BSCS FINAL PROJECT

Software Design Specification

ProLabour: Smart Job Matching Platform for Skilled Laborers

Project Advisor

Asim Raza

Presented by:
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Faculty of Information Technology & Computer Science

University of Central Punjab

Software Design Specification

SDP Phase II

ProLabour: Smart Job Matching Platform for Skilled Laborers

Advisor: Asim Raza

Team: S25BS030

Member Name	Primary Responsibility
Muhammad Sami Khan	Full Stack Development, UI/UX Design/QA/Documentation
Danish Nawaz	Frontend Development
Muhammad Abubakar	Backend Development

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Revision History

Name	Date	Reason For Changes	Version

Abstract

Hiring qualified workers is often difficult, particularly in places such as Pakistan, where current platforms restrict worker sign-ups and keep salary standards inflexible. To tackle existing problems, ProLabour designs a platform that promotes openness, flexibility, and fairness in job matching. By using ProLabour, electricians, plumbers, carpenters, as well as other skilled workers, are able to register without barriers and receive pay according to each job they complete, instead of receiving a set salary. Real-time messaging on ProLabour ensures laborers connect straight with customers, resulting in better and more transparent communication. Geolocation services for discovering local openings and a rating mechanism to recognize reliability are among its features. By harnessing current technological developments, ProLabour seeks to reduce current labor-market gaps and provide a platform that helps workers maintain employment and gives customers more choices from qualified professionals.

1. Introduction

1.1 Product

The software under development is a mobile application code named ProLabour whose key resolution aspect will be the solution to the issue of matching skilled laborers with customers in Pakistan effectively. Its proposed solution is the difficulty experienced by customers to acquire reliable workers, such as electricians, plumbers, or carpenters, and the lack of job opportunities that exist between highly skilled laborers, because of the limitations established by current platforms. The final output will be a program to find the connection between workers and jobs with the help of their skill level, place, and availability. It will also have features such as direct messages, ratings, and reviews so it will be reliable and will be quality like a software package that will be used in this particular application.

1.2 Background

In Pakistan, the labour market is grappling with platforms that centralise everything, allowing only a specific amount of workers and offering them fixed pay rates. In example, some systems such as *Maahir* and *Karsaz* just permit limited number of laborers to signup and pays them a base salary regardless of the amount of work. This may see employees underpaid and customers upset by their inabilities to get assistance. ProLabour is somewhat different, it is decentralized in nature, anyone with skills can join, make direct contact with customers, and they are paid per job accomplished. This is both more equitable to the workers, as well as convenient to the customers.

Compared to other existing platforms, ProLabour does not limit registrations nor impose fixed payment rates making it stand out. After checking the project file from the Project Office, **there is no project similar to this in the project file**.

1.3 Objective(s)/Aim(s)/Target(s)

- **Unlimited registration of skilled laborers:** Permit an unlimited number of skilled laborers to be registered on the platform.
- **Real-time direct interaction:** Enable real-time direct interaction between customers and laborers through an integrated messaging/Network Manager.
- **Rating & review system:** Provide mutual ratings following jobs to develop trust and enhance service quality.
- **Network Manager Feature:** Implement a dedicated component to manage peer-to-peer connections and job coordination among users.
- **Worker availability management:** Allow workers to mark themselves offline when they are not available so that they don't get new requests.
- **Easy-to-use interface:** Give an easy, responsive mobile UI/UX to make the experience better.

- **Pay-per-job reward model:** Introduce a pay-per-job payment system that incentivizes workers per completed job instead of fixed pay.

1.4 Scope

ProLabour shall be an end-to-end mobile platform encompassing:

- User registration and profile creation for laborers and customers.
- Job posting and search functionality with option for filtering.
- Direct messaging channels between laborers and customers.
- Network Manager to create connections among users.
- Rating and review mechanism for quality control.
- Worker availability management through online/offline status.
- Confirmation of job completion.
- Real-time notifications for job status and messages.
- Geolocation services for job matching based on proximity.
- The platform will be offered as a mobile app targeting first the Pakistani market with scope for expansion in the future.

1.5 Business Goals

ProLabour supports these business aims:

- Create a platform that can grow to include as many workers as needed.
- Help workers earn more by paying them per job.
- Make customers happy by connecting them to skilled workers quickly.
- Build trust in the labor market with ratings and reviews.
- Let workers choose when they work, giving them flexibility.

1.6 Document Conventions

This SRS is formatted according to standard documents with headings in bold and use-case tables for functional requirements. External systems or components are indicated in italics.

1.7 Miscellaneous

The team will maintain a good contact to ensure that ProLabour is completed well. The additional information and alterations will be posted when the project progresses.

2. Overall Description

2.1 Product Features

ProLabour will do:

- Let any skilled worker sign up without restrictions.
- Allow customers to post jobs and find workers.
- Enable direct chatting between workers and customers via the *Network Manager*.
- Include ratings and reviews to check quality.
- Let workers set their availability, even offline.
- Send instant updates about jobs or messages.
- Work well on mobile phones.

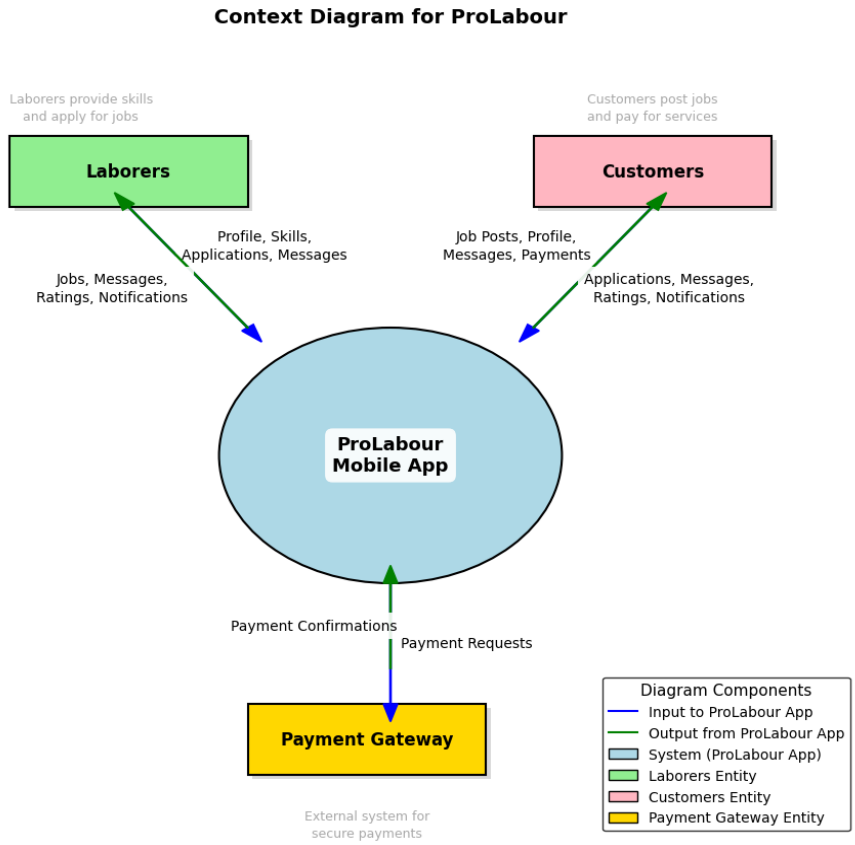
2.2 Functional Description

ProLabour is a mobile application designed to operate within the labor market of Pakistan, and it simplifies the process of establishing contact between professional workers and their clients (electricians, plumbers, and carpenters). It runs on a decentralized model unlike in the traditional systems, where the user is given the freedom to interact directly and have flexible job structures. The major functionality comprises:

- **Open Registration**: Any skilled laborer can create an account, upload their qualifications, and build a profile without restrictions, unlike centralized platforms that limit sign-ups.
- **Job Creation and Discovery**: Customers can post detailed job requests, including location and budget, while laborers browse and apply to opportunities matching their skills and proximity.
- **Real-Time Communication**: An integrated chat system allows laborers and customers to negotiate terms, share updates, and coordinate directly.
- **Trust Mechanism**: A two-way rating and review system lets both parties evaluate each other after job completion, fostering accountability.
- **Flexible Scheduling**: Laborers can set their availability status, enabling them to control when they receive job notifications.

- **Location-Based Matching**: Using geolocation, the app prioritizes nearby job opportunities, reducing travel time for laborers.
- **Secure Payments**: Customers confirm job completion and process payments through the app, ensuring laborers are compensated per job.

This functionality eliminates middlemen, enhances transparency, and provides a user-driven experience, setting ProLabour apart from existing labor market solutions in Pakistan.



2.3 User Classes and Characteristics

The main user categories for ProLabour are:

Laborers/Workers:

- Trade workers like plumbers, electricians, carpenters, and painters.
- Need easy access to employment opportunities and immediate communication with customers.
- Different levels of digital literacy; app interface must be simple and user-friendly.

Customers (Employers):

- Individuals or small companies looking for labor for particular jobs.
- Need to advertise job requirements, search for laborers, and communicate directly with chosen workers.

2.4 Design and Implementation Constraints

CON-1: The application should be able to run smoothly on standard Android smartphones.
CON-2: Should be compatible with Android 10 and above.
CON-3: All core features such as messaging and job search need network connectivity.
CON-4: Adherence to data privacy regulations to secure user data (e.g., user permission for location tracking).
CON-5: Limited backend resources can impact real-time notification and data processing speed.
CON-6: Should be able to manage multiple users concurrently without causing system crashes or data loss.

2.5 Assumptions and Dependencies

Assumptions:

- Users possess smartphones with internet connectivity.
- Laborers are ready to register and utilize the platform.
- Customers are ready to employ laborers via the app.
- Direct interaction between laborers and customers will result in more effective outcomes.

Dependencies:

- Third-party services such as Firebase and Google Maps API.
- Presence of skilled laborers in the target market.

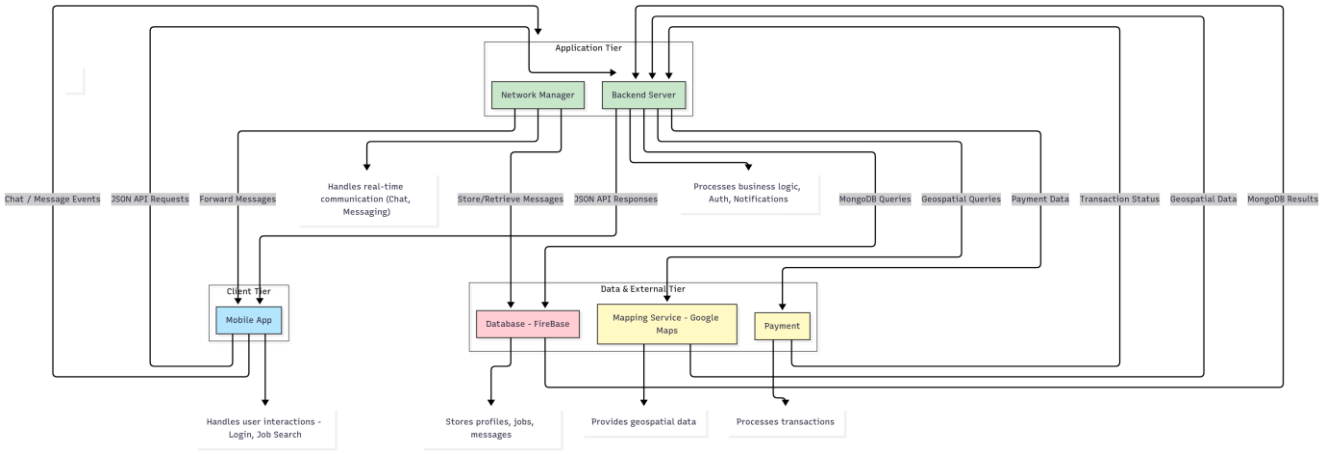
3. Technical Architecture

Supply of skilled workforce through ProLabour system is not Commercial Off-The-Shelf (COTS) product but a custom-built mobile application based on the specific features of connecting skilled labour and customers to each other in Pakistan. It is using a client-server architecture with the mobile app as a client and a backend server that performs business logic, and data management. The system mainly handles real-time processing of functionalities user registration, job, posting, application, and communication.

It consists of large components, which are mobile app, backend server, database, and integration with other services like payment gateway and mapping-services to execute geolocation-based job matching. The data that the system processes and stores include user profiles (both of laborers and customers), job offerings, applications, messages, rating, reviews, payment details and location information.

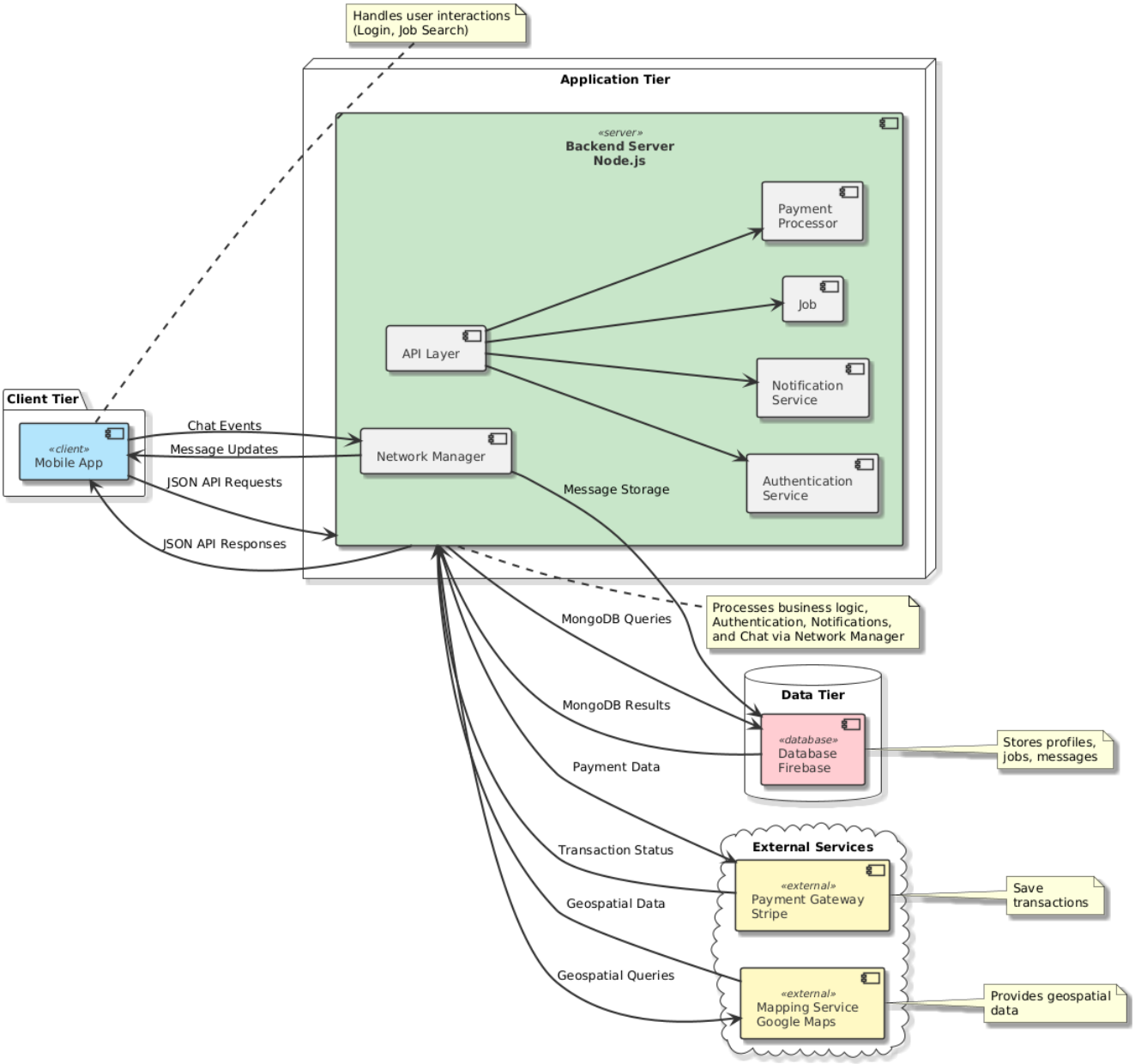
It uses React Native framework and the end-user interface is implemented as a mobile app. The backend which would be built with the help of Node.js would communicate with a Firebase database. The system is Internet-based and therefore can be accessed anywhere, and the system also runs on an elastic cloud.

Here is the High Level Architecture Diagram:

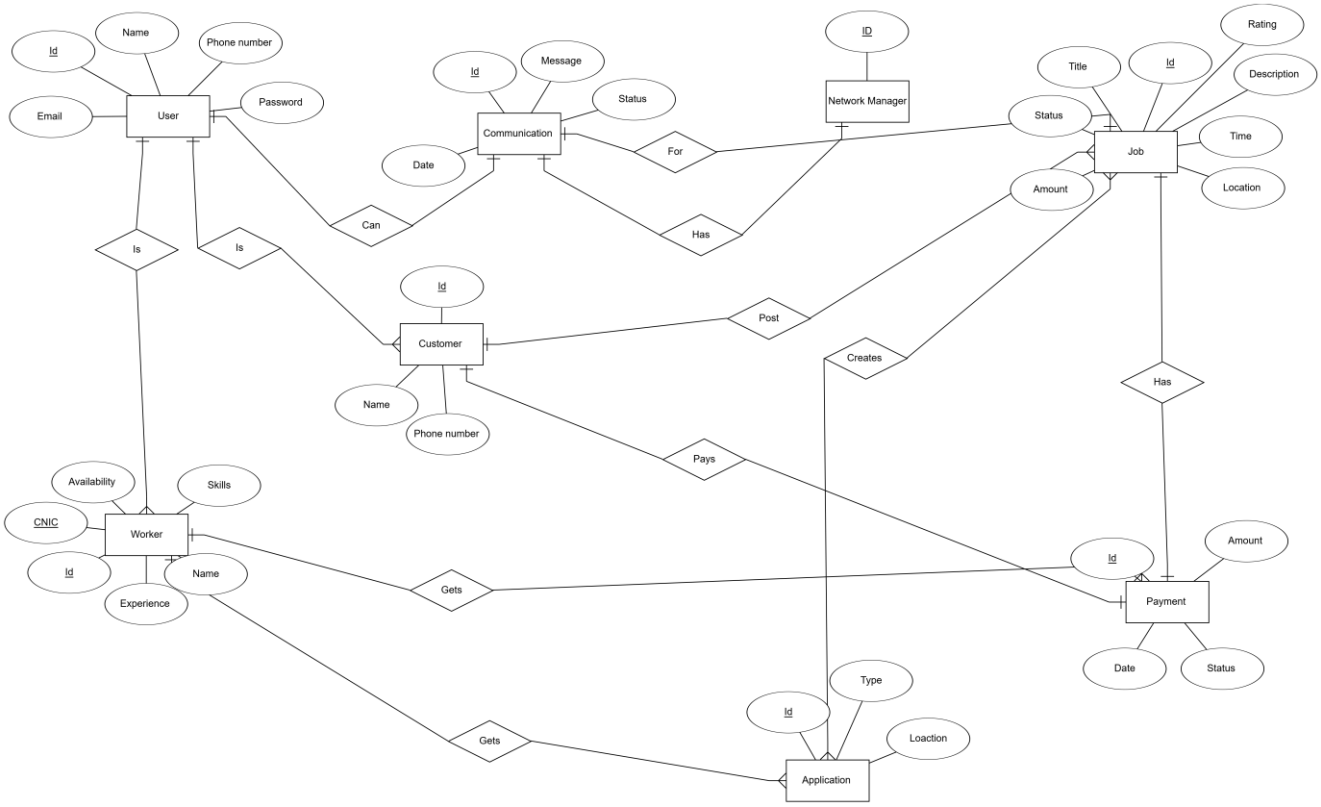


3.1 Application and Data Architecture

1. Component Diagram



2. *ER diagram*


Name
Id
Phone number
Email
User
Password
Id
Message
Status
Date
Communication
For
ID
Network Manager
Rating
Title
Id
Description
Status
Job
Time
Amount
Location
Can
Has
Is
Is
Id
Customer
Post
Creates
Has
Name
Phone number
Pays
Availability
Skills
CNIC
Worker
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Name
Experience
Gets
Amount
Id
Payment
Date
Status
Type
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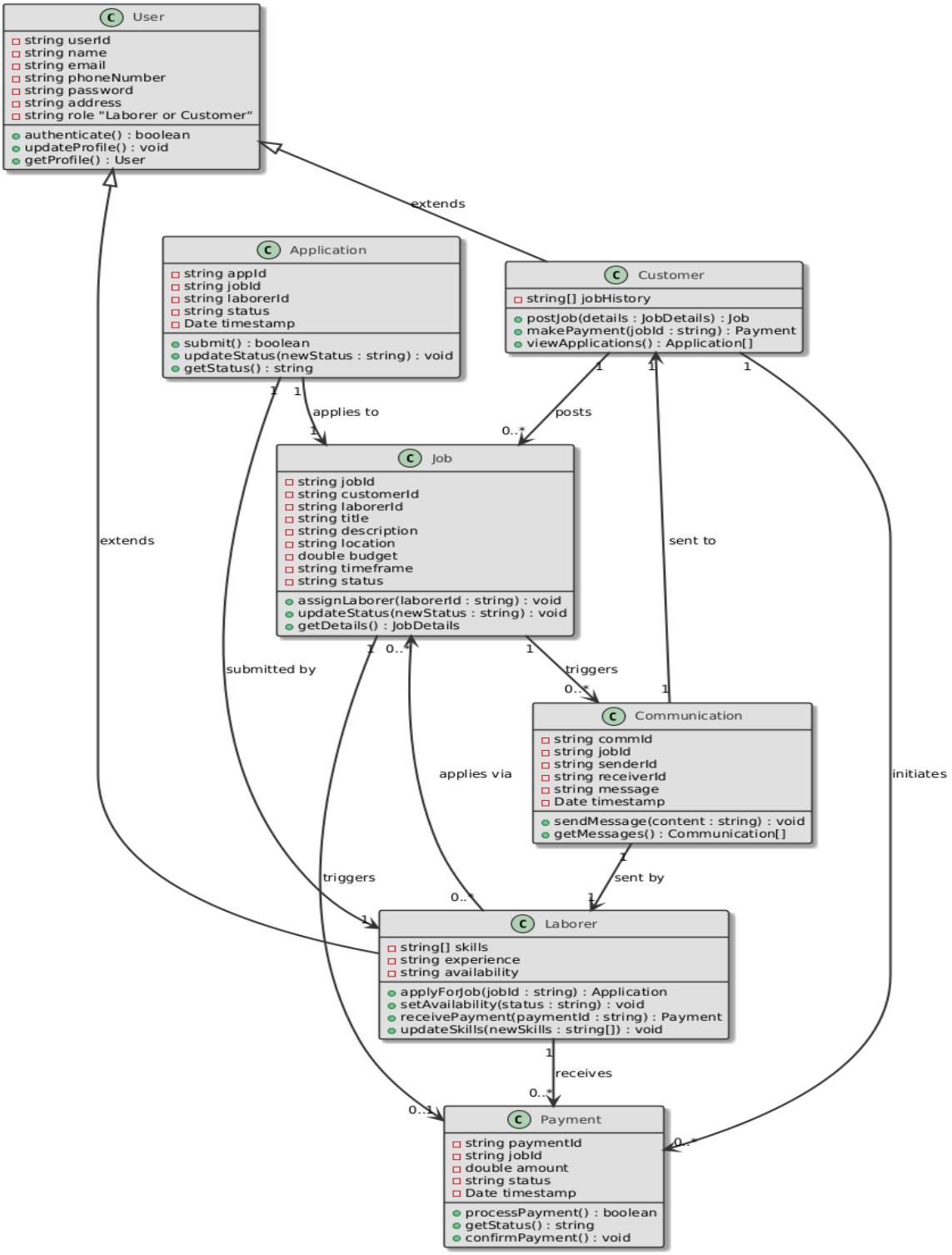
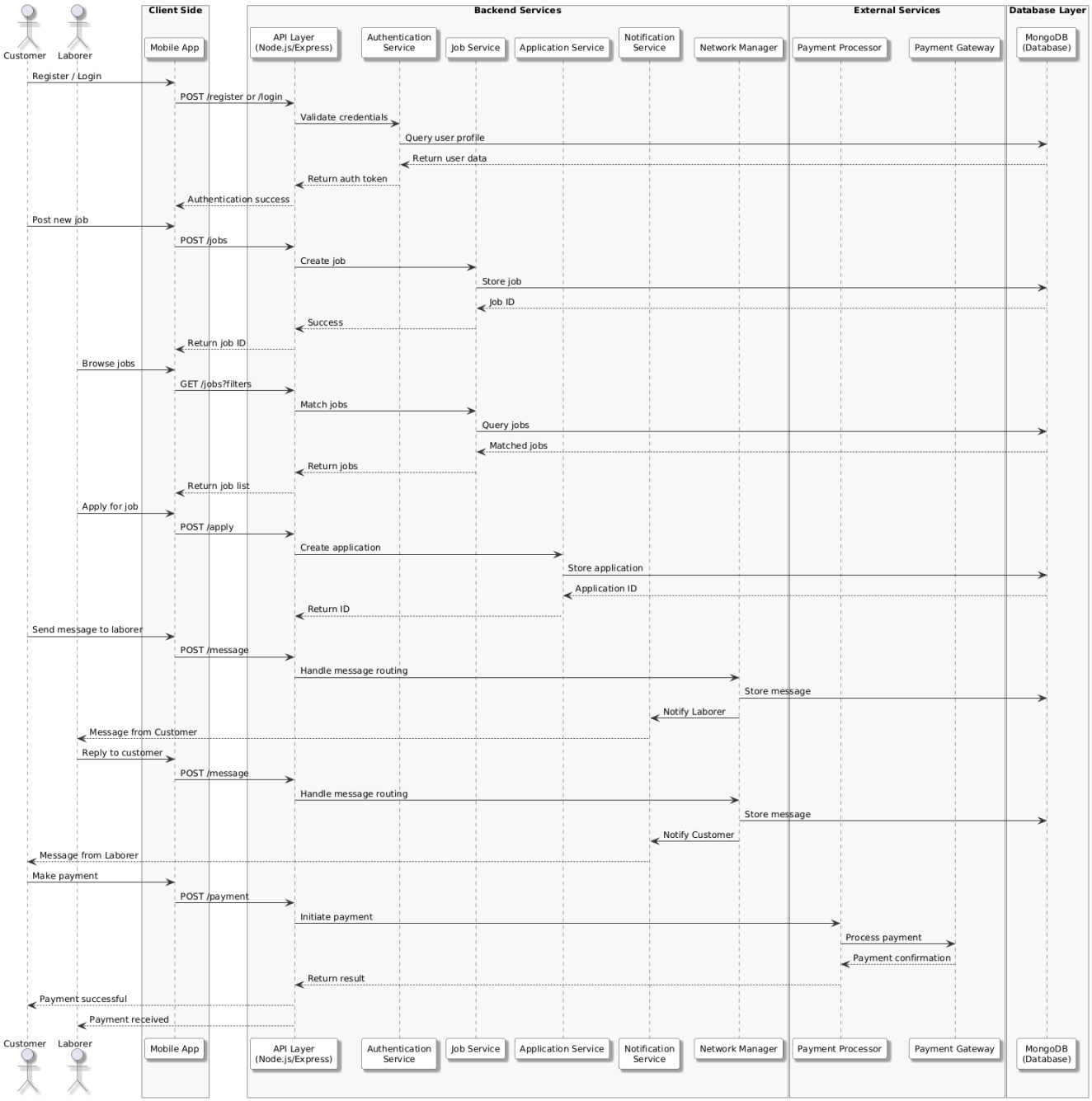
Loaction
Application
Gets

3. Class Diagram

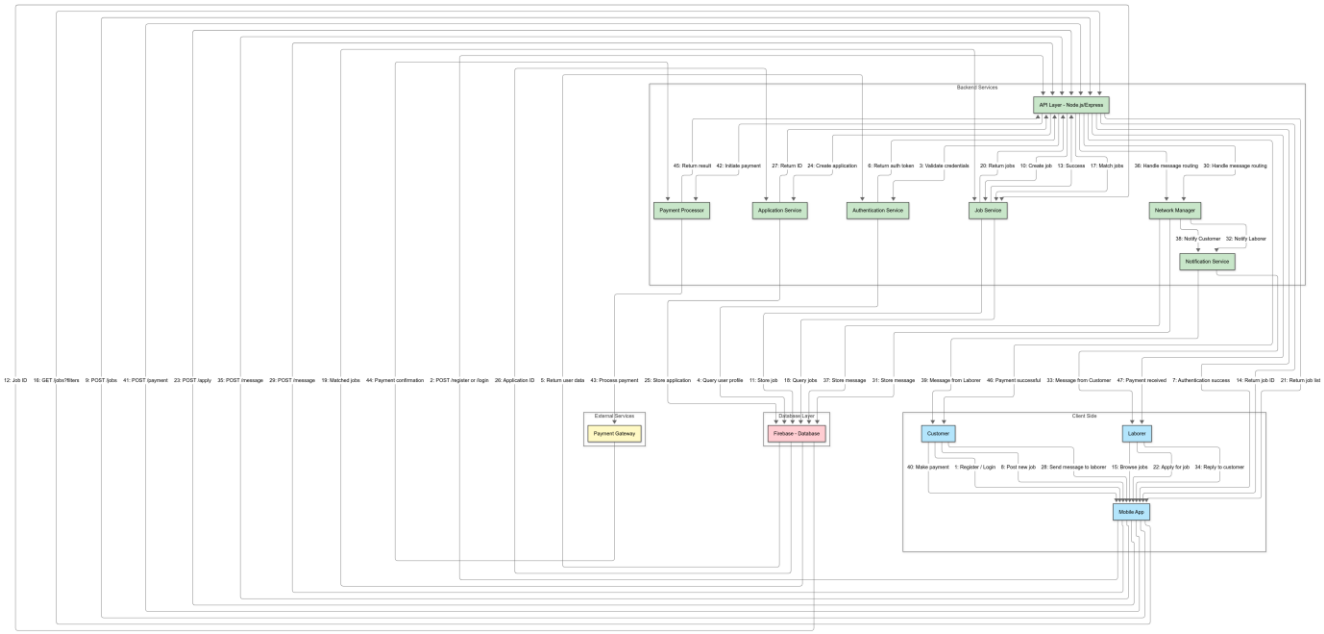


3.2 Component Interactions and Collaborations

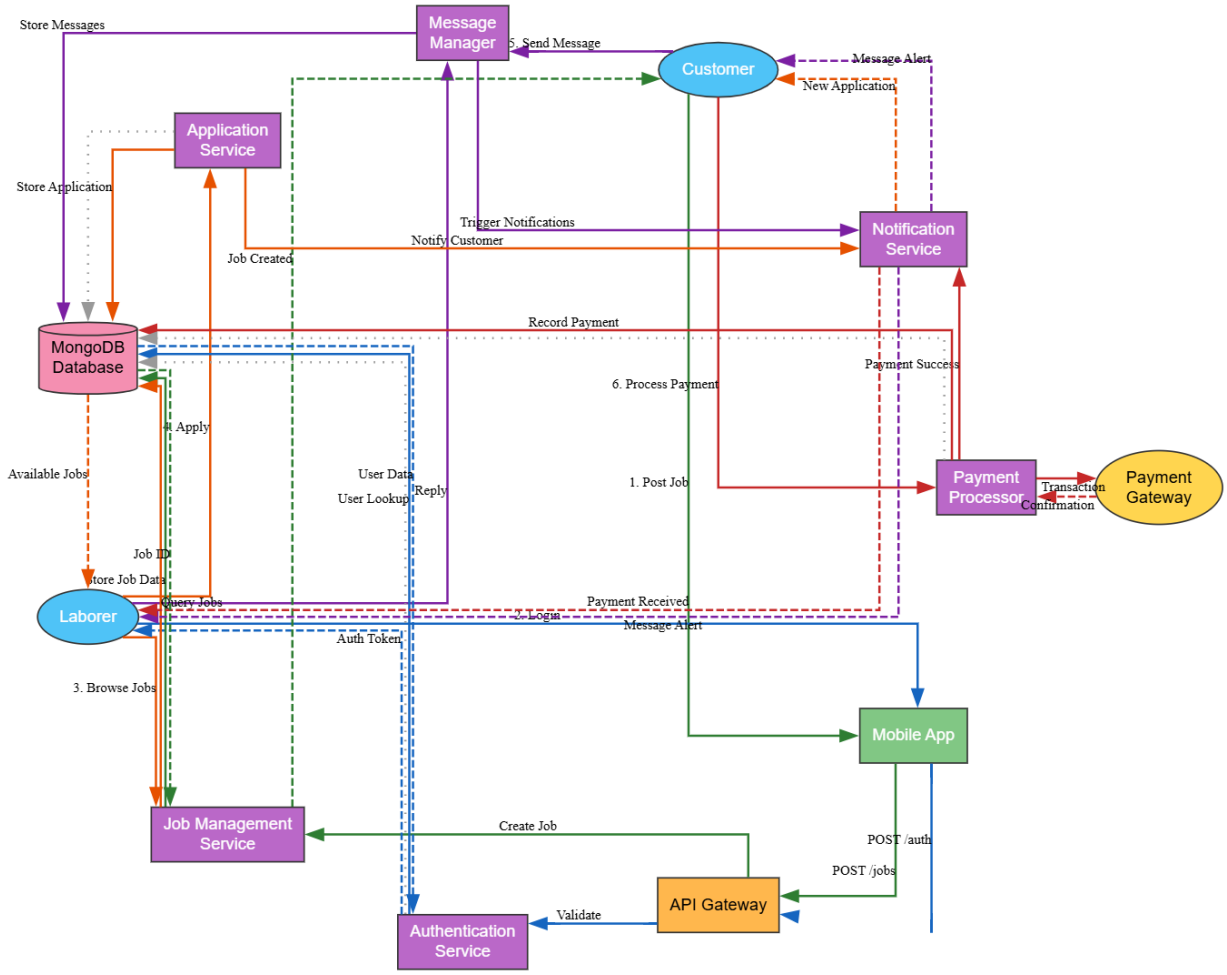
1. Design Level Sequence Diagram



2. Collaboration Diagram



3. DFD


Store Messages
Message Manager
5. Send Message
Customer
Message Alert
New Application
Application Service
Store Application
Trigger Notifications
Notify Customer
Notification Service
Job Created
Record Payment
MongoDB Database
Payment Success
6. Process Payment
4. Apply
Available Jobs
User Data
User Lookup
Reply
1. Post Job
Payment Processor
Transaction Confirmation
Payment Gateway
Job ID
Store Job Data
Laborer
Query Jobs
Payment Received
2. Login
Message Alert
Auth Token
3. Browse Jobs
Mobile App
Job Management Service
Create Job
POST /auth
POST /jobs
API Gateway
Validate
Authentication Service

3.3 Design Reuse and Design Patterns

Design Reuse

- Firebase Authentication: For secure user sign-up/login (email/password, OTP).
- Google Maps API: For location-based job matching and navigation.
- Firebase Realtime Database: To store chat messages and job updates instantly.

Design Patterns

- Model (data: user profiles, jobs).
- View (UI: screens for job search, chat).
- Controller (logic: handles user actions).

Example: When a customer posts a job, the Controller updates the Model (database), and the View shows the new job listing.

- Observer Pattern:

Notifies users in real-time (e.g., when a worker applies for their job or sends a message).

- Factory Pattern:

Creates different types of users (workers/customers) with shared sign-up steps but unique profiles.

3.4 Technology Architecture

Platform Requirements:

- **Mobile Platform**: Android 10 and above
- **Backend Platform**: *Node.js* runtime environment
- **Database Platform**: *Firebase*
- **Cloud Hosting**: Scalable cloud infrastructure for backend services

Connectivity Requirements:

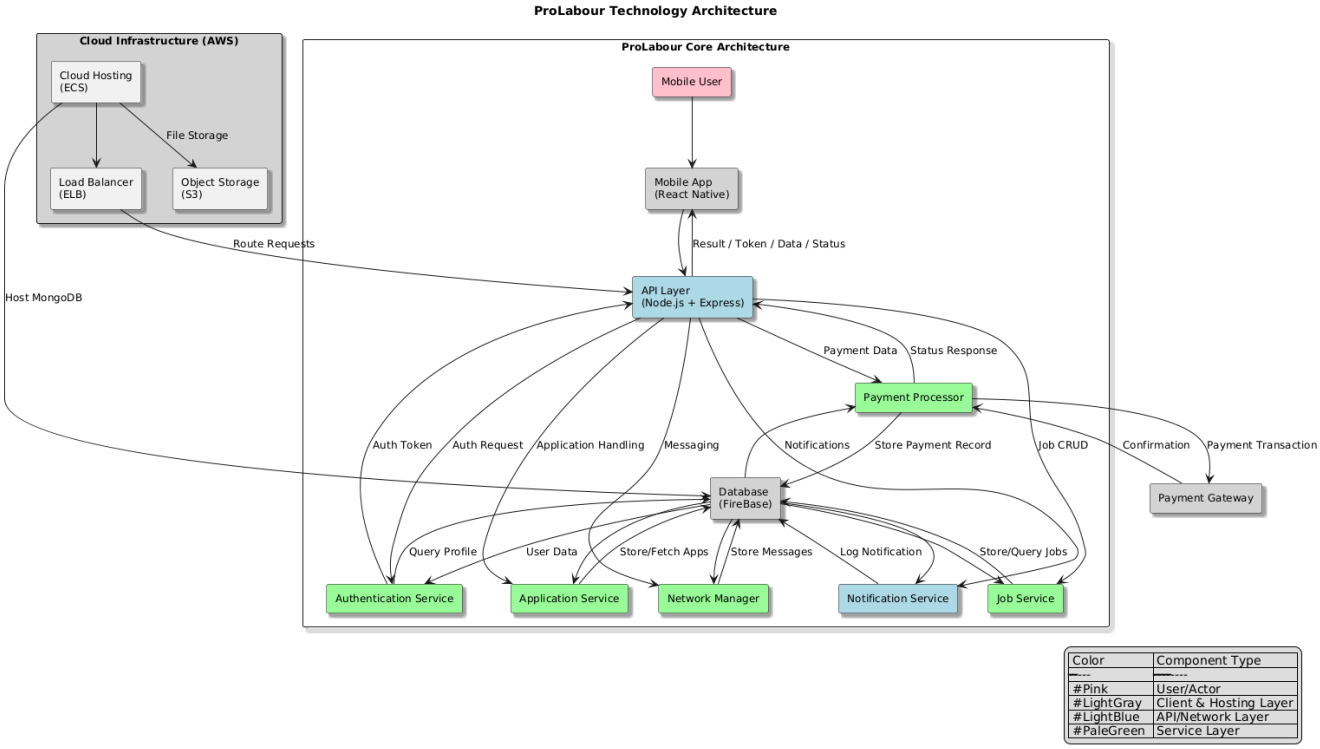
- Internet connection (mobile data or WiFi) for all core features
- Real-time connectivity for messaging and notifications
- Intermittent connectivity support for offline profile viewing

System Hosting:

- Backend services hosted on cloud platform for scalability
- Mobile app distributed through Google Play Store

Security Infrastructure:

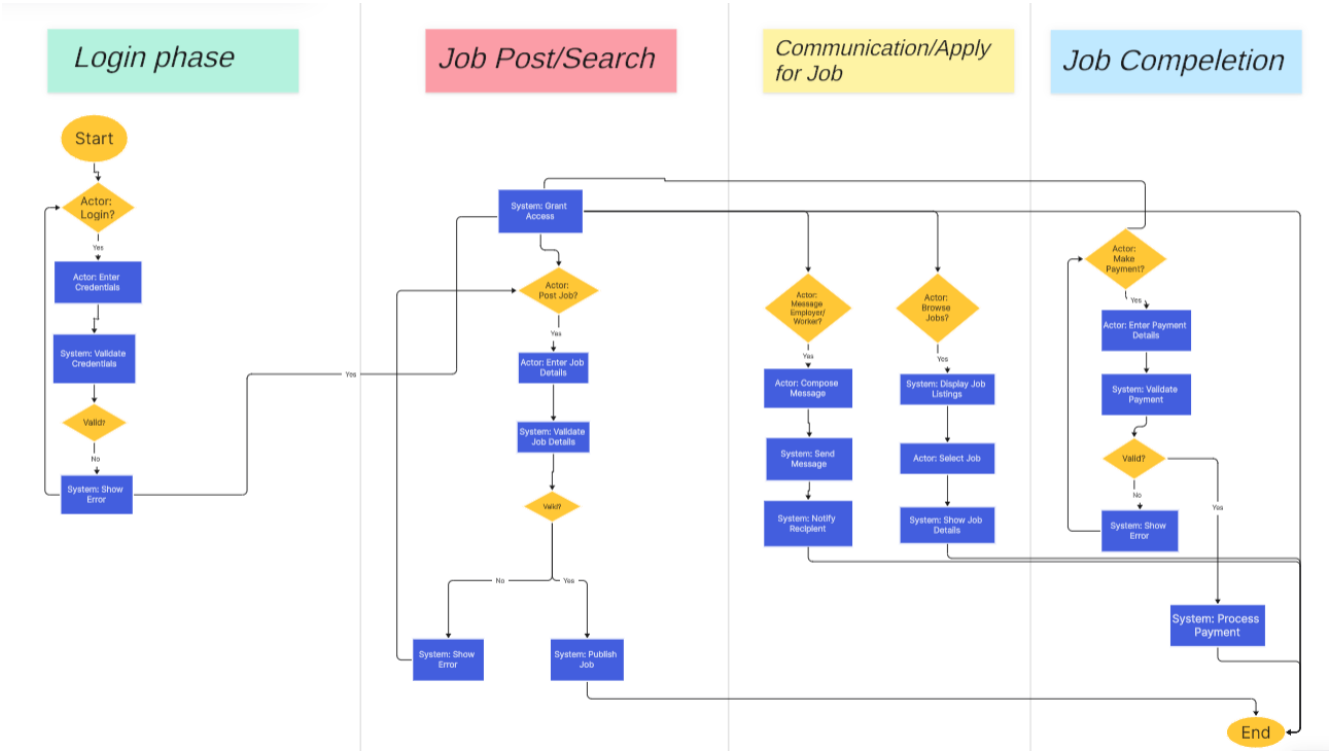
- HTTPS/SSL encryption for all data transmission
- JWT tokens for secure session management
- Encrypted password storage in database
- Secure API endpoints with authentication requirements



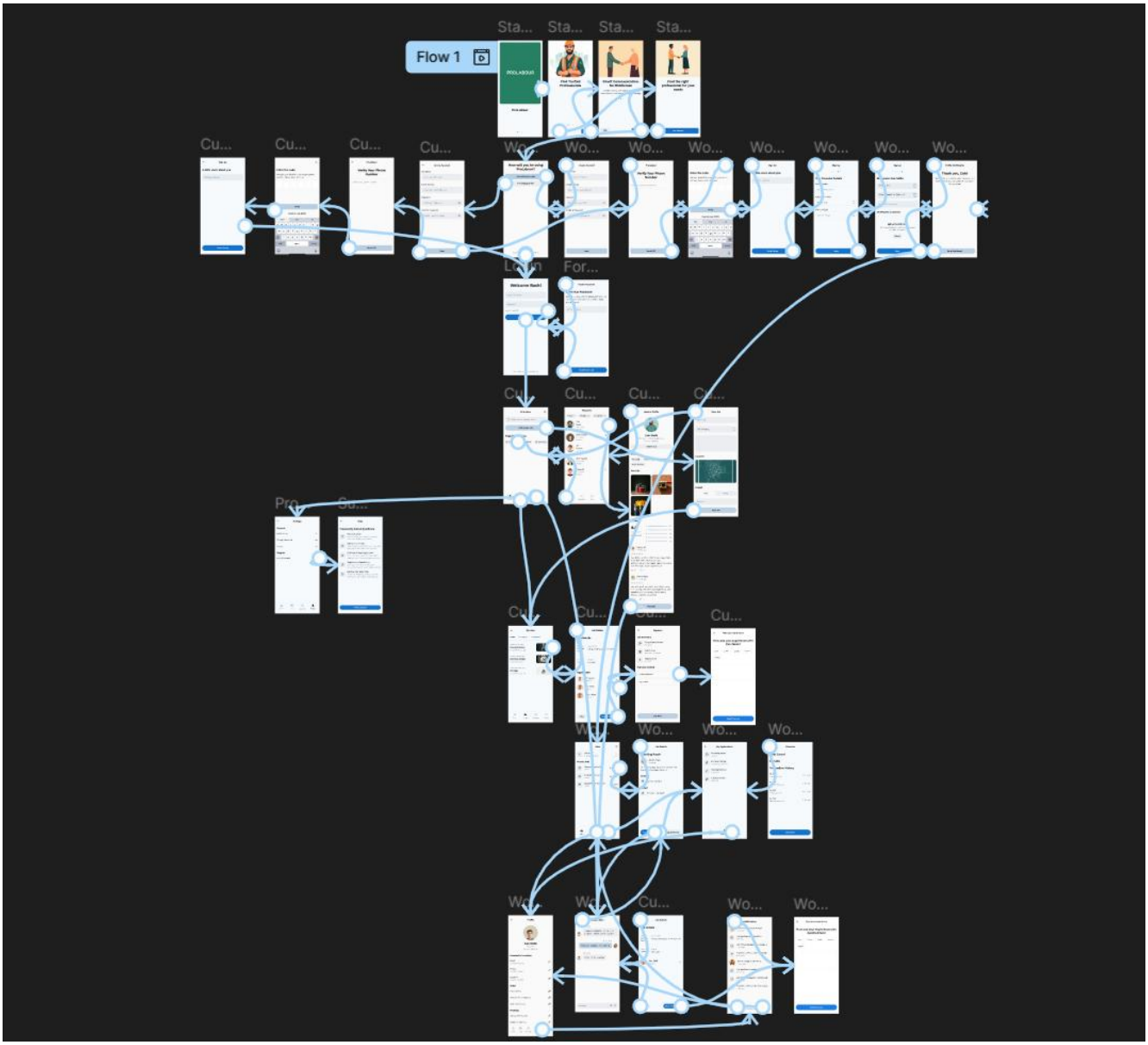
4. Screenshots/Prototype

4.1 Workflow

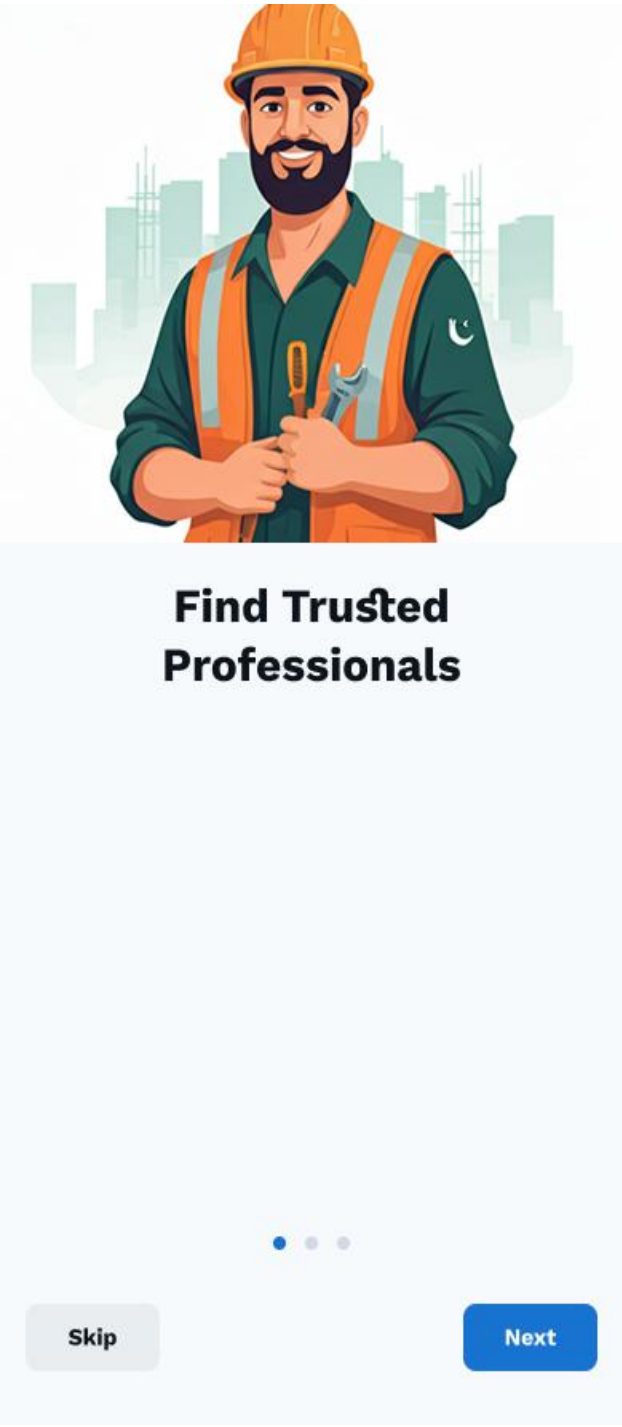
SwimLane Diagram:



4.2 Screens




PROLABOUR
ProLabour


Find Trusted Professionals
Skip
Next

Direct Communication, No Middleman

Connect directly with clients, eliminating intermediaries and maximizing your earnings.

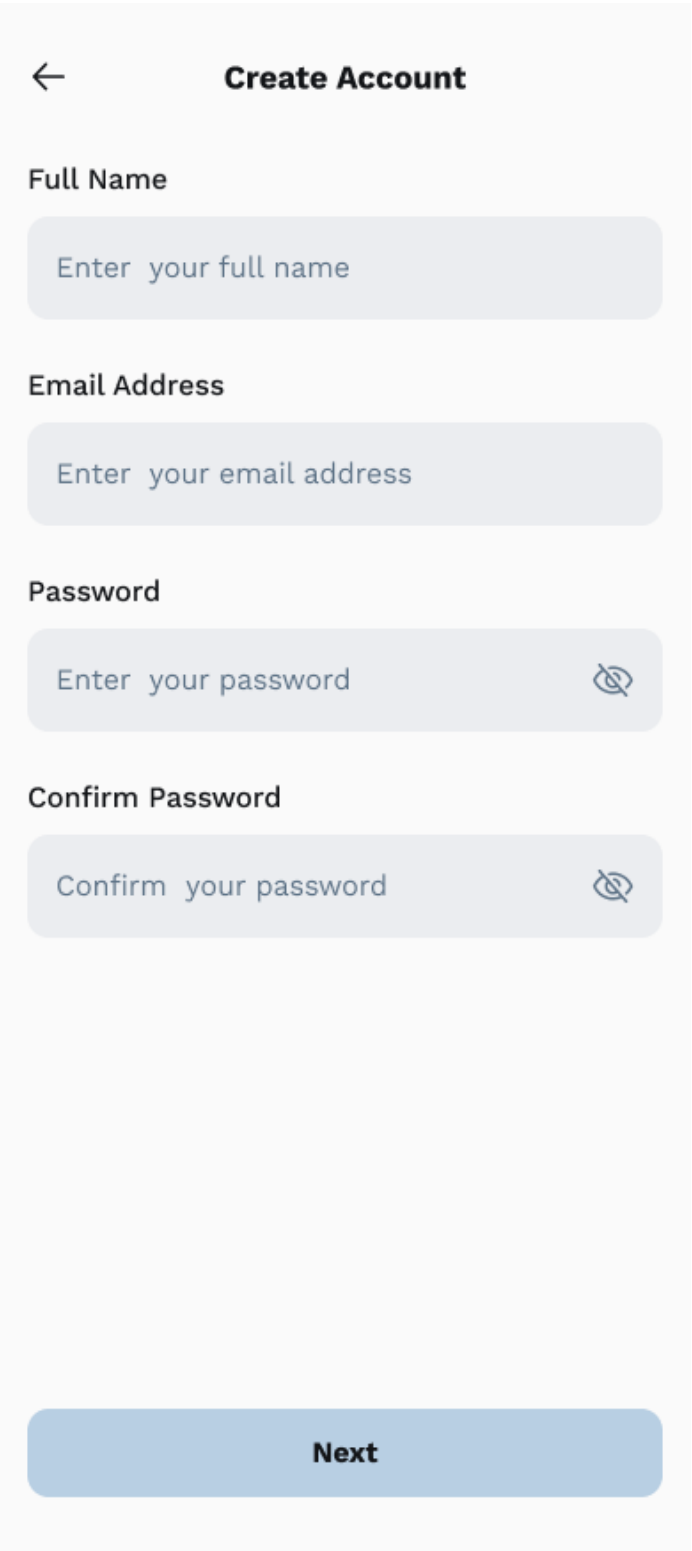
Skip

Next

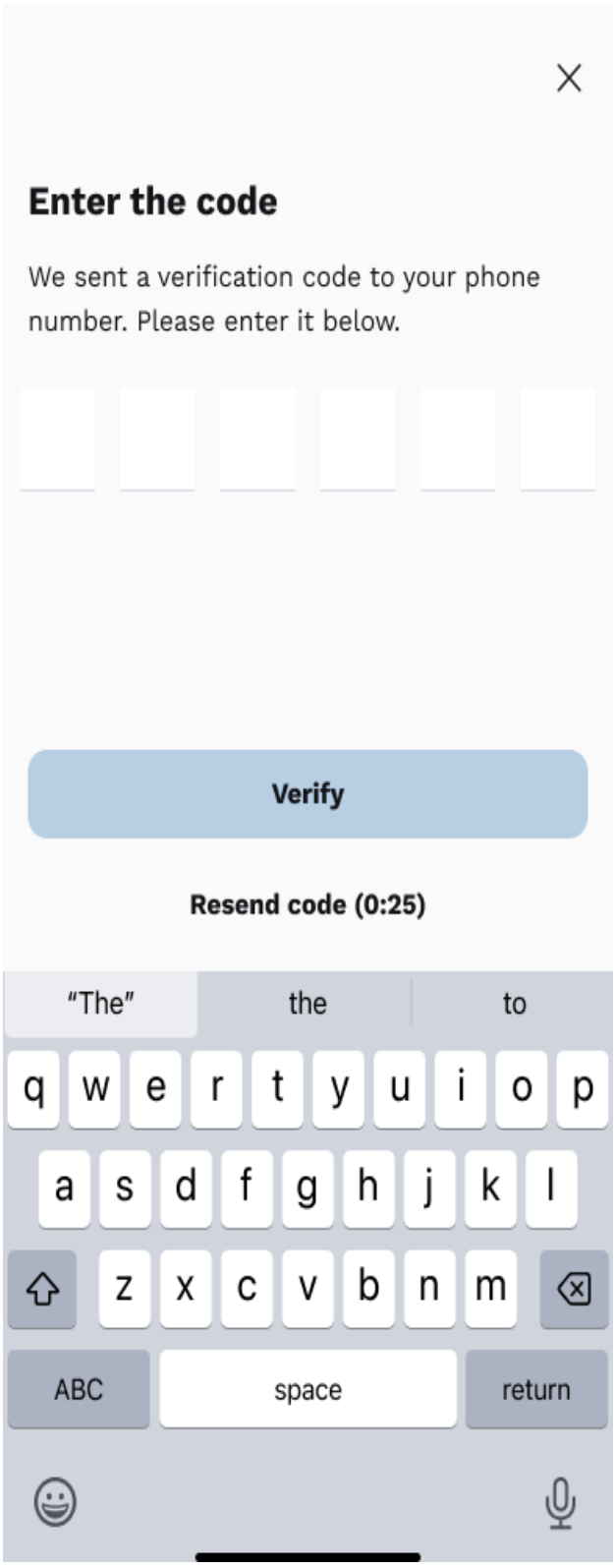
Find the right professional for your needs

Get Started

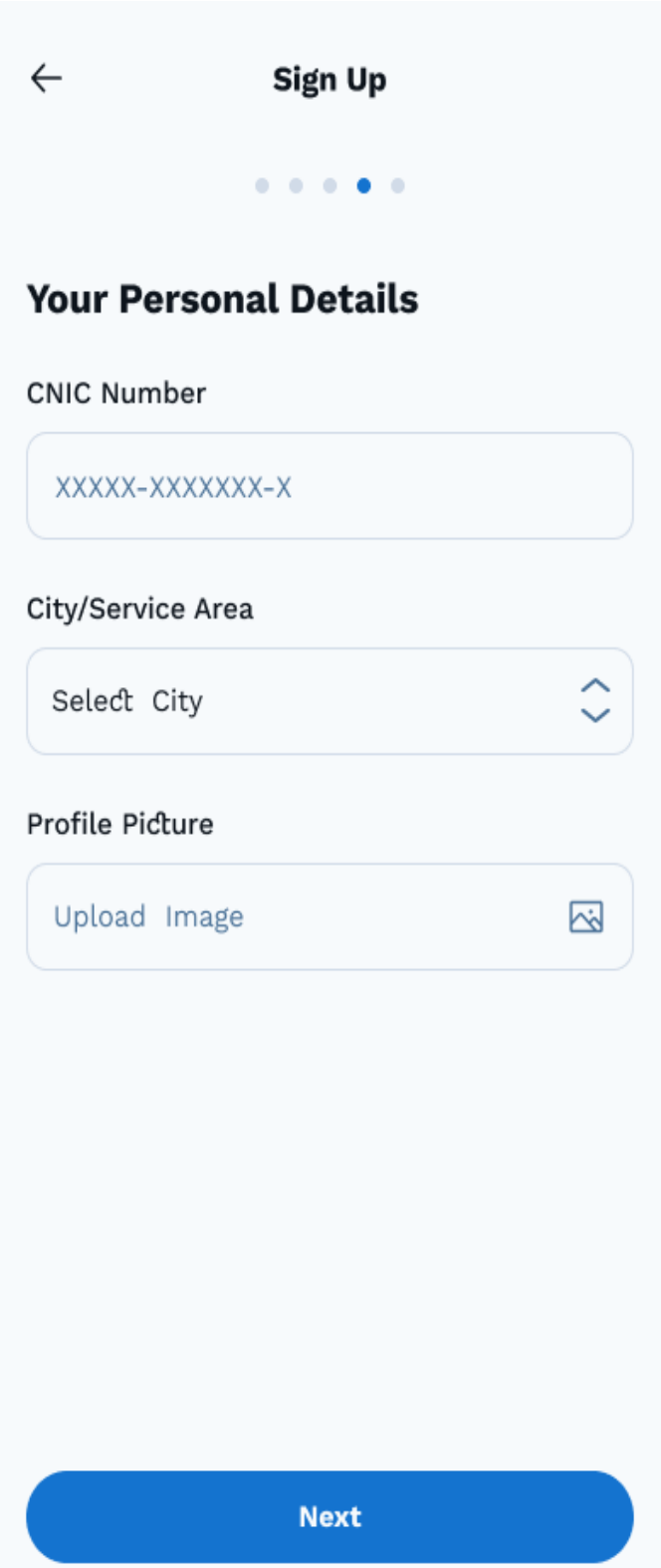

How will you be using ProLabour?
I'm looking for work
I'm looking to hire
Already have an account? Sign In

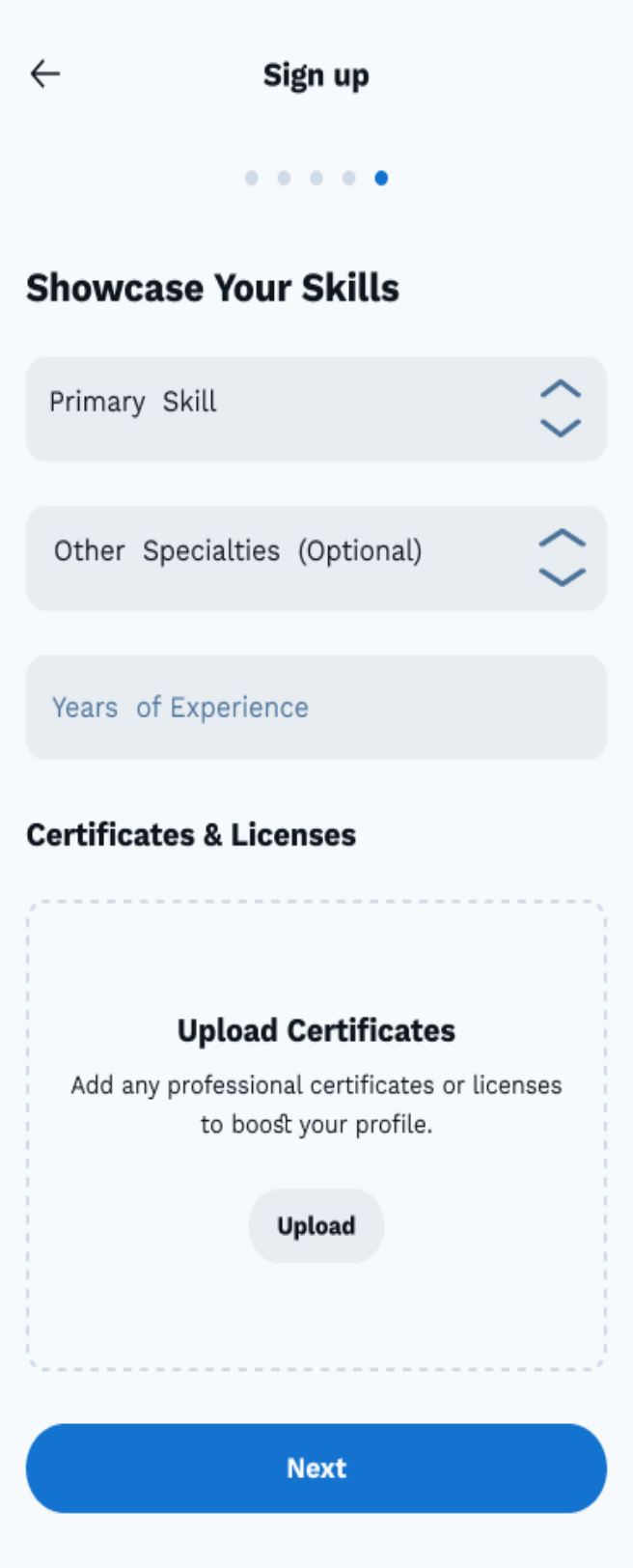

Create Account
Full Name
Enter your full name
Email Address
Enter your email address
Password
Enter your password
Confirm Password
Confirm your password
Next


ProLabour
Verify Your Phone Number
Enter your phone number
Send OTP

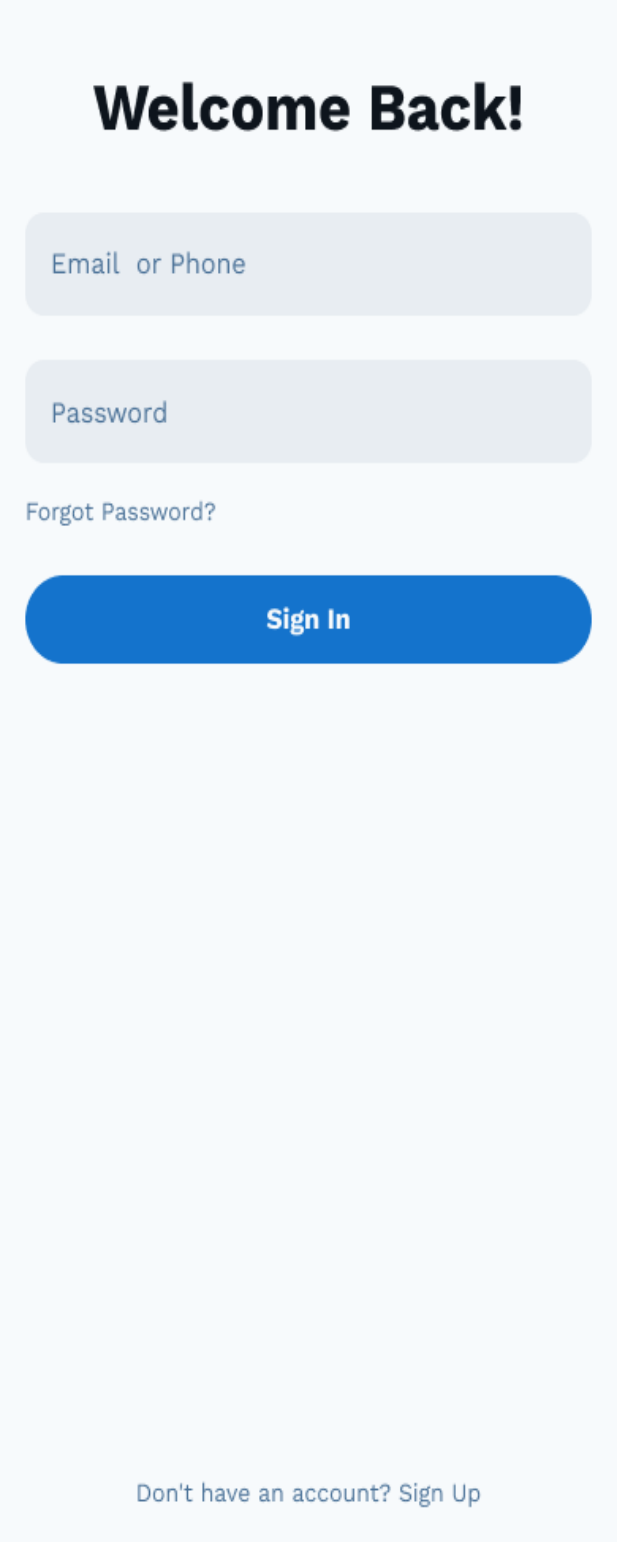

Enter the code
We sent a verification code to your phone number. Please enter it below.
Verify
Resend code (0:25)
"The"
the
to
q w e r t y u i o p
a s d f g h j k l
z x c v b n m
ABC
space
return

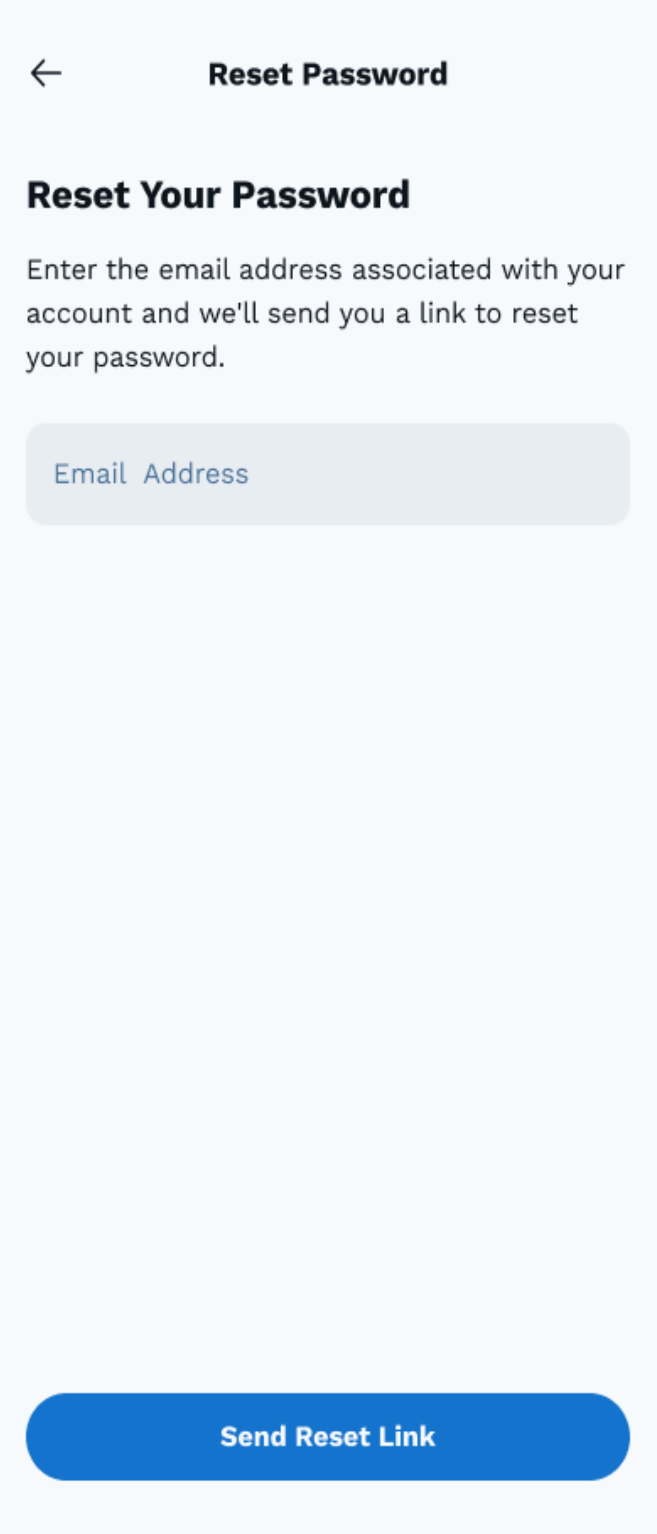

Sign Up
A little more about you
Primary Address
Finish Setup


Sign Up
Your Personal Details
CNIC Number
XXXXX-XXXXXXX-X
City/Service Area
Select City
Profile Picture
Upload Image
Next

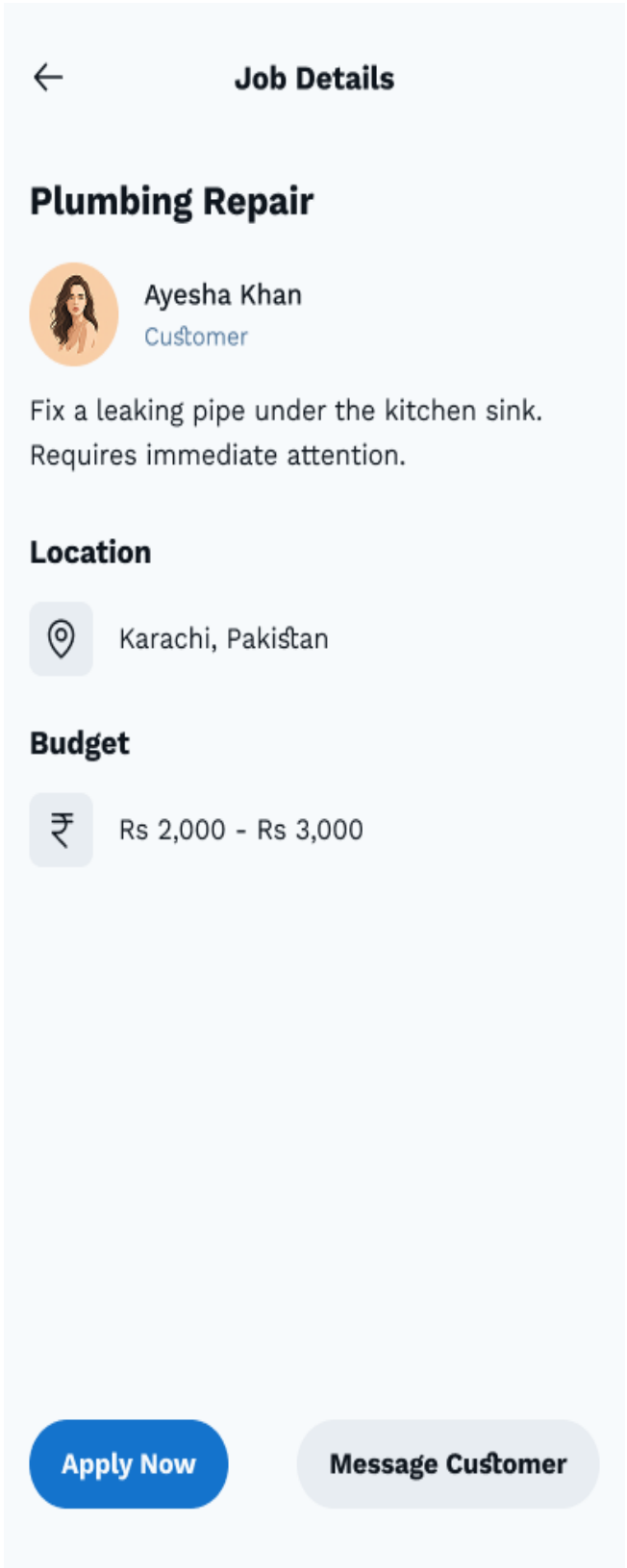

Sign up
Showcase Your Skills
Primary Skill
Other Specialties (Optional)
Years of Experience
Certificates & Licenses
Upload Certificates
Add any professional certificates or licenses to boost your profile.
Upload
Next


Profile Verification
Thank you, Zain!
Your profile is currently under review by our team. We'll notify you within 24 hours once it's approved.
Go to Dashboard

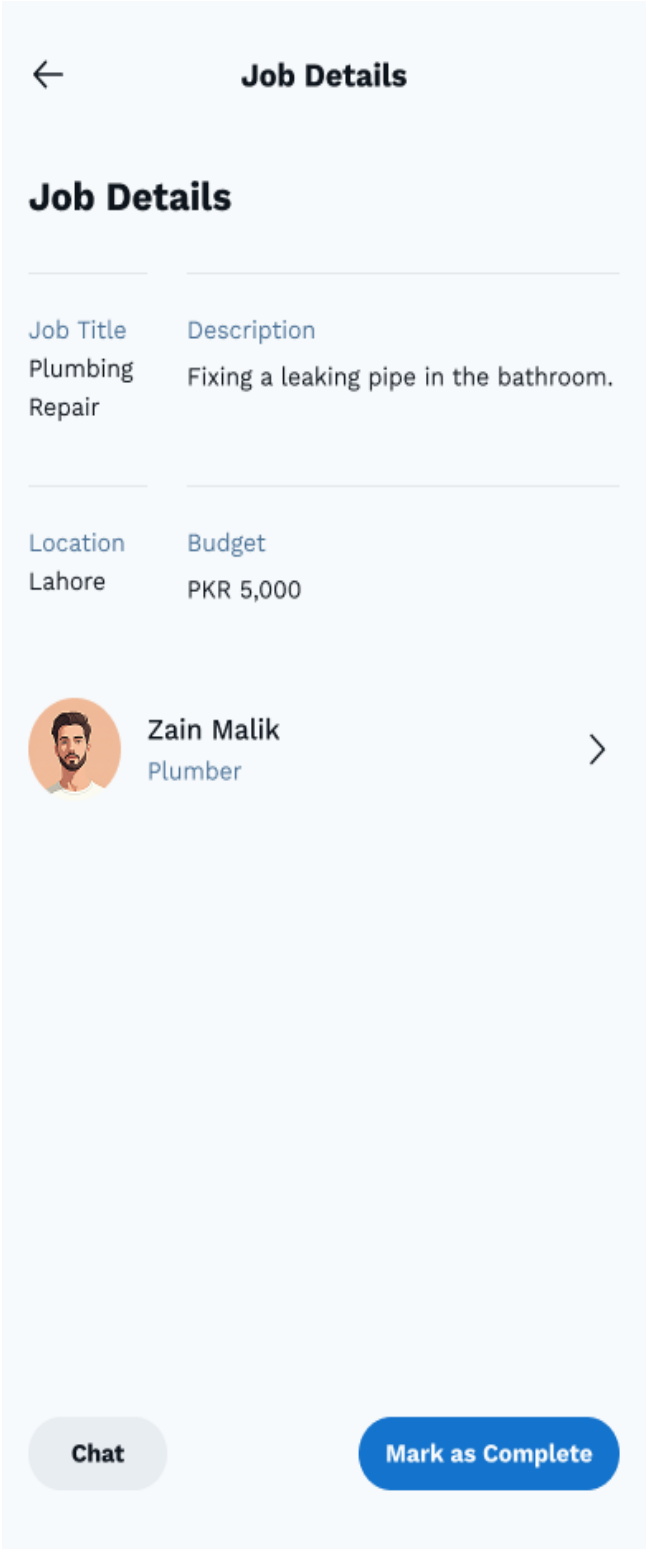

Welcome Back!
Email or Phone
Password
Forgot Password?
Sign In
Don't have an account? Sign Up

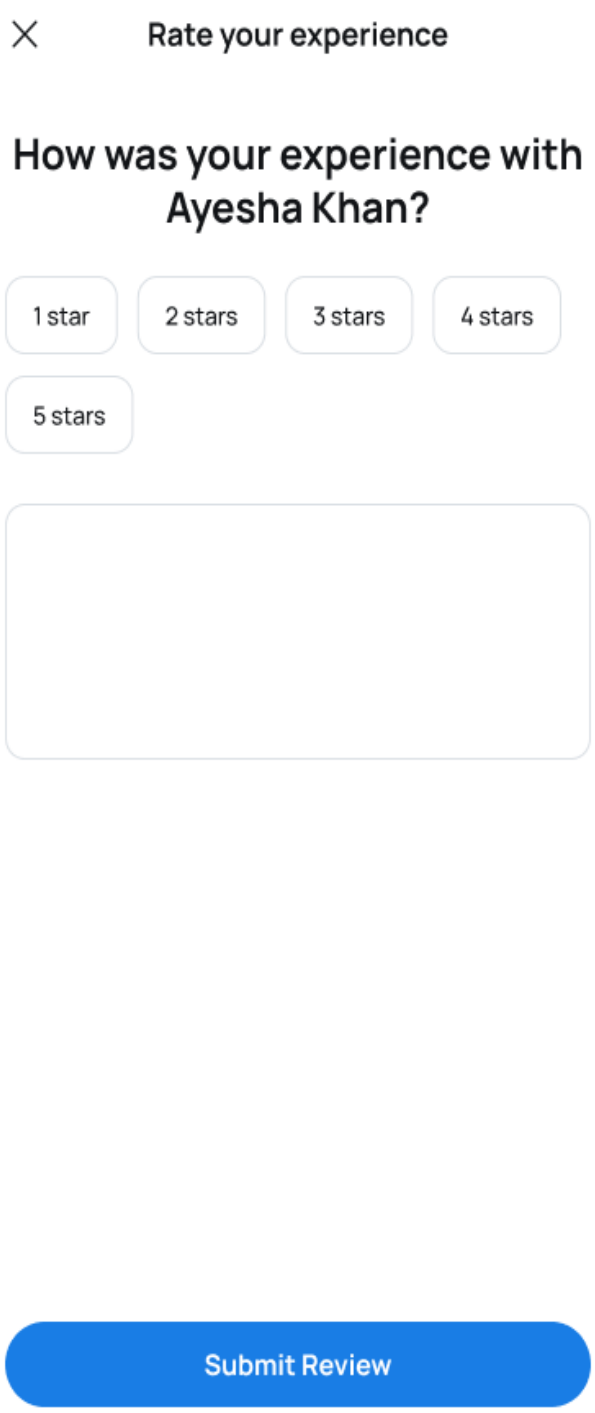

Reset Password
Reset Your Password
Enter the email address associated with your account and we'll send you a link to reset your password.
Email Address
Send Reset Link

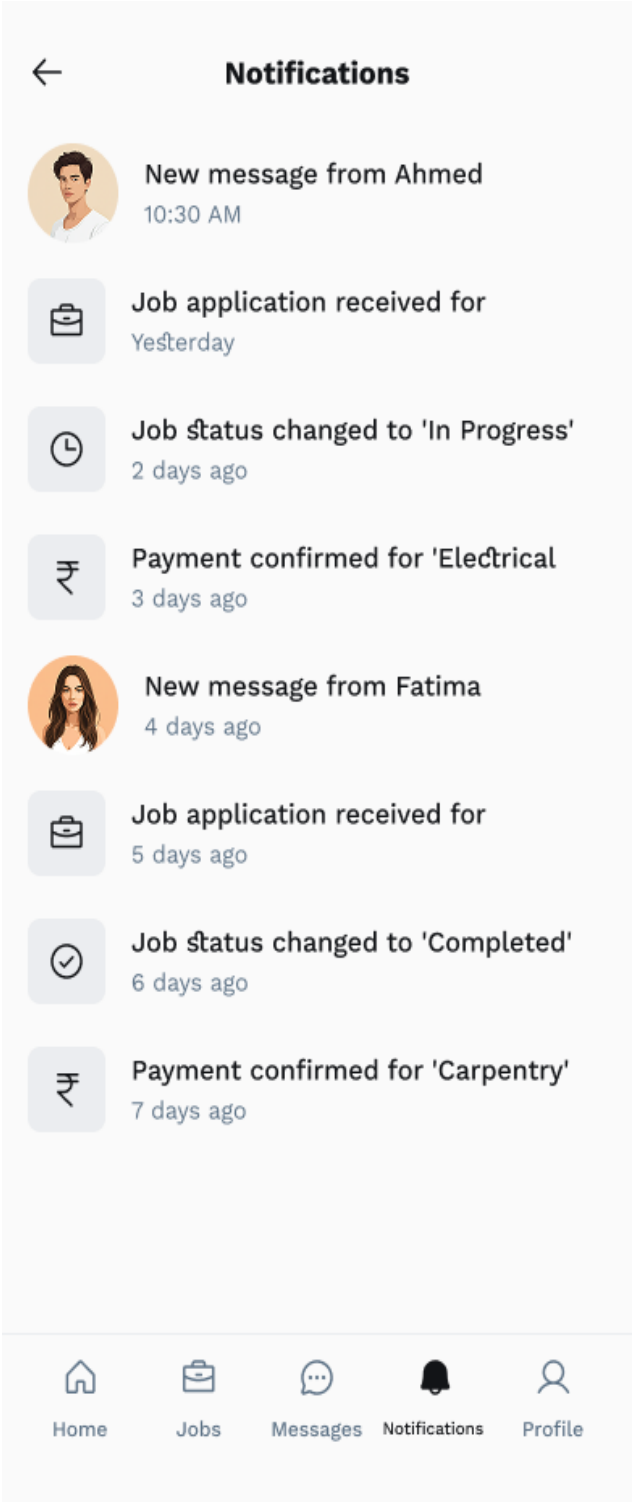

Jobs
Online
Available to work
Nearby Jobs
Plumber needed for
Lahore
Rs. 2,000
Electrician for wiring
Lahore
Rs. 2,000
Carpenter for furniture
Lahore
Rs. 1,800
Jobs
Applications
Messages
Profile

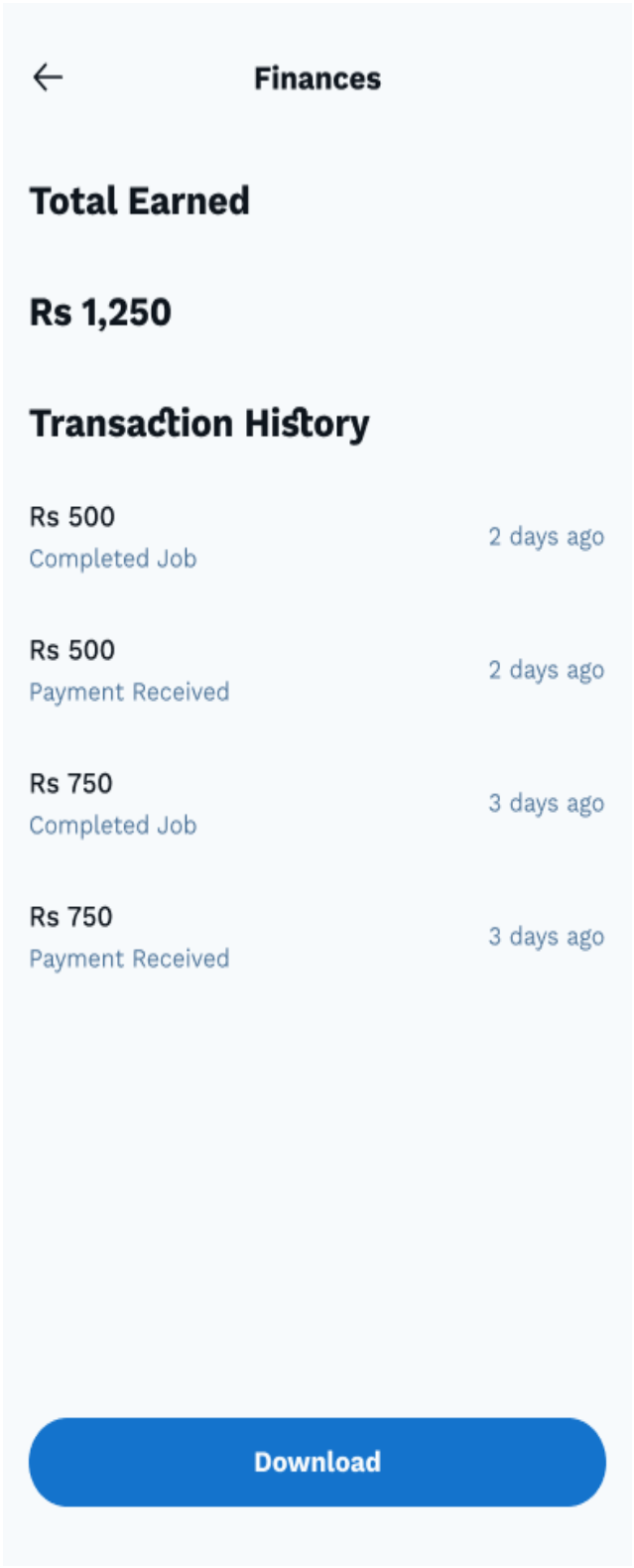

Job Details
Plumbing Repair
Ayesha Khan
Customer
Fix a leaking pipe under the kitchen sink.
Requires immediate attention.
Location
Karachi, Pakistan
Budget
Rs 2,000 - Rs 3,000
Apply Now
Message Customer


Ayesha Khan
Zain Malik
Asalam-o-Alaikum, I'm at your location. Please come outside.
Ayesha Khan
Walaikum Asalam, I'm coming.
Zain Malik
Okay, I'll be waiting.
Message


Job Details
Job Details
Job Title
Plumbing Repair
Description
Fixing a leaking pipe in the bathroom.
Location
Lahore
Budget
PKR 5,000
Zain Malik
Plumber
Chat
Mark as Complete


Rate your experience
How was your experience with Ayesha Khan?
1 star
2 stars
3 stars
4 stars
5 stars
Submit Review


Notifications
New message from Ahmed
10:30 AM
Job application received for
Yesterday
Job status changed to 'In Progress'
2 days ago
Payment confirmed for 'Electrical
3 days ago
New message from Fatima
4 days ago
Job application received for
5 days ago
Job status changed to 'Completed'
6 days ago
Payment confirmed for 'Carpentry'
7 days ago
Home
Jobs
Messages
Notifications
Profile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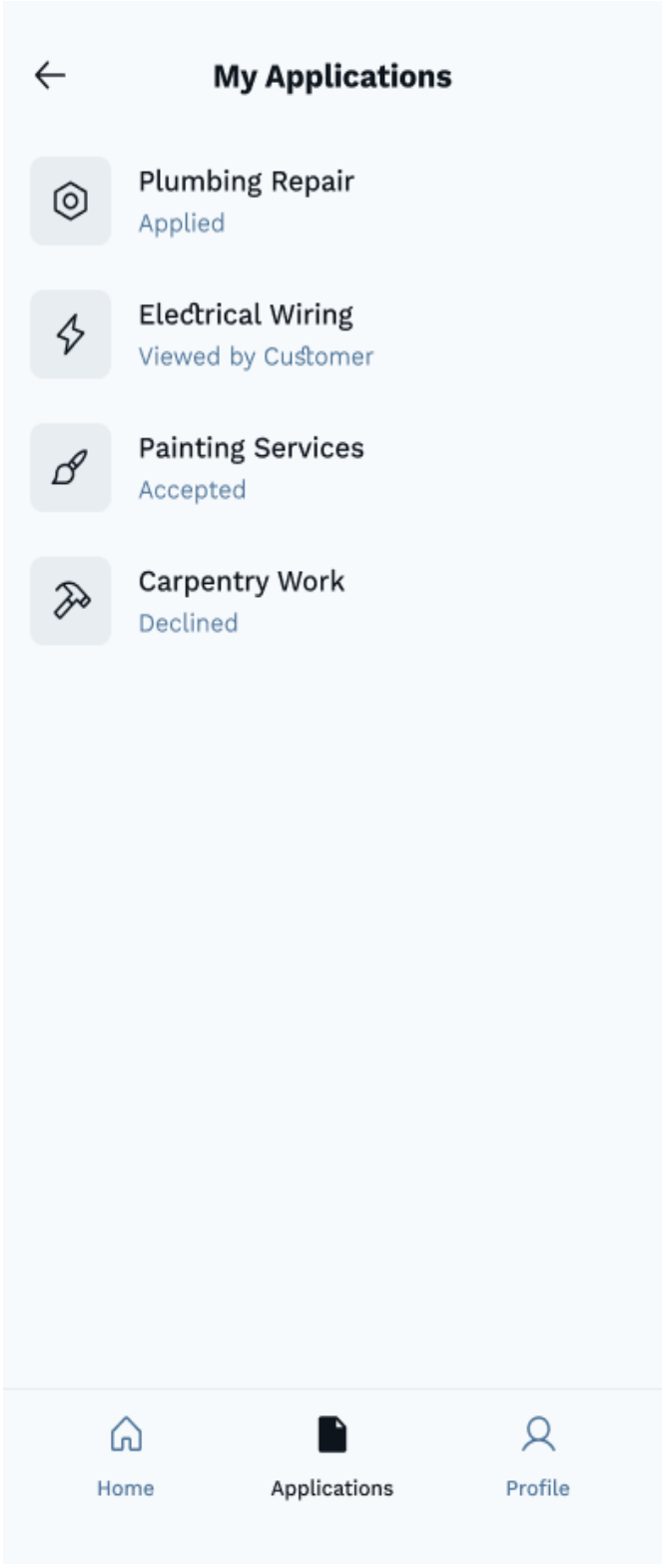
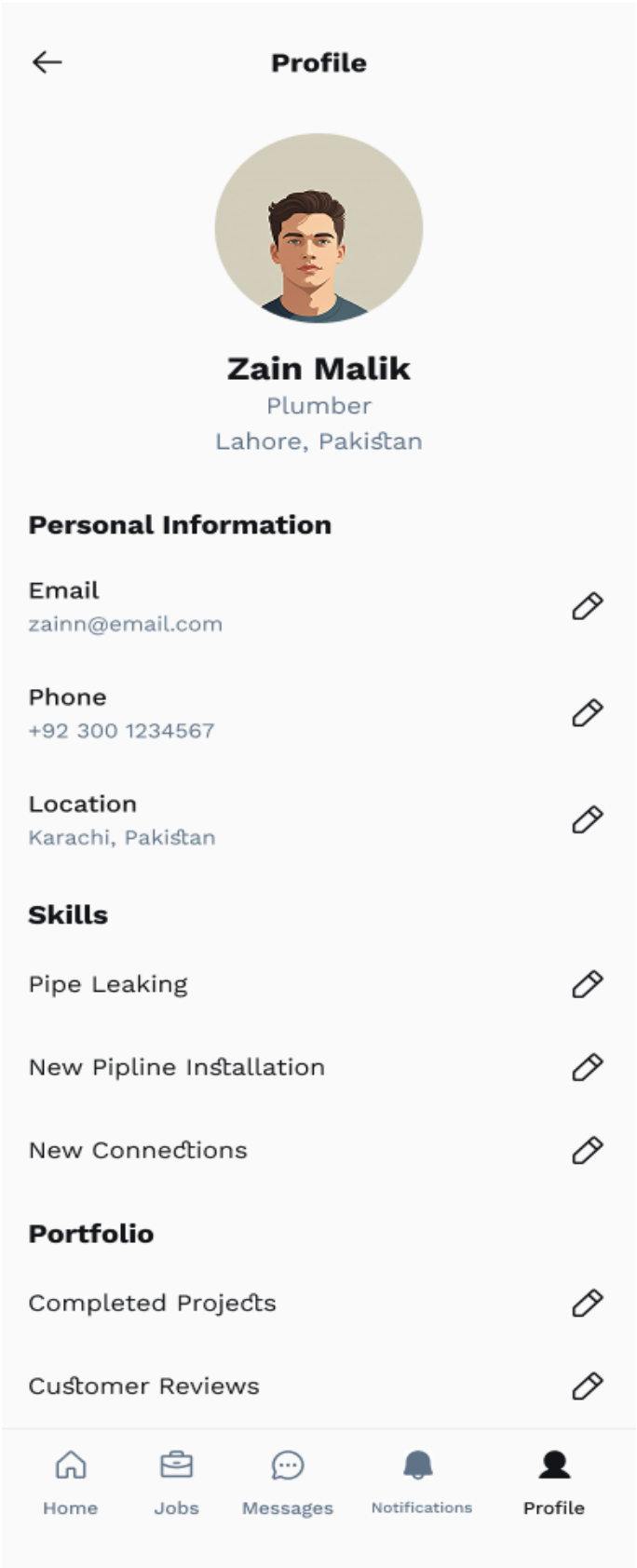
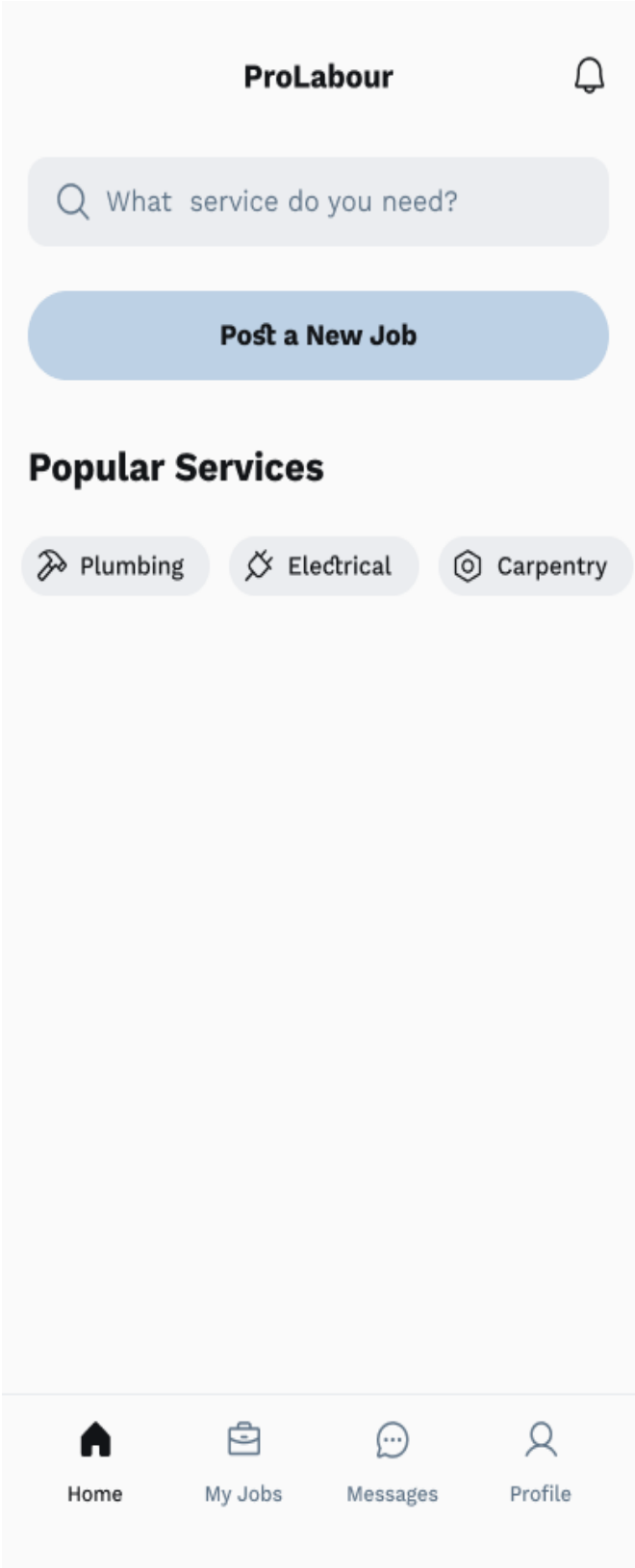
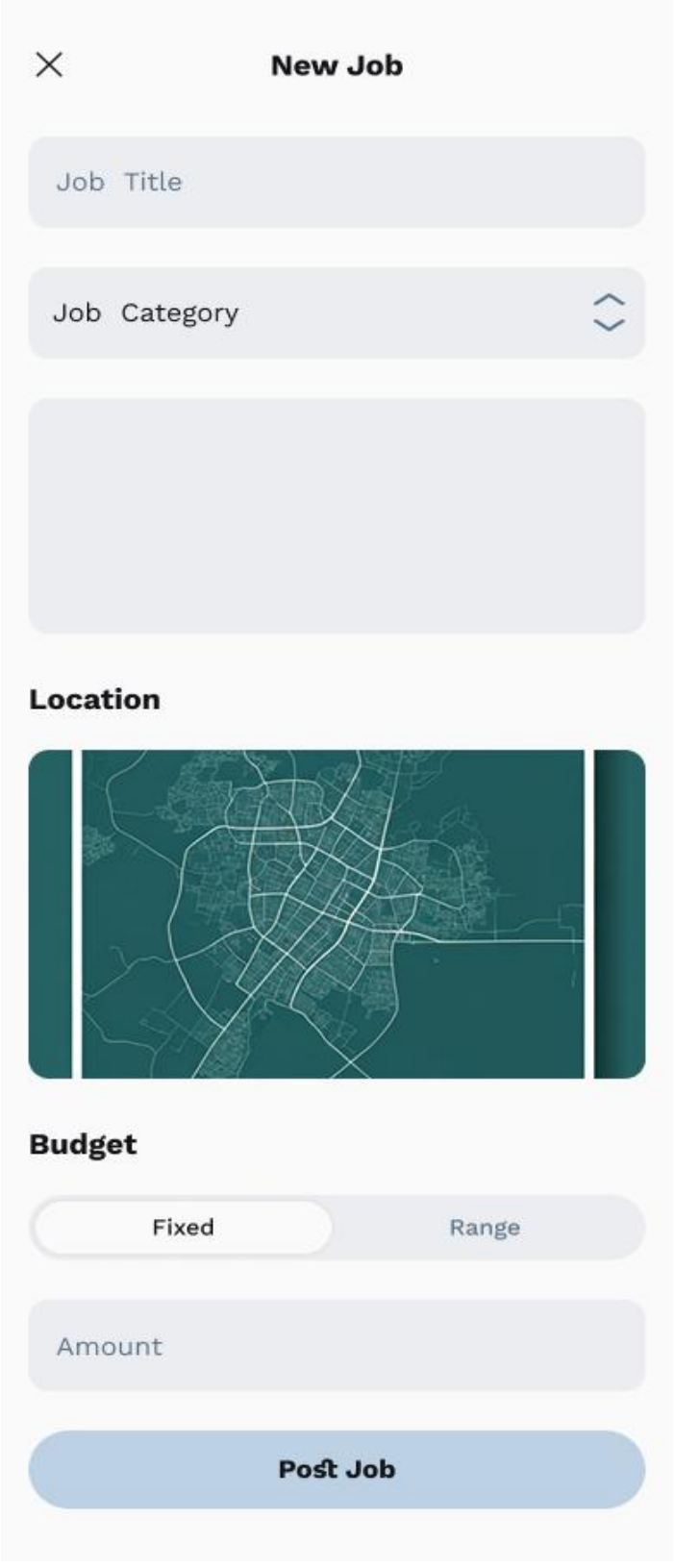
Rs 1,250
Transaction History
Rs 500
Completed Job
2 days ago
Rs 500
Payment Received
2 days ago
Rs 750
Completed Job
3 days ago
Rs 750
Payment Received
3 days ago
Download


My Applications
Plumbing Repair
Applied
Electrical Wiring
Viewed by Customer
Painting Services
Accepted
Carpentry Work
Declined
Home
Applications
Profile


Profile
Zain Malik
Plumber
Lahore, Pakistan
Personal Information
Email
zainn@email.com
Phone
+92 300 1234567
Location
Karachi, Pakistan
Skills
Pipe Leaking
New Pipline Installation
New Connections
Portfolio
Completed Projects
Customer Reviews
Home
Jobs
Messages
Notifications
Profile


ProLabour
What service do you need?
Post a New Job
Popular Services
Plumbing
Electrical
Carpentry
Home
My Jobs
Messages
Profile


New Job
Job Title
Job Category
Location
Budget
Fixed
Range
Amount
Post Job

My Jobs

Active | In Progress | Completed

Posted 2 days ago
Plumbing Repair
No laborer hired yet

Posted 1 week ago
Electrical Wiring
Hired: Ali Hassan

Posted 3 weeks ago
Painting
No laborer hired yet

Home | Jobs | Messages | Profile

Plumbers

Rating | Distance | Availability

Zain Malik
4.8 • 2 km
Plumber

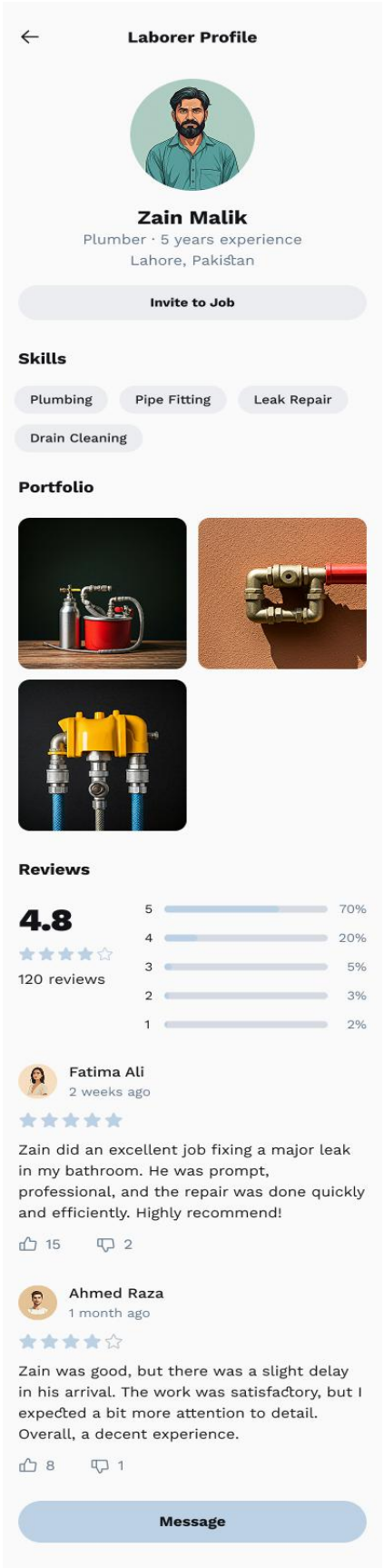
Ahmad Khan
4.7 • 3 km
Plumber

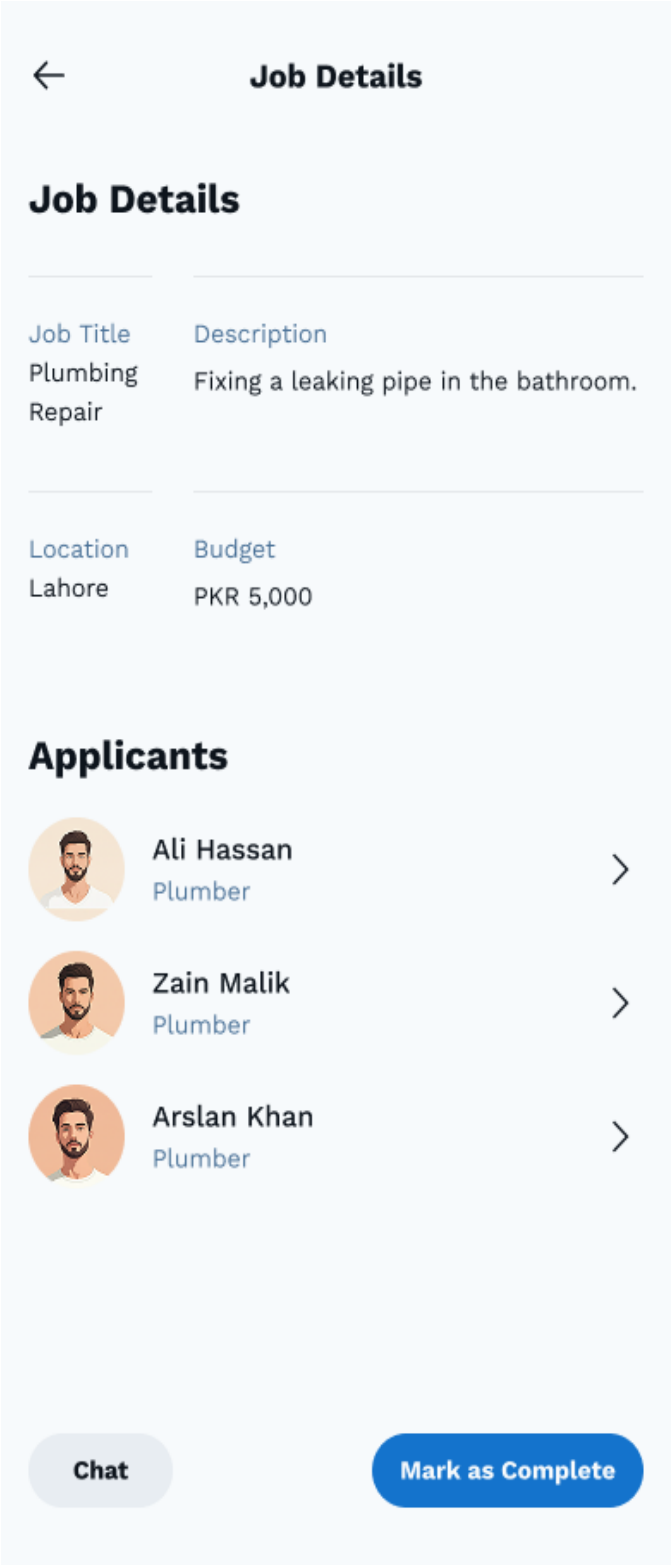
Ali Hassan
4.6 • 4 km
Plumber

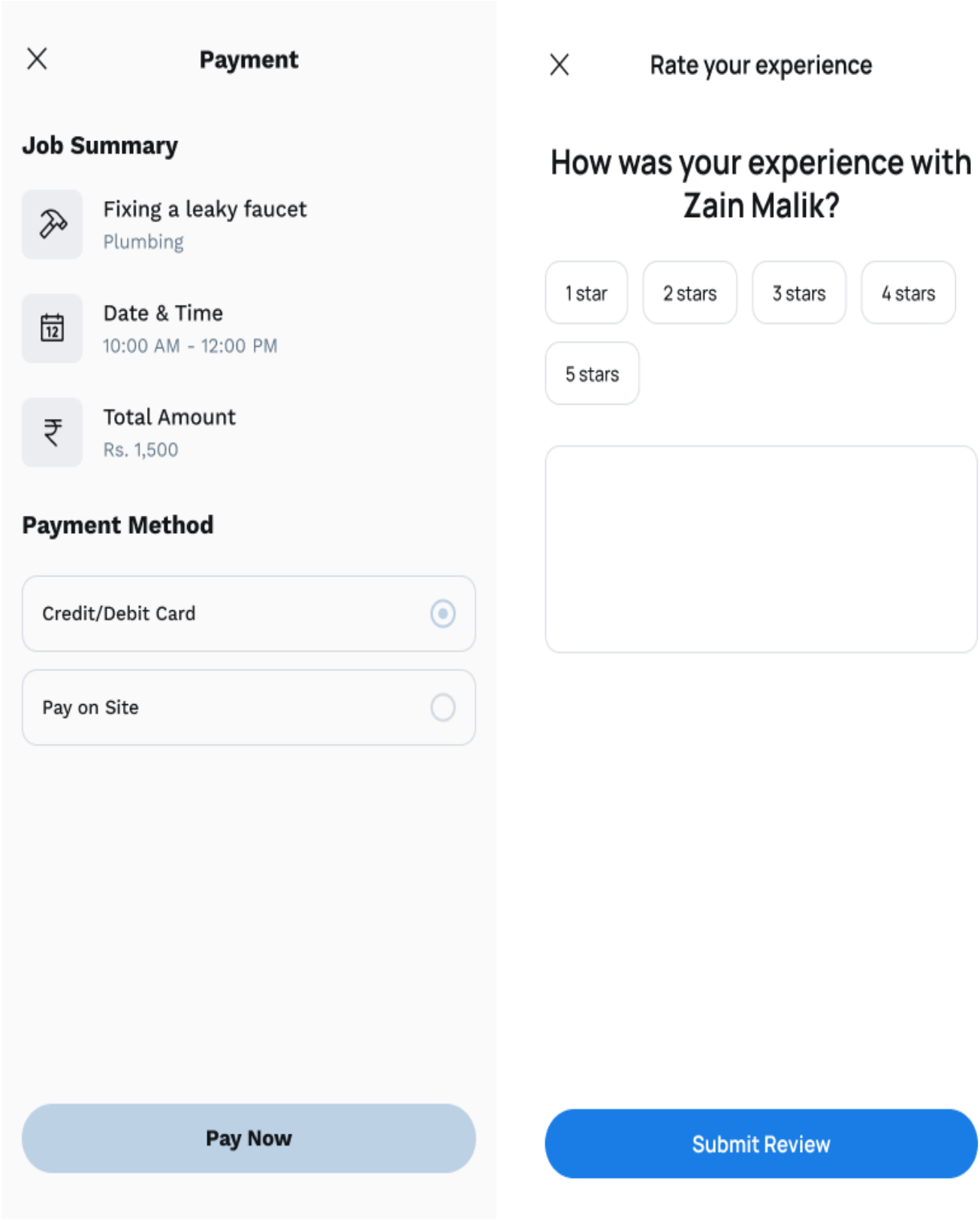
Bilal Qureshi
4.5 • 5 km
Plumber

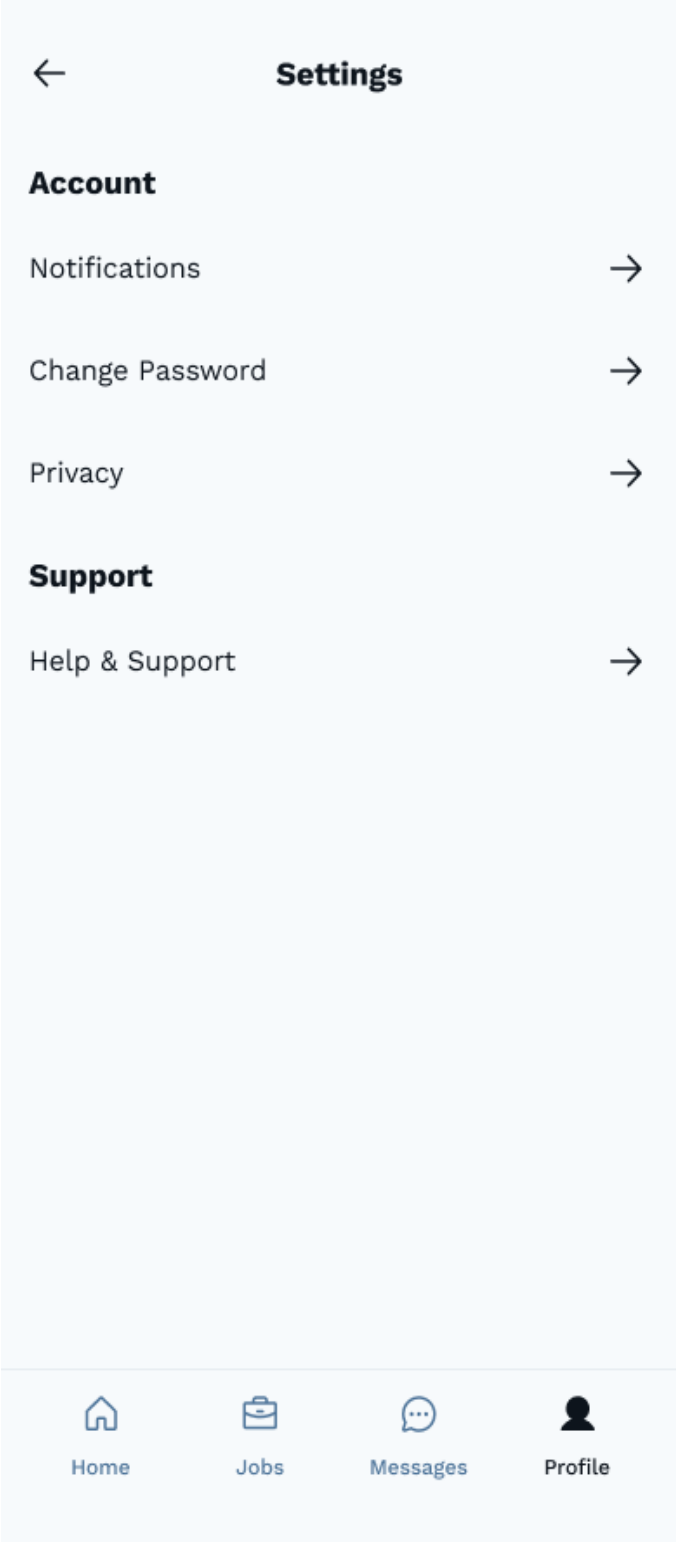
Fahad Ali
4.4 • 6 km
Plumber

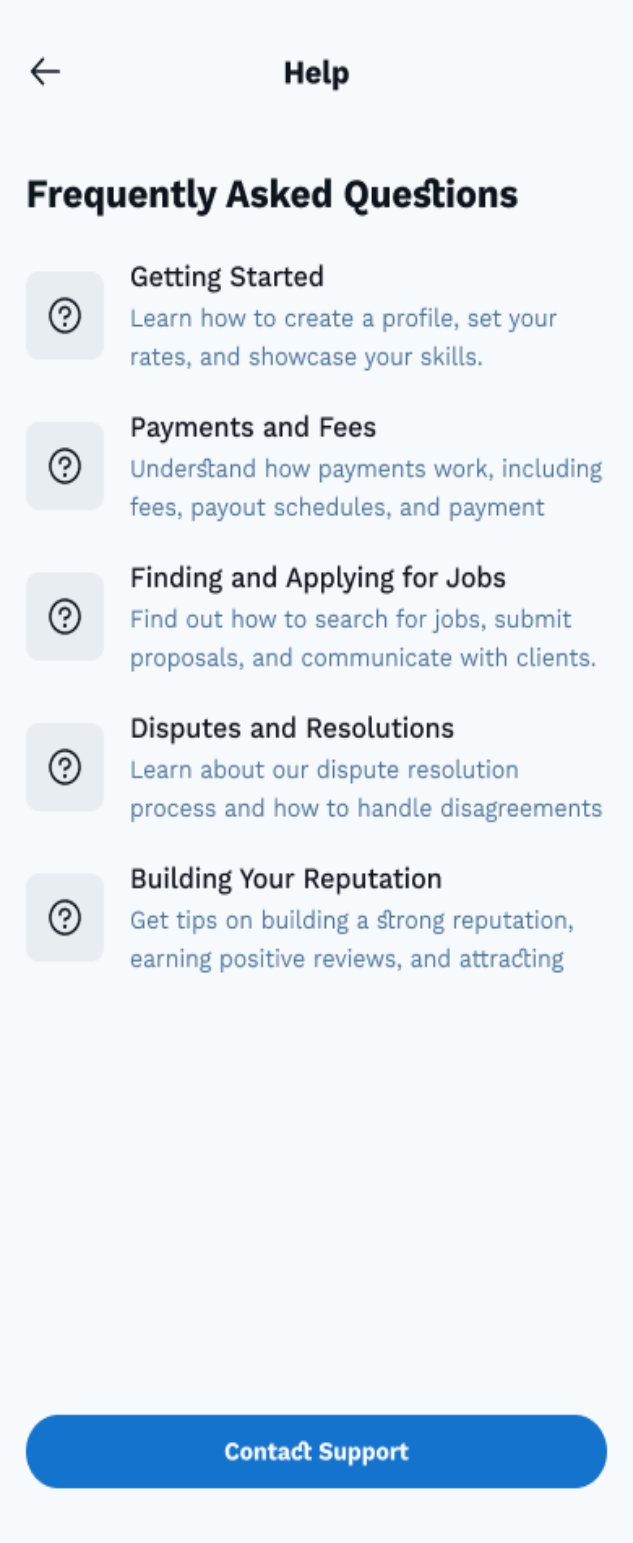
Home | Requests | Chat | Profile


Laborer Profile
Zain Malik
Plumber · 5 years experience
Lahore, Pakistan
Invite to Job
Skills
Plumbing
Pipe Fitting
Leak Repair
Drain Cleaning
Portfolio
Reviews
4.8
120 reviews
5 70%
4 20%
3 5%
2 3%
1 2%
Fatima Ali
2 weeks ago
Zain did an excellent job fixing a major leak in my bathroom. He was prompt, professional, and the repair was done quickly and efficiently. Highly recommend!
15
2
Ahmed Raza
1 month ago
Zain was good, but there was a slight delay in his arrival. The work was satisfactory, but I expected a bit more attention to detail. Overall, a decent experience.
8
1
Message


Job Details
Job Details
Job Title
Plumbing Repair
Description
Fixing a leaking pipe in the bathroom.
Location
Lahore
Budget
PKR 5,000
Applicants
Ali Hassan
Plumber
Zain Malik
Plumber
Arslan Khan
Plumber
Chat
Mark as Complete


Payment
Job Summary
Fixing a leaky faucet
Plumbing
Date & Time
10:00 AM - 12:00 PM
Total Amount
Rs. 1,500
Payment Method
Credit/Debit Card
Pay on Site
Pay Now
Rate your experience
How was your experience with Zain Malik?
1 star
2 stars
3 stars
4 stars
5 stars
Submit Review


Settings
Account
Notifications
Change Password
Privacy
Support
Help & Support
Home
Jobs
Messages
Profile


Help
Frequently Asked Questions
Getting Started
Learn how to create a profile, set your rates, and showcase your skills.
Payments and Fees
Understand how payments work, including fees, payout schedules, and payment
Finding and Applying for Jobs
Find out how to search for jobs, submit proposals, and communicate with clients.
Disputes and Resolutions
Learn about our dispute resolution process and how to handle disagreements
Building Your Reputation
Get tips on building a strong reputation, earning positive reviews, and attracting
Contact Support

4.3 Additional Information

The mobile interface is designed with simplicity in mind, considering that many skilled workers may have limited experience with smartphone apps. Large buttons, clear icons, and straightforward navigation ensure accessibility for all user types.

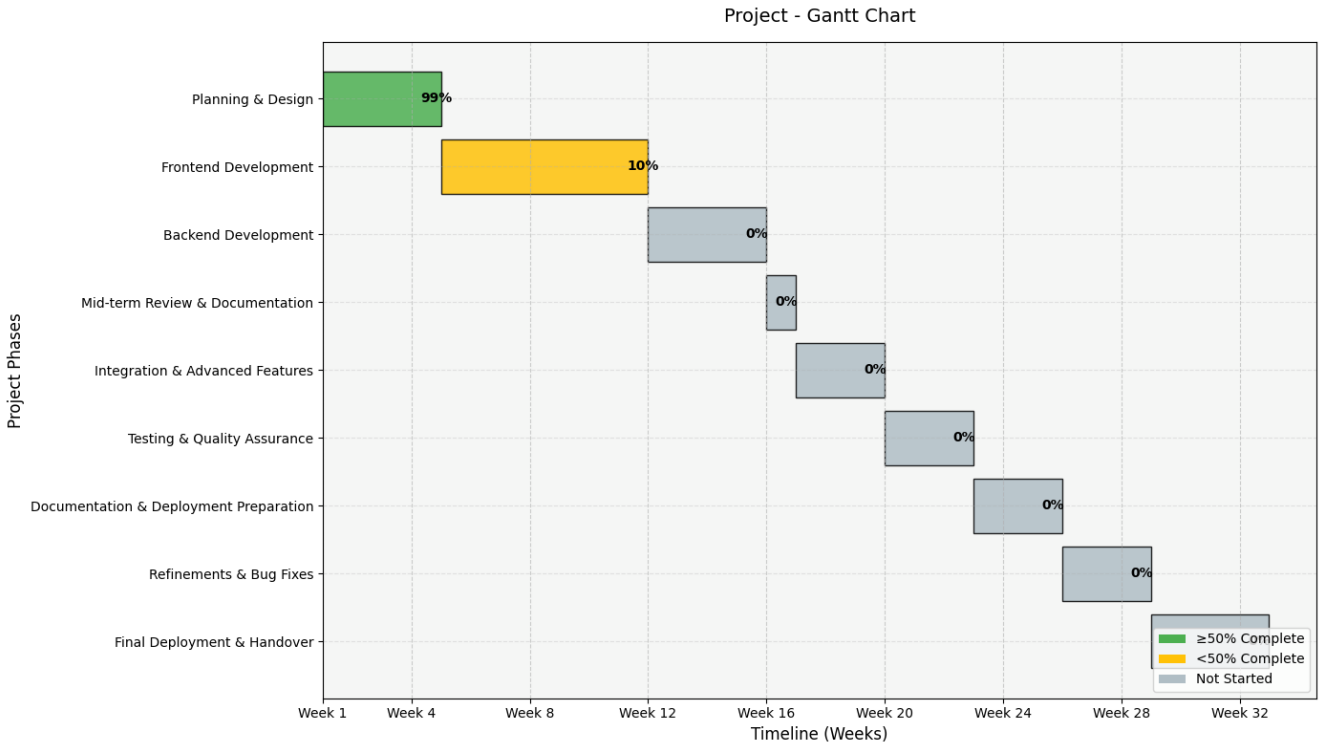
5. Other Design Details

Further design details, such as specific user interface elements or advanced features, will be developed in later stages of the project.

6. Revised Project Plan

As per our proposal, we've done about 99% of the Planning & Design phase.We spent time investigating project needs, discovering pertinent insight, and sketching initial ideas for the UI and UX. The next stage of our work is the Frontend Development phase which is scheduled for (Weeks 5–-11). We're about 10% through.

Below, the Gantt chart clearly shows how the project has progressed, which tasks are completed, ongoing, and that which is upcoming in line with our plan.



7. References

· G. Haeringer and M. Wooders, *"Decentralized job matching,"* International Journal of Game Theory, vol. 40, no. 1, pp. 1–28, Jan. 2011.

· M. Nardini, S. Helmer, N. El Ioini, and C. Pahl, *"A Blockchain-Based Decentralized Electronic Marketplace for Computing Resources,"* SN Computer Science, vol. 1, art. no. 251, 2020.

· Pakistan Bureau of Statistics, *"Labour Force Statistics 2022-23,"* Government of Pakistan.

https://www.pbs.gov.pk/content/labour-force-statistics

· A. Kamal, *"Mutually beneficial: App connects job-seeking labourers with employers,"* The Express Tribune, May 14, 2014.

https://tribune.com.pk/story/786908/mutually-beneficial-app-connects-job-seeking-labourers-with-employers

· Beamexchange, *"Pakistan Labour Market Assessment – 2022,"* BEAM Exchange, 2022. https://beamexchange.org/resources/2038/

· AskSource Info, *"Labour Market Assessment – Pakistan – 2022,"* AskSource, 2022.

https://asksource.info/resources/labour-market-assessment-pakistan-2022

Appendix A: Glossary

Decentralized System	A system architecture where control and data are distributed across multiple nodes, allowing direct interaction between users without intermediaries.
Laborer/Worker	A skilled professional (e.g., electrician, plumber, carpenter) registered on the ProLabour platform to offer services.
Network Manager	A dedicated component of the ProLabour platform that facilitates peer-to-peer connections and manages direct communication between users.
OTP	One-Time Password, a temporary code sent to a user's phone for authentication during registration or login.
Pay-per-job	A payment model where laborers are compensated based on individual tasks completed rather than a fixed salary.
Portfolio	A digital collection of a laborer's work, including images, descriptions, and past job details, displayed on their profile.
Rating and Review System	A feature allowing customers and laborers to provide feedback (star ratings and written reviews) after job completion to build trust.
Real-time Notifications	Instant alerts sent to users via push notifications for job updates, messages, or application statuses.
UI/UX	User Interface/User Experience, referring to the design and interaction of the mobile application to ensure usability and satisfaction.
JWT	JSON Web Token, a standard used for secure session management and authentication in the ProLabour platform.
HTTPS/SSL	Hypertext Transfer Protocol Secure/Secure Sockets Layer, used to encrypt communications between the app and servers.
Node.js	A JavaScript runtime environment used for backend development of the ProLabour platform.
Firebase	A platform used for real-time messaging, authentication, and push notifications in the ProLabour app.
Google Maps API	An application programming interface used for geolocation services, such as proximity-based job matching.

Appendix B: IV & V Report

(Independent verification & validation)
IV & V Resource

Name Signature

S#	Defect Description	Origin Stage	Status	Fix Time	
				Hours	Minutes
1					
2					
3					
…					

Table 1: List of non-trivial defects

This document has been adapted from the following:

1. Previous project templates at UCP
2. High-level Technical Design, Centers for Medicare & Medicaid Services. (www.cms.gov)