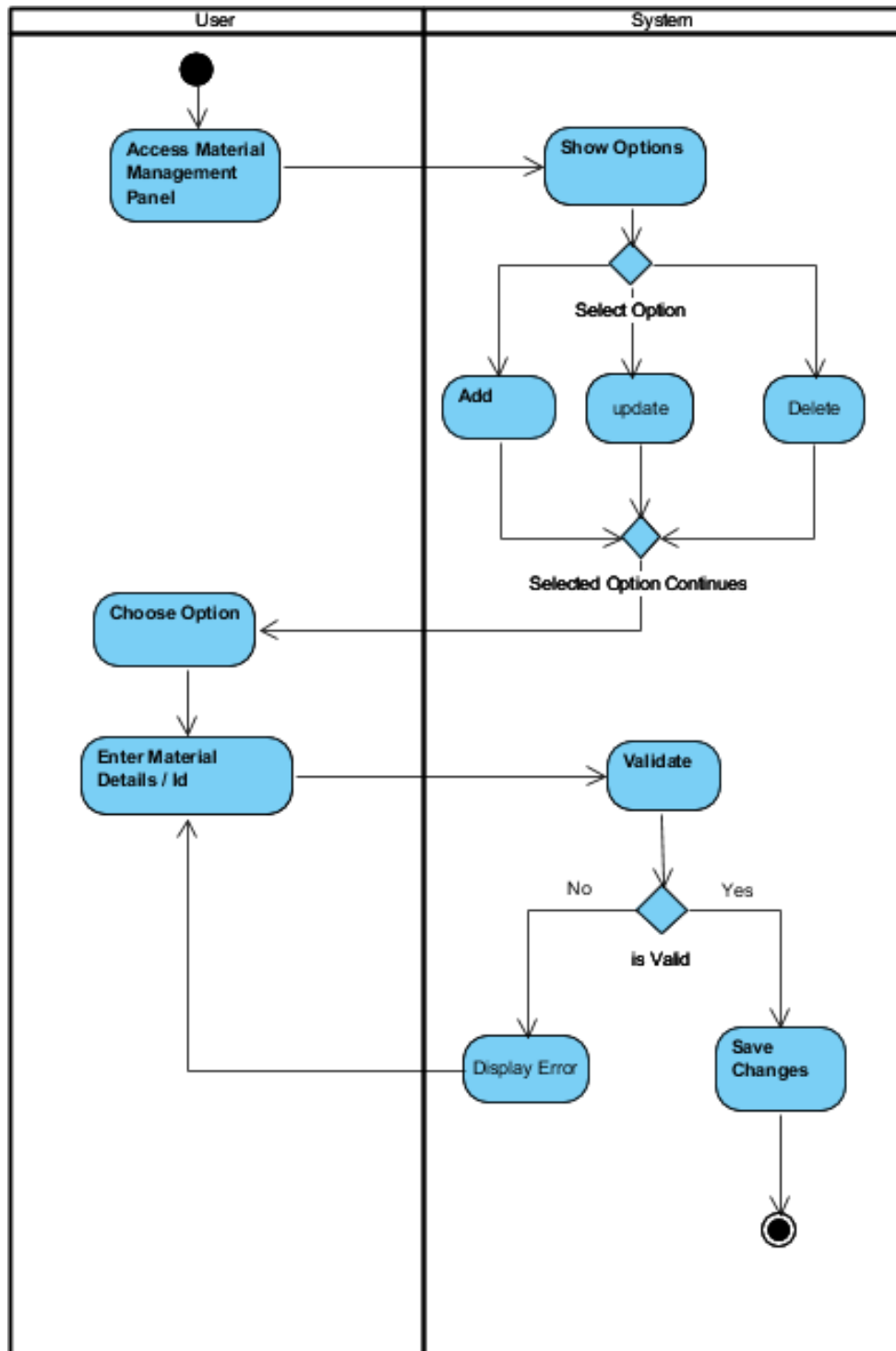
Figure 4. 14:Activity diagram for Material items CRUD

4.4.4 Entity Relationship Diagram
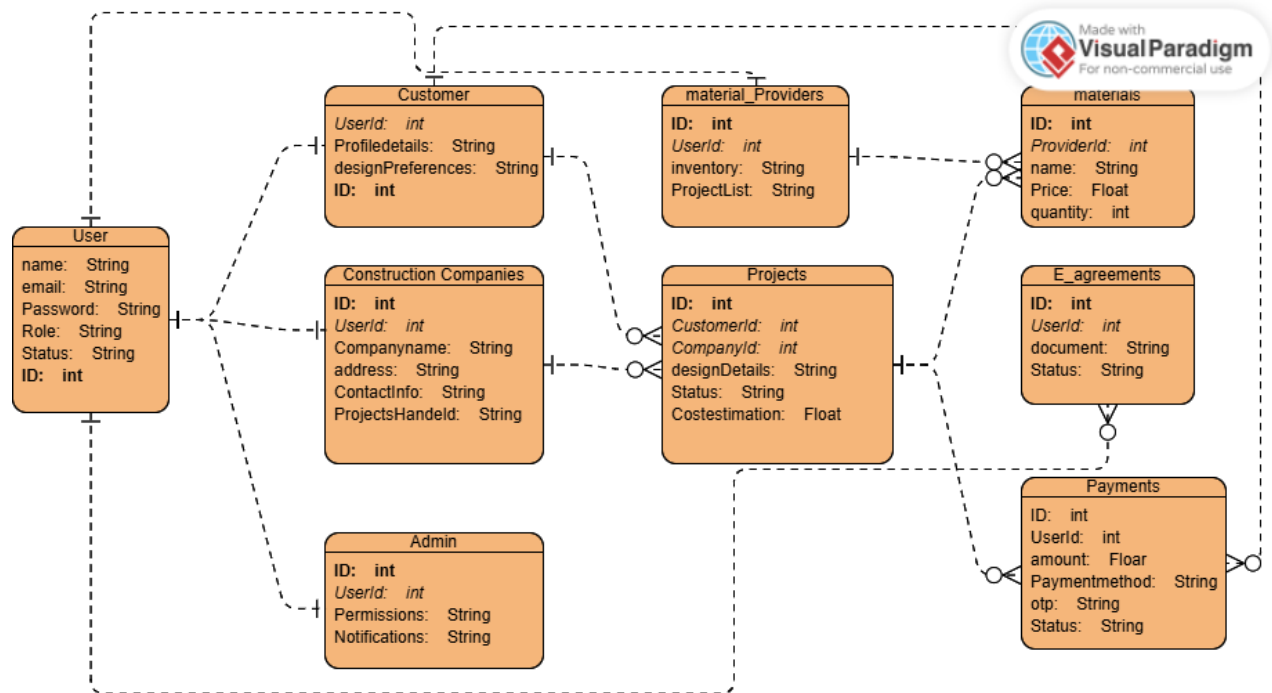
Figure 4. 15:Entity Relationship Diagram

4.4.5 Data Flow Diagram

We create Data Flow Diagram (DFD) to visually represents how data moves through a system. Level 1 DFD breaks down the main system process into sub processes, while Level 2 provides a more detailed view of those sub processes and their data interactions.

4.4.5.1 Level 1 DFD
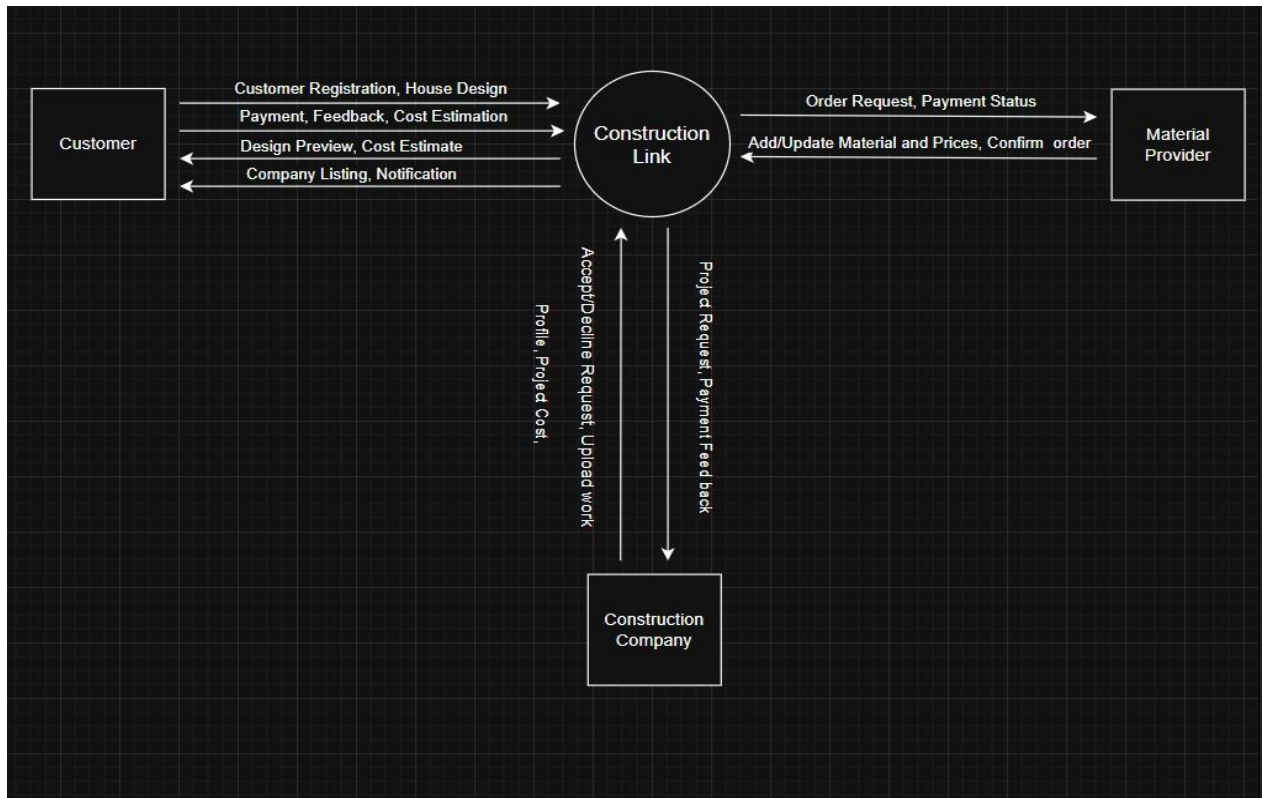
Figure 4. 16: Level 1 Data flow Diagram

4.4.5.2 Level 2 DFD
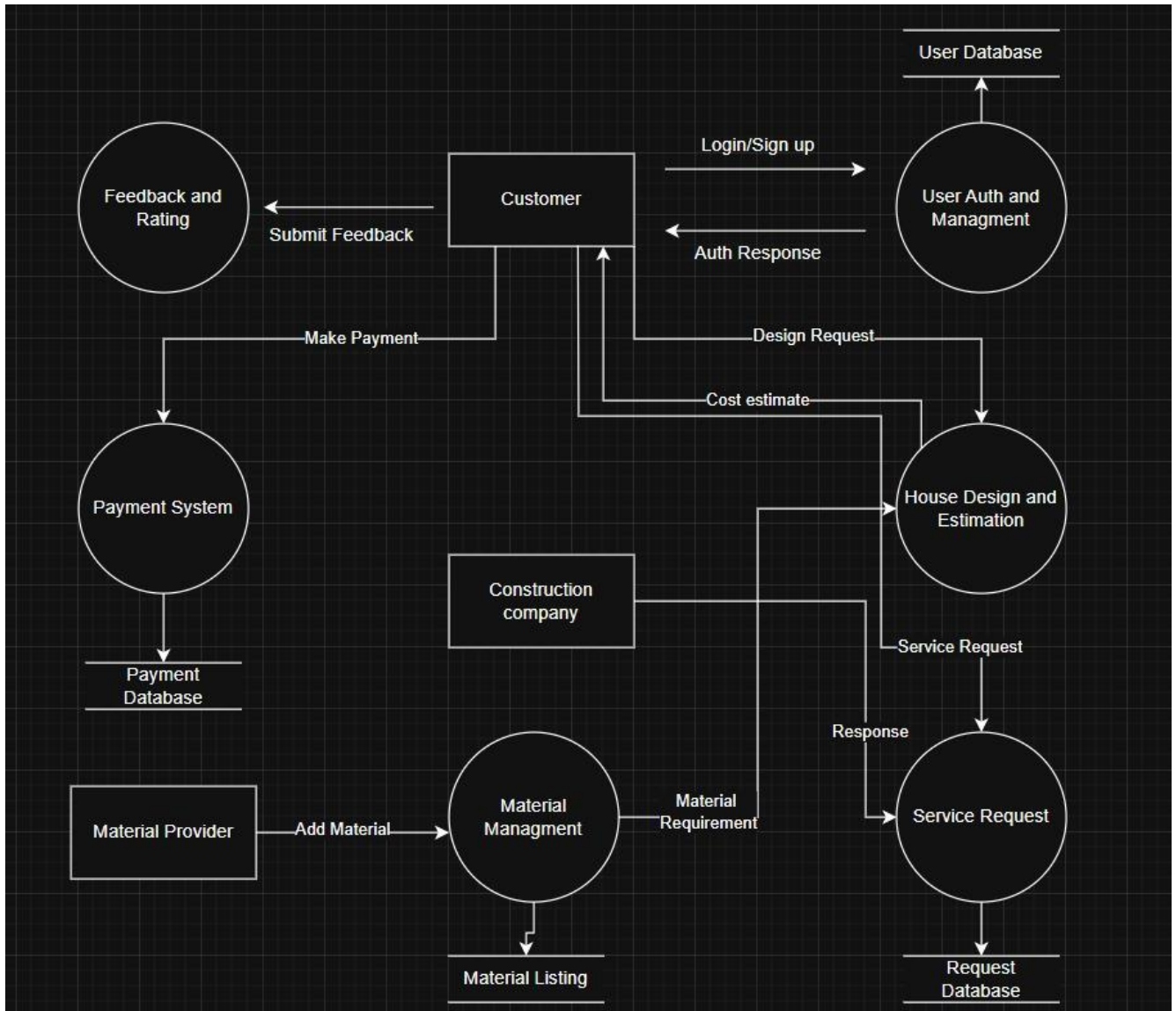
Figure 4. 17: Level 2 Data Flow Diagram

Chapter 5: Implementation

5.1 IDE, Tools and Technologies

5.1.1 Front-End:

6.1.1. HTML

6.1.2. CSS

6.1.3. JavaScript

5.1.2 Back-End:

6.1.1. Php

6.1.2. Node Js

6.1.3. Three.Js

5.1.3 Database:

6.1.1. MySQL

5.1.4 Tools:

6.1.1. VS Code

6.1.2. Visual Paradigm

6.1.3. Git & GitHub

5.2   Best Practices / Coding Standard

1. external stylesheets and scripts

2. separation of concerns

3. Error Handling

4. proper indentation

Chapter 6: Testing

6.1 Test Report for login

In this section we will do the testing of the login module it include unit testing, Integration testing, functional testing, security testing

6.1.1. Unit Testing

Unit testing focuses on verifying that individual components of the login system work correctly in isolation.

Tools Used

- PHPUnit for PHP function testing
- Jest for frontend JavaScript functionality

Test Cases

Test ID	Description	Input	Expected Output	Result
UT-01	Verify email validation	Valid email: user@example.com	Accept input	PASS
UT-02	Verify email validation	Invalid email: user.example	Reject input	PASS
UT-03	Verify password field	Empty password	Form validation error	PASS
UT-04	Test password_verify function	Known password hash pair	True for correct password	PASS
UT-05	Test session creation	Valid login credentials	Session variables set correctly	PASS

Table 25:Unit Test Cases for login

6.1.2. Integration Testing

Integration testing focuses on verifying that different components work correctly together.

Modules Tested Together

- Login form + PHP backend
- Database connection + user authentication
- Session management + redirection logic

Tools Used

- Postman for API testing
- Selenium for browser automation

Results

Test ID	Description	Expected Outcome	Result
IT-01	Database connection	Successful connection to MySQL	PASS
IT-02	Form submission to backend	Form data correctly processed by PHP	PASS
IT-03	Login with valid credentials	User authenticated and redirected	PASS
IT-04	Login with invalid credentials	Error message displayed	PASS
IT-05	Session management	Session variables correctly set	PASS
IT-06	Role-based redirection	User redirected based on role	PASS

Table 26: Result of integration testing

6.1.3 Functional Testing

Testing specific functions of the login system to ensure they work as expected.

Functions Tested

Test ID	Function	Expected Behavior	Result
FT-01	Email authentication	Verify user exists in database	PASS
FT-02	Password verification	Correctly match hashed passwords	PASS
FT-03	Email verification check	Only allow verified users to login	PASS
FT-04	Role-based redirection	Direct users to correct dashboard	PASS
FT-05	"Forgot Password" link	Navigate to password reset page	PASS
FT-06	Google login button	Initiate OAuth flow	FAIL - URL not configured properly
FT-07	Error message display	Show appropriate error messages	PASS

Table 27:Functions Tested table of login

6.1.4 Security Testing

Common Vulnerabilities Tested

Vulnerability	Testing Method	Result	Recommendation
SQL Injection	Attempted injection via login form	PASS	PDO with parameterized queries is secure
XSS (Cross-Site Scripting)	Tested input fields with script tags	PASS	Input is properly sanitized
CSRF (Cross-Site Request Forgery)	Tested form submission from external site	FAIL	Implement CSRF token
Password Storage	Reviewed password handling code	PASS	Using password_hash and password_verify
Session Security	Analyzed session management	PASS	Session started securely
Error Information Leakage	Reviewed error messages	PASS	Generic error messages for invalid credentials

Table 28: Security testing of login

6.2 Test Report for Signup

I'll conduct comprehensive testing on your signup functionality, analyzing both the Signup.html and signup.php files. Here's a detailed testing report:

6.2.1. Unit Testing

Unit testing involves testing individual components of the signup system in isolation to ensure each part functions correctly.

Tools Used

- PHPUnit for PHP function testing
- Jest for JavaScript validation

Test Cases

Test ID	Description	Input	Expected Output	Result
UT-01	Email validation (server-side)	Valid email: user@example.com	Accept input	PASS
UT-02	Email validation (server-side)	Invalid email: user@example	Reject with alert	PASS
UT-03	Password complexity validation	Password: Test1@	Accept input	PASS
UT-04	Password complexity validation	Password: test123	Reject with alert	PASS
UT-05	Password matching check	Matching passwords	Accept input	PASS
UT-06	Password matching check	Non-matching passwords	Reject with alert	PASS
UT-07	Email uniqueness check	New email	Accept input	PASS
UT-08	Email uniqueness check	Existing email	Reject with alert	PASS
UT-09	Verification code generation	Any valid input	Unique code generated	PASS

Table 29: Test cases for signup module

6.2.2. Integration Testing

Integration testing verifies that different components work together correctly.

Modules Tested Together

- Form submission + PHP backend
- Database operations + email verification system
- Frontend validation + server-side validation

Tools Used

- Postman for API testing
- Selenium for browser automation

Results

Test ID	Description	Expected Outcome	Result
IT-01	Form submission to PHP backend	Data correctly processed	PASS
IT-02	Database connection and user insertion	User added to database	PASS
IT-03	Email verification system	Email sent with verification link	PASS
IT-04	Redirection after successful signup	Redirect to confirmation page	PASS
IT-05	Error handling for duplicate email	Alert displayed	PASS
IT-06	Error handling for invalid input	Appropriate alerts shown	PASS
IT-07	PHPMailer integration	Email sent successfully	PASS (With valid credentials)

Table 30: result of intergration testing of sign up

6.2.3. Functional Testing

Testing specific functions of the signup system to ensure they work as expected.

Functions Tested

Test ID	Function	Expected Behavior	Result
FT-01	Email validation	Properly validate email format	PASS
FT-02	Password complexity check	Enforce password requirements	PASS
FT-03	Email uniqueness verification	Prevent duplicate accounts	PASS
FT-04	Password hashing	Securely hash using BCRYPT	PASS
FT-05	Verification code generation	Create unique verification code	PASS
FT-06	Email sending	Send verification email	PASS (With correct SMTP credentials)
FT-07	Google signup button	Initiate OAuth flow	FAIL - URL not configured properly
FT-08	Form submission	Submit data to backend	PASS
FT-09	alertAndRedirect function	Show alert and redirect user	PASS

Table 31:function tested of signup

6.2.4. Security Testing

Common Vulnerabilities Tested

Vulnerability	Testing Method	Result	Recommendation
SQL Injection	Attempted injection via signup form	PASS	PDO with parameterized queries is secure
XSS (Cross-Site Scripting)	Tested input fields with script tags	PASS	Input is properly sanitized
CSRF (Cross-Site Request Forgery)	Tested form submission from external site	FAIL	Implement CSRF token
Password Storage	Reviewed password handling code	PASS	Using password_hash with BCRYPT
Email Validation	Tested with various formats	PASS	Using filter_var with FILTER_VALIDATE_EMAIL
Information Disclosure	Analyzed error messages	PASS	Errors don't reveal sensitive info
Password Complexity	Tested weak passwords	PASS	Strong regex validation implemented
Session Security	Reviewed session management	NEEDS IMPROVEMENT	Implement secure session handling after signup

Table 32: security testing of signup

6.3. Test Report for Design Module

In this section we perform the testing of Create Design module. In which user can create design in 2d and visualize it in 3d.

6.3.1. Unit Testing

Unit testing focuses on testing individual components of the system in isolation to ensure they function correctly.

Tools Used

- PHPUnit for PHP backend functions
- Jest for JavaScript functions
- Mocha for Node.js components

Test Cases

Test ID	Component	Description	Expected Result	Actual Result	Status
UT-01	Login Authentication	Test user authentication with valid credentials	User session created, redirect to correct dashboard	Session created, proper redirection	PASS
UT-02	Login Authentication	Test with invalid credentials	Error message displayed	Error message shown	PASS
UT-03	Wall Creation	Create wall with valid dimensions	Wall created in 2D & 3D views	Wall properly rendered	PASS
UT-04	Project Saving	Save project with valid project name	Project saved to database	Project saved successfully	PASS
UT-05	Material Estimation	Calculate materials for simple design	Accurate material estimates	Calculations match expected values	PASS
UT-06	Session Management	Test session timeout after inactivity	Session destroyed, redirect to login	Session expired correctly	PASS
UT-07	3D Rendering	Test Three.js canvas initialization	3D canvas rendered correctly	Canvas initialized properly	PASS
UT-08	Design API	Test project data retrieval API	JSON response with correct project data	Proper data returned	PASS
UT-09	Form Validation	Test signup form validation	Invalid inputs rejected	Proper validation errors	PASS
UT-10	Toast Notifications	Test notification system	Toast messages appear and disappear	Notifications work correctly	PASS

Table 33:Test cases for design module

6.3.2. Integration Testing

Integration testing verifies that different components of the system work together correctly.

Modules Tested Together

- Frontend design UI + Backend storage
- 2D drawing + 3D rendering systems
- Authentication + Project management
- Material estimation + Provider database

Tools Used

- Selenium for automated browser testing
- Postman for API testing
- Chrome DevTools for network inspection

Results

Test ID	Integration Point	Description	Expected Result	Actual Result	Status
IT-01	Login + Session	Login flow and session creation	User authenticated and session maintained	Session created correctly	PASS
IT-02	2D + 3D Integration	Changes in 2D view reflected in 3D	3D model updates with 2D changes	Views sync correctly	PASS
IT-03	Project Save + DB	Save project data to database	Project data stored & retrievable	Data saved correctly	PASS
IT-04	Material Estimation + Provider DB	Get material costs from providers	Material costs calculated correctly	Calculations match expected	PASS
IT-05	Session + Project Loading	Load user's projects based on session	Only user's projects shown	Correct projects loaded	PASS
IT-06	Session + Authorization	Check role-based access control	Correct access based on user role	Proper access control	PASS
IT-07	API + Frontend	API endpoints integration with frontend	Frontend displays API data correctly	Data displayed properly	PASS
IT-08	Google Auth + Session	OAuth integration with session management	Google login creates valid session	OAuth flow works	FAIL (config needed)
IT-09	Export + PDF Generation	Generate PDF from design	PDF created with design elements	Export works correctly	PASS
IT-10	Material Calc + Estimation Page	Calculated data shown on estimation page	Estimation page displays correct values	Data shown correctly	PASS

Table 34:Integration Testing results for design module

6.3.3. Functional Testing

Functional testing ensures that the application functions as expected according to requirements.

Functions Tested

Test ID	Function	Description	Expected Result	Actual Result	Status
FT-01	User Login	Login with valid credentials	User authenticated	Authentication successful	PASS
FT-02	User Registration	Register new account	Account created	Registration works	PASS
FT-03	Create Project	Create new design project	Project initialized	Project creation works	PASS
FT-04	Save Project	Save current design	Design saved to database	Saving works	PASS
FT-05	Load Project	Load existing project	Project loaded correctly	Loading works	PASS
FT-06	Delete Project	Delete existing project	Project removed from database	Deletion works	PASS
FT-07	Wall Creation	Add wall to design	Wall rendered in 2D and 3D	Wall creation works	PASS
FT-08	Door Addition	Add door to wall	Door shown in design	Door addition works	PASS
FT-09	Window Addition	Add window to wall	Window shown in design	Window addition works	PASS
FT-10	Beam & Column	Add structural elements	Beams and columns rendered	Structural elements work	PASS
FT-11	Roof Creation	Add roof to design	Roof rendered in 3D	Roof creation works	PASS
FT-12	Floor Creation	Add floor to design	Floor rendered in 3D	Floor creation works	PASS
FT-13	Material Estimation	Calculate required materials	Accurate material list	Calculation works	PASS
FT-14	Provider Cost Calculation	Calculate costs from providers	Accurate cost calculation	Cost calculation works	PASS
FT-15	Export as JPG	Export design as image	JPG file created	Export works	PASS
FT-16	Export as PDF	Export design as PDF	PDF file created	Export works	PASS
FT-17	Project Search	Search saved projects	Relevant projects shown	Search works	PASS
FT-18	Session Timeout	Test inactivity timeout	Session expires after timeout	Timeout works	PASS
FT-19	Wall Editing	Modify existing wall	Wall updated correctly	Editing works	PASS
FT-20	Design Restoration	Restore design from session	Design loaded from sessionStorage	Restoration works	PASS

Table 35:Functional testing of design module

6.3.4. Security Testing

Common Vulnerabilities Tested

Vulnerability	Testing Method	Result	Recommendations
SQL Injection	Testing login forms and query parameters	PASS	PDO with parameterized queries provides protection
XSS (Cross-Site Scripting)	Attempted script injection in input fields	PASS	Input validation and sanitization working
CSRF (Cross-Site Request Forgery)	Attempted form submission from external site	FAIL	Implement CSRF tokens for form submissions
Authentication Bypass	Attempted to access restricted pages	PASS	Session validation works properly
Session Hijacking	Analysis of session cookie settings	PARTIAL	Set HttpOnly and Secure flags on session cookies
Insecure Direct Object References	Tried accessing other users' projects	PASS	User ID validation prevents unauthorized access
Error Information Disclosure	Analyzed error messages	PARTIAL	Some error messages reveal too much information
Password Storage	Reviewed password hashing implementation	PASS	Proper BCRYPT hashing implemented
API Security	Tested API endpoints for proper authentication	PASS	API routes require authentication
File Upload Vulnerabilities	N/A (No file upload in current system)	N/A	N/A

Table 36:Security testing of design module

6.4. Test report for material providers

6.4.1. Unit Testing Data

Test ID	Component	Test Case Description	Input	Expected Output	Actual Output	Status
UT-001	upload_material.php	Upload new material with valid data	Form with all required fields	JSON with success=true, material details	{"success", "material":{...}}	PASS
UT-002	upload_material.php	Upload without required fields	Form missing material name	Error message for required field	{"success", "errors":{"materialName":"Material name is required."}}	PASS
UT-003	edit_material.php	Edit material with valid data	Form with updated price	JSON with success=true, updated material	{"success", "material":{...}}	PASS
UT-004	edit_material.php	Edit with no changes	Form with same data	No changes notification	{"success", "message":"No changes were made."}	PASS
UT-005	delete_material.php	Delete existing material	material_id=5	JSON with success=true	{"success"}	PASS
UT-006	delete_material.php	Delete non-existent material	material_id=999	Error message	{"success", "message":"Material not found..."}	PASS
UT-007	view_orders.php	Accept pending order	order_id=12	Order status updates to "confirmed"	{"success"}	PASS
UT-008	view_orders.php	Reject pending order	order_id=13	Order status updates to "order rejected"	{"success"}	PASS
UT-009	update_delivery_info.php	Set delivery time	Valid form data	JSON with success=true	{"success"}	PASS
UT-010	get_order_count.php	Fetch pending orders count	No input needed	Count of pending orders	{"count":3}	PASS

Table 37: Unit Testing of material providers

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6.4.2. Integration Testing Data

Test ID	Modules	Test Description	Test Steps	Expected Result	Actual Result	Status
IT-001	MaterialProviders + upload_material	Upload material from dashboard	1. Open dashboard 2. Click "Upload Items" 3. Fill form & submit	Material added to dashboard	Material displayed on dashboard	PASS
IT-002	MaterialProviders + edit_material	Edit existing material	1. Click edit on material 2. Change price 3. Submit form	Material updated with new price	Material details updated	PASS
IT-003	MaterialProviders + delete_material	Delete material from dashboard	1. Click delete on material 2. Confirm deletion	Material removed from dashboard	Material no longer displayed	PASS
IT-004	view_orders + update_order_status	Accept order process	1. View pending orders 2. Click "Accept Order" 3. Check status change	Order status changes to "confirmed"	Status updated correctly	PASS
IT-005	update_order_status + store_time	Timer tracking on order accept	1. Accept pending order 2. Check timer data in DB	Timer data stored in time_storage table	Data stored correctly	PASS
IT-006	view_orders + save_delivery_details	Set delivery information	1. View confirmed order 2. Set delivery time 3. Check order status	Delivery details saved, status updated	Details saved correctly	PASS
IT-007	customer_payments + update_delivery_info	Update delivery from payments page	1. Open payments page 2. Update delivery info 3. Check details	Delivery info updated	Information updated correctly	PARTIAL PASS
IT-008	Order flow from pending to completed	Complete order flow	1. Accept order 2. Set delivery 3. Wait for customer confirm 4. Check status	Order moves through all statuses	Order completed successfully	PASS
IT-009	Order cancellation due to inactivity	Timer expiration	1. Leave order pending 2. Wait for timer to expire	Order auto-cancelled due to inactivity	Cancelled with correct status	PASS
IT-010	Escrow payment receiving and tracking	Process escrow payment	1. Customer pays 2. Check payment notifications 3. Verify funds held status	Payment received notification shown	Payment tracked correctly	PASS

Table 38:Integration testing of material providers

6.4.3. Functional Testing Data

Function ID	Function Name	Test Description	Test Data	Expected Result	Actual Result	Status
FT-001	Provider Dashboard Display	Load MaterialProviders.php	user_id=5	Dashboard loads with materials	Dashboard displayed correctly	PASS
FT-002	Material Upload Form	Open upload modal	Click "Upload Items"	Modal opens with form	Form displayed correctly	PASS
FT-003	Material Validation	Submit invalid material	Missing required fields	Validation errors shown	Errors displayed correctly	PASS
FT-004	Material Editing	Edit existing material	Update price from 500 to 600	Material price updated	Price updated successfully	PASS
FT-005	Material Deletion	Delete material	Click delete button	Material removed from database	Deletion successful	PASS
FT-006	Order Notifications	Order badge display	New pending order	Badge shows count of pending orders	Badge displays correct count	PASS
FT-007	Order Timer Display	Timer for pending order	Newly created order	10-minute countdown displays	Timer works correctly	PASS
FT-008	Order Acceptance	Accept pending order	Click "Accept Order"	Order status changes to "confirmed"	Status updated correctly	PASS
FT-009	Order Rejection	Reject pending order	Click "Reject Order"	Order status changes to "rejected"	Status updated correctly	PASS
FT-010	Auto-Cancel Inactivity	Timeout on pending order	Wait 10 minutes	Order auto-cancelled	Status updated to "inactivity_cancelation"	PASS
FT-011	Delivery Date Setting	Set delivery date and message	Form with future date	Delivery information saved	Information saved correctly	PASS
FT-012	Payment Status Display	View escrow payment	Open customer_payments.php	Payments in escrow displayed	Correct payment information shown	PASS

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Function ID	Function Name	Test Description	Test Data	Expected Result	Actual Result	Status
FT-013	Sales History Display	View completed sales	Open sales_done.php	Completed sales displayed	Sales history displayed correctly	PASS
FT-014	Filter Sales Data	Filter by date range	Start and end date	Sales filtered by date range	Correct filtered results shown	PASS
FT-015	Edit Provider Profile	Update provider information	New phone number	Profile updated with new info	Profile updated successfully	PASS

Table 39:Functional testing of material providers

6.4.4. Security Testing Data

Test ID	Security Aspect	Test Description	Test Input	Vulnerability Found	Severity	Status
ST-001	Authentication	Access pages without login	Direct URL to provider pages	Redirected to login	N/A	PASS
ST-002	Authorization	Access other provider's materials	Modify material ID in request	Error: no permission	N/A	PASS
ST-003	SQL Injection	Inject SQL in material name	material_name="'; DROP TABLE users; --"	No vulnerability	N/A	PASS
ST-004	XSS	Script in description field	description="<script>alert('XSS')</script>"	Properly escaped	N/A	PASS
ST-005	CSRF	Form submission from external site	External POST to update_delivery_info.php	Session validation prevents attack	N/A	PASS
ST-006	File Upload	Upload malicious file	PHP file with .jpg extension	Extension validation blocks attack	N/A	PASS
ST-007	Authorization	Modify other provider's order	Change service_provider_id in request	Error: no permission	N/A	PASS
ST-008	Parameter Tampering	Modify material price	Send negative price value	Validation prevents negative prices	N/A	PASS
ST-009	Directory Traversal	Upload path manipulation	image="../config.php"	Path sanitization prevents attack	N/A	PASS
ST-010	Access Control	Access sales_done.php directly	Direct URL	Redirected to login	N/A	PASS

Table 40:Security testing of material providers

6.4.5. Usability Testing Data

Test ID	User Type	Feature Tested	Scenario	User Feedback	Result	Status
UAT-001	Material Provider	Dashboard Navigation	Navigate through main sections	"Navigation is intuitive and well-organized"	Positive	PASS
UAT-002	Material Provider	Upload Material	Complete entire upload process	"Form validation is helpful but price limits are too restrictive"	Needs improvement	PARTIAL PASS
UAT-003	Material Provider	View Orders	Check pending and process orders	"Order status is clearly visible, actions are easy to find"	Positive	PASS
UAT-004	Material Provider	Payment Tracking	View payments in escrow	"Payment information is clear, but would like more details on fees"	Mostly positive	PASS
UAT-005	Material Provider	Setting Delivery	Set delivery time for order	"Process is straightforward, calendar makes selection easy"	Positive	PASS
UAT-006	Material Provider	Sales History	View past completed sales	"Filter by date is useful, would like export option"	Mostly positive	PASS
UAT-007	Material Provider	Edit Profile	Update company information	"Form is easy to use, but unclear which fields can be edited"	Needs improvement	PARTIAL PASS
UAT-008	Material Provider	Mobile Responsiveness	Use dashboard on smartphone	"Layout works on mobile but some buttons are too small"	Needs improvement	PARTIAL PASS
UAT-009	Material Provider	Order Timers	Monitor countdown timers	"Visual timer helps track order deadlines, color change for urgency is helpful"	Positive	PASS
UAT-010	Material Provider	Material Management	Edit and delete materials	"Actions are intuitive, confirmation for delete is	Positive	PASS

Table 41: Usability testing of material providers

6.4.6. Performance Testing Data

Test ID	Test Type	Test Tool	Test Parameters	Metric	Result	Benchmark	Status
PT-001	Page Load	Lighthouse	MaterialProviders.php	Performance Score	82/100	>80	PASS
PT-002	Page Load	Lighthouse	customer_payments.php	Performance Score	78/100	>80	FAIL
PT-003	Page Load	Lighthouse	sales_done.php	Performance Score	84/100	>80	PASS

Test ID	Test Type	Test Tool	Test Parameters	Metric	Result	Benchmark	Status
PT-004	Page Load	Lighthouse	view_orders.php	Performance Score	76/100	>80	FAIL
PT-005	Database	Custom Query Timing	Material Listing	Query Time	45ms	<100ms	PASS
PT-006	Database	Custom Query Timing	Order Listing	Query Time	120ms	<100ms	FAIL
PT-007	API Response	JMeter	upload_material.php	Response Time	180ms	<200ms	PASS
PT-008	API Response	JMeter	update_delivery_info.php	Response Time	90ms	<200ms	PASS
PT-009	Load Test	JMeter	10 concurrent users	Average Response Time	220ms	<500ms	PASS
PT-010	Load Test	JMeter	50 concurrent users	Average Response Time	780ms	<500ms	FAIL
PT-011	Memory Usage	Custom	Process 100 orders	Peak Memory	38MB	<64MB	PASS
PT-012	File Upload	Custom	5MB image upload	Upload Time	1.8s	<3s	PASS

Table 42:Performance testing of material providers

6.4.7. Regression Testing Data

Test ID	Related Change	Component Tested	Test Description	Before Change	After Change	Status
RT-001	Material price validation	upload_material.php	Submit material with high price	Accepted any price	Validates against material-specific limits	PASS
RT-002	Order timer display	view_orders.php	Check timer format	Only showed minutes	Shows minutes:seconds	PASS
RT-003	Payment notification	customer_payments.php	New payment alert	No notification	Visual and sound notification	PASS
RT-004	Mobile responsive UI	MaterialProviders.php	Mobile display	Poor layout on small screens	Improved responsive design	PASS
RT-005	Sales date filter	sales_done.php	Filter by date range	No filtering available	Date range filter works correctly	PASS
RT-006	Image optimization	upload_material.php	Upload large image	Slow upload, no resizing	Faster upload with resizing	PASS
RT-007	Order auto-cancel	view_orders.php	Timer expiration behavior	Manual cancellation only	Automatic cancellation on timeout	PASS
RT-008	Payment badge count	MaterialProviders.php	Count display for new payments	Static count	Dynamic updates with AJAX	PASS
RT-009	Material name	edit_material.php	Edit with duplicate name	Allowed duplicates	Validates uniqueness	PASS

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Test ID	Related Change	Component Tested	Test Description	Before Change	After Change	Status
	validation					
RT-010	Profile image	edit_material_provider.php	Upload profile image	Fixed dimensions	Responsive cropping	PASS

Table 43:Regression Testing of material providers

6.5. Test report for Customer Panel
6.5.1. Unit Testing Data

Test ID	Component	Test Case Description	Input	Expected Output	Actual Output	Status
UT-001	create_payment_intent.php	Create valid payment intent	order_id=35	JSON with success=true, payment_intent_id	{"success", "payment_intent_id":"pi_1R6fXpIEavc19MeP0KlbJfU8"}	PASS
UT-002	create_payment_intent.php	Handle missing order_id	(empty)	Error message	{"error":"Order ID is missing."}	PASS
UT-003	update_stock.php	Reduce product quantity	order_id=42	Updated stock and success response	{"success", "order_id":42, "updated_products":[{"product_id":123,"product_type":"material","old_stock":50,"new_stock":45}]}	PASS
UT-004	delievery_info.php	Form validation	Missing required fields	Form error validation	Form not submitted, error markers displayed	PASS
UT-005	server.js (release-funds)	Process payment release	{"paymentIntentId":"pi_1R6gXpIEavc19MeP0KlbJfU8"}	Success response	{"success", "status":"funds_released"}	PASS
UT-006	add_to_cart_action.php	Add product to cart	product_id=15, quantity=2	Cart updated, success response	{"success", "cart_count":2}	PASS
UT-007	clear_cart.php	Clear all cart items	user_id=123	Empty cart confirmation	{"success"}	PASS
UT-008	get_order_status.php	Retrieve order status	order_id=35	Current order status	{"status":"pending", "created_at":"2025-05-04 14:30:00"}	PASS
UT-009	update_order_status.php	Update order to completed	order_id=36, new_status="completed"	Status updated confirmation	{"success"}	PASS
UT-	get_payment_de	Get payment	order_id=	Payment details	{"payment_intent_id":	PASS

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Test ID	Component	Test Case Description	Input	Expected Output	Actual Output	Status
010	tails.php	info	37	JSON	"pi_1R6gHpIEavc19MeP0ZabCdE8", "payment_status":"funds_held"}	

Table 44:Unit testing for customer panel

6.5.2. Integration Testing Data

Test ID	Modules	Test Description	Test Steps	Expected Result	Actual Result	Status
IT-001	Dashboard + Add to Cart	Add product from dashboard to cart	1. Browse dashboard 2. Click "Add to Cart" 3. Check cart	Product added to cart	Product added to cart with correct details	PASS
IT-002	Cart + Checkout	Proceed from cart to checkout	1. View cart 2. Click checkout 3. Fill delivery info	Delivery info page loads with cart items	Delivery info page loaded with all items	PASS
IT-003	Checkout + Payment	Complete payment process	1. Enter delivery info 2. Enter payment details 3. Confirm payment	Payment processed, order created	Payment processed, order #38 created	PASS
IT-004	Payment + Escrow	Funds held in escrow	1. Process payment 2. Check payment status	Payment status "funds_held"	Status correctly set to "funds_held"	PASS
IT-005	Delivery Info + Order Status	Order status updates	1. Submit delivery info 2. Provider confirms 3. Check status	Status changes to "confirmed"	Status updated to "confirmed"	PASS
IT-006	Order Confirmation + Refund	Auto-refund missed delivery	1. Create order 2. Set delivery time 3. Let timer expire	Auto-refund triggered	Refund processed after timer expired	PASS
IT-007	Product View + Stock Update	Stock reduction after purchase	1. View product with stock=10 2. Purchase 2 units 3. Check stock	Stock reduced to 8	Stock correctly updated to 8	PASS
IT-008	Delivery Details + Notifications	Notification when delivery set	1. Provider sets delivery time 2. Check customer notifications	Customer notified	Notification sometimes delayed or missing	PARTIAL PASS
IT-009	Payment + Order History	Order appears in history	1. Complete purchase 2. Check order history	Order visible in history	Order correctly displayed in history	PASS
IT-010	Login + Session	Session persistence	1. Login 2. Add to cart 3. Wait 15min 4. Continue checkout	Session maintained	Session expired after 15min	FAIL

Table 45:Intergration testing for customer panel

6.5.3. Functional Testing Data

Function ID	Function Name	Test Description	Test Data	Expected Result	Actual Result	Status
FT-001	User Login	Valid login credentials	email="test@example.com", password="Test123!"	Successful login	Login successful, redirected to dashboard	PASS
FT-002	User Login	Invalid credentials	email="test@example.com", password="wrong"	Error message	"Invalid credentials" message displayed	PASS
FT-003	Add to Cart	Add single item	product_id=45, quantity=1	Item added to cart	Item added to cart, count updated	PASS
FT-004	Update Cart	Change quantity	item_id=12, quantity=3	Quantity updated	Quantity updated, subtotal recalculated	PASS
FT-005	Remove from Cart	Remove item	item_id=13	Item removed	Item removed from cart	PASS
FT-006	Checkout Form	Complete required fields	Valid address data	Form submits	Form submitted successfully	PASS
FT-007	Payment Processing	Valid card details	Card: 4242424242424242	Payment succeeds	Payment processed successfully	PASS
FT-008	Payment Processing	Invalid card	Card: 4000000000000002	Declined message	"Card declined" error displayed	PASS
FT-009	Email Notification	Order confirmation	order_id=46	Email sent	No email functionality implemented	FAIL
FT-010	Delivery Timer	Countdown functionality	delivery_time="2025-05-07 14:00:00"	Timer counts down	Timer displayed and counted correctly	PASS
FT-011	Order Confirmation	Confirm receipt	order_id=47	Status updates, payment released	Status updated to "completed"	PASS
FT-012	Auto Refund	Expired delivery	delivery_time="2025-05-05 10:00:00"	Auto refund triggered	Refund processed automatically	PASS
FT-013	Service Provider View	See pending orders	provider_id=5	List of pending orders	Orders displayed correctly	PASS
FT-014	Track Order	View order status	order_id=48	Current status displayed	Status and timeline displayed	PASS

Table 46:Functional testing for customer panel

6.5.4. Security Testing Data

Test ID	Security Aspect	Test Description	Test Input	Vulnerability Found	Severity	Status
ST-001	SQL Injection	Test login form	email="' OR 1=1; --"	No vulnerability	N/A	PASS
ST-002	SQL Injection	Test search form	query="'; DROP TABLE users; --"	String concatenation in search.php line 45	Medium	FAIL
ST-003	XSS	Test product comment	comment="<script>alert('XSS')</script>"	No vulnerability	N/A	PASS
ST-004	XSS	Test address field	address="<img src=x onerror=alert('XSS')>"	No vulnerability	N/A	PASS
ST-005	CSRF	Test form submission	External form submission to cart.php	No CSRF tokens	High	FAIL
ST-006	Session Security	Session fixation	Attempt to set session ID	Sessions properly regenerated	N/A	PASS
ST-007	Authentication	Password strength	password="password123"	Weak password accepted	Low	FAIL
ST-008	Payment Security	Stripe key exposure	Check source code	No exposed keys	N/A	PASS
ST-009	File Upload	Test malicious file	order_file.php.jpg	No file upload functionality	N/A	N/A
ST-010	Access Control	Unauthorized access	Direct URL to admin_panel.php	Proper redirection to login	N/A	PASS

Table 47:Security testing for customer panel

6.6.5. Performance Testing Data

Test ID	Test Type	Test Tool	Test Parameters	Metric	Result	Benchmark	Status
PT-001	Page Load	Lighthouse	Homepage	Performance Score	78/100	>80	FAIL
PT-002	Page Load	Lighthouse	Product Page	Performance Score	82/100	>80	PASS
PT-003	Page Load	Lighthouse	Cart Page	Performance Score	85/100	>80	PASS
PT-004	Page Load	Lighthouse	Checkout Page	Performance Score	73/100	>80	FAIL
PT-005	Database	Custom Query Timing	Product Listing (100 items)	Query Time	235ms	<200ms	FAIL
PT-006	Database	Custom Query Timing	Cart Operations	Query Time	45ms	<100ms	PASS

Test ID	Test Type	Test Tool	Test Parameters	Metric	Result	Benchmark	Status
PT-007	API Response	JMeter	create_payment_intent	Response Time	320ms	<500ms	PASS
PT-008	Load Test	JMeter	100 concurrent users	Avg Response Time	1.2s	<2s	PASS
PT-009	Load Test	JMeter	100 concurrent users	Error Rate	0.5%	<1%	PASS
PT-010	Load Test	JMeter	100 concurrent users	Throughput	82 req/sec	>50 req/sec	PASS
PT-011	Memory Usage	Custom	Full checkout process	Peak Memory	64MB	<128MB	PASS
PT-012	CPU Usage	Custom	Full checkout process	Peak CPU	65%	<80%	PASS

Table 48:Performance Testing for customer panel

6.5.6. User Acceptance Testing Data

Test ID	User Type	Feature Tested	Scenario	User Feedback	Result	Status
UAT-001	Customer (Technical)	Product Browsing	Browse and filter products	"Easy to use, filter options are intuitive"	Positive	PASS
UAT-002	Customer (Non-Technical)	Checkout Process	Complete purchase flow	"Simple process but confused by escrow concept"	Needs improvement	PARTIAL PASS
UAT-003	Customer (Mobile User)	Responsive Design	Use site on smartphone	"Payment page is difficult to use on mobile"	Needs improvement	FAIL
UAT-004	Customer (Senior)	Navigation	Find and purchase product	"Font is too small, needs larger buttons"	Needs improvement	PARTIAL PASS
UAT-005	Service Provider	Order Management	Process incoming orders	"Clear interface, easy to update order status"	Positive	PASS
UAT-006	Service Provider	Delivery Scheduling	Set delivery times	"Simple to use, calendar interface is helpful"	Positive	PASS
UAT-007	Financial Dept	Payment Reports	Review payment status	"All necessary information is available"	Positive	PASS
UAT-008	Customer Support	Order Lookup	Find customer orders	"Quick search functionality works well"	Positive	PASS
UAT-009	Customer (Returning)	Saved Information	Use saved delivery address	"Address saved correctly, saved time"	Positive	PASS
UAT-010	New User	Registration	Create new account	"Simple process, email verification worked"	Positive	PASS

Table 49:Acceptane testing for customer panel

6.5.7. Regression Testing Data

Test ID	Related Change	Component Tested	Test Description	Before Change	After Change	Status
RT-001	Session timeout fix	Authentication	Login session persistence	Session expired unexpectedly	Session maintained properly	PASS
RT-002	Stripe API update	Payment processing	Process payment	Successful payment	Still successful with new API	PASS
RT-003	Cart quantity validation	Cart management	Add negative quantity	Allowed negative values	Now prevents negative quantities	PASS
RT-004	Auto-refund implementation	Order status	Missed delivery refund	Manual refund required	Automatic refund processed	PASS
RT-005	Transaction support	Stock management	Concurrent purchases	Occasional incorrect stock	Consistent stock values	PASS
RT-006	Mobile UI improvements	Payment panel	Mobile responsiveness	Difficult to use on mobile	Improved mobile experience	PASS
RT-007	Image optimization	Product pages	Image loading time	Slow image loading	Faster page rendering	PASS
RT-008	Database indexing	Search function	Search performance	Slow search results	Faster response time	PASS
RT-009	Escrow release fix	Payment release	Release funds to seller	Occasional timing issues	Reliable fund release	PASS
RT-010	Cart session fix	Cart persistence	Cart when session expires	Cart emptied on timeout	Cart items preserved	PASS

Table 50:Regression testing for customer panel