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HireLink - Local Service Provider Platform

Academic Project Documentation

UIT,ADOOR,Academic Year 2025-2026

Academic Year 2025-2026

HireLink

A Full-Stack Web Application for Connecting Customers with Local Service Providers

Submitted in partial fulfillment of the requirements for the BCA ,Graduate Academic Project

Project Team: HireLink Development Team

Submission Date: January 2026

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1. Executive Summary

HireLink is a comprehensive full-stack web application designed to bridge the gap between customers seeking home services and verified local service providers. The platform facilitates seamless booking, tracking, and management of services such as electrical work, plumbing, carpentry, cleaning, painting, and more.

Key Highlights

Aspect	Description
Platform Type	Web-based Service Marketplace
Target Users	Customers, Service Providers, Administrators
Primary Services	Electrical, Plumbing, Carpentry, Cleaning, Painting, AC & Appliances
Technology Stack	React.js, Spring Boot, MySQL, Docker
Architecture	Microservices-ready Monolith

Project Objectives

1. Create a user-friendly platform for booking home services
 2. Implement a robust verification system for service providers
 3. Enable real-time booking management and tracking
 4. Provide transparent pricing and rating mechanisms
 5. Ensure secure authentication and data protection
-

2. Introduction

2.1 Problem Statement

The home services industry faces significant challenges in connecting customers with reliable service providers:

- **Lack of transparency** in pricing and service quality
- **Difficulty in verifying** provider credentials
- **Inefficient scheduling** and booking processes
- **No standardized feedback** mechanisms
- **Trust deficit** between customers and providers

2.2 Proposed Solution

HireLink addresses these challenges by providing a centralized digital platform that:

- 1. **Verifies Service Providers** through KYC documentation and background checks
- 2. **Standardizes Pricing** with transparent cost structures
- 3. **Enables Easy Booking** with intuitive scheduling interfaces
- 4. **Implements Rating Systems** for quality assurance
- 5. **Provides Real-time Tracking** of service status

2.3 Scope of the Project

In Scope: - User registration and authentication (Customers, Providers, Admins) - Service category management - Booking creation, tracking, and management - Provider profile and service management - Review and rating system - Location-based service discovery - Multi-role dashboard interfaces

Out of Scope (Future Enhancements): - Payment gateway integration - Real-time chat/messaging - Mobile native applications - AI-based service recommendations

2.4 Target Audience

User Type	Description
Customers	Individuals seeking home services for residential needs
Service Providers	Skilled professionals offering home services
Administrators	Platform managers overseeing operations and verification

3. Software Requirements Specification (SRS)

3.1 Functional Requirements

3.1.1 User Management Module

ID	Requirement	Priority
FR-001	Users shall be able to register with email/phone and password	High
FR-002	Users shall be able to login using credentials	High
FR-003	System shall support OTP-based verification	High
FR-004	Users shall be able to update their profile information	Medium
FR-005	Users shall be able to manage multiple addresses	Medium
FR-006	System shall support role-based access	High

ID	Requirement	Priority
	(Customer, Provider, Admin)	

3.1.2 Service Provider Module

ID	Requirement	Priority
FR-007	Providers shall be able to create and manage service listings	High
FR-008	Providers shall submit KYC documents for verification	High
FR-009	Providers shall set availability schedules	Medium
FR-010	Providers shall define service areas by pincode/radius	Medium
FR-011	Providers shall accept/reject booking requests	High
FR-012	System shall track provider statistics (ratings, bookings, earnings)	High

3.1.3 Service Category Module

ID	Requirement	Priority
FR-013	System shall support hierarchical service categories	High
FR-014	Categories shall have configurable pricing structures	Medium
FR-015	Featured categories shall be highlighted on homepage	Low
FR-016	Categories shall support multiple pricing units	Medium

3.1.4 Booking Module

ID	Requirement	Priority
FR-017	Customers shall be able to create service bookings	High
FR-018	System shall generate unique booking numbers	High
FR-019	Bookings shall support multiple status states	High
FR-020	Customers shall track booking status in real-time	High
FR-021	System shall prevent duplicate active bookings	Medium

ID	Requirement	Priority
FR-022	Bookings shall support cancellation with reason tracking	Medium

3.1.5 Review and Rating Module

ID	Requirement	Priority
FR-023	Customers shall rate completed services	High
FR-024	System shall support multi-dimensional ratings	Medium
FR-025	Reviews shall be visible on provider profiles	High
FR-026	System shall calculate and display average ratings	High

3.2 Non-Functional Requirements

3.2.1 Performance Requirements

ID	Requirement	Metric
NFR-001	Page load time shall be under 3 seconds	< 3s
NFR-002	API response time shall be under 500ms	< 500ms
NFR-003	System shall support 1000 concurrent users	1000 users
NFR-004	Database queries shall execute under 100ms	< 100ms

3.2.2 Security Requirements

ID	Requirement	Implementation
NFR-005	Passwords shall be encrypted using bcrypt	BCrypt hashing
NFR-006	API endpoints shall be secured with JWT tokens	JWT Authentication
NFR-007	Sensitive data shall be encrypted at rest	AES Encryption
NFR-008	System shall implement role-based access control	Spring Security RBAC

3.2.3 Usability Requirements

ID	Requirement
NFR-009	UI shall be responsive across devices (mobile, tablet, desktop)
NFR-010	System shall provide clear error messages
NFR-011	Navigation shall be intuitive with maximum 3 clicks to any feature

3.3 Use Case Specifications

Use Case UC-001: User Registration

Field	Description
Use Case ID	UC-001

Field	Description
Name	User Registration
Actors	Customer, Service Provider
Precondition	User has valid email/phone number
Main Flow	1. User navigates to registration page 2. User selects account type 3. User enters required details 4. System validates input 5. System sends OTP verification 6. User verifies OTP 7. Account is created
Postcondition	User account is created and verified

Use Case UC-002: Book a Service

Field	Description
Use Case ID	UC-002
Name	Book a Service
Actors	Customer
Precondition	Customer is logged in
Main Flow	1. Customer browses/searches services 2. Customer selects a service 3. Customer views service details 4. Customer clicks “Book Now” 5. Customer selects date and time 6. Customer enters service address 7. Customer describes the issue 8. System creates booking
Postcondition	Booking is created with unique booking number

4. System Architecture

4.1 High-Level Architecture

HireLink - System Architecture

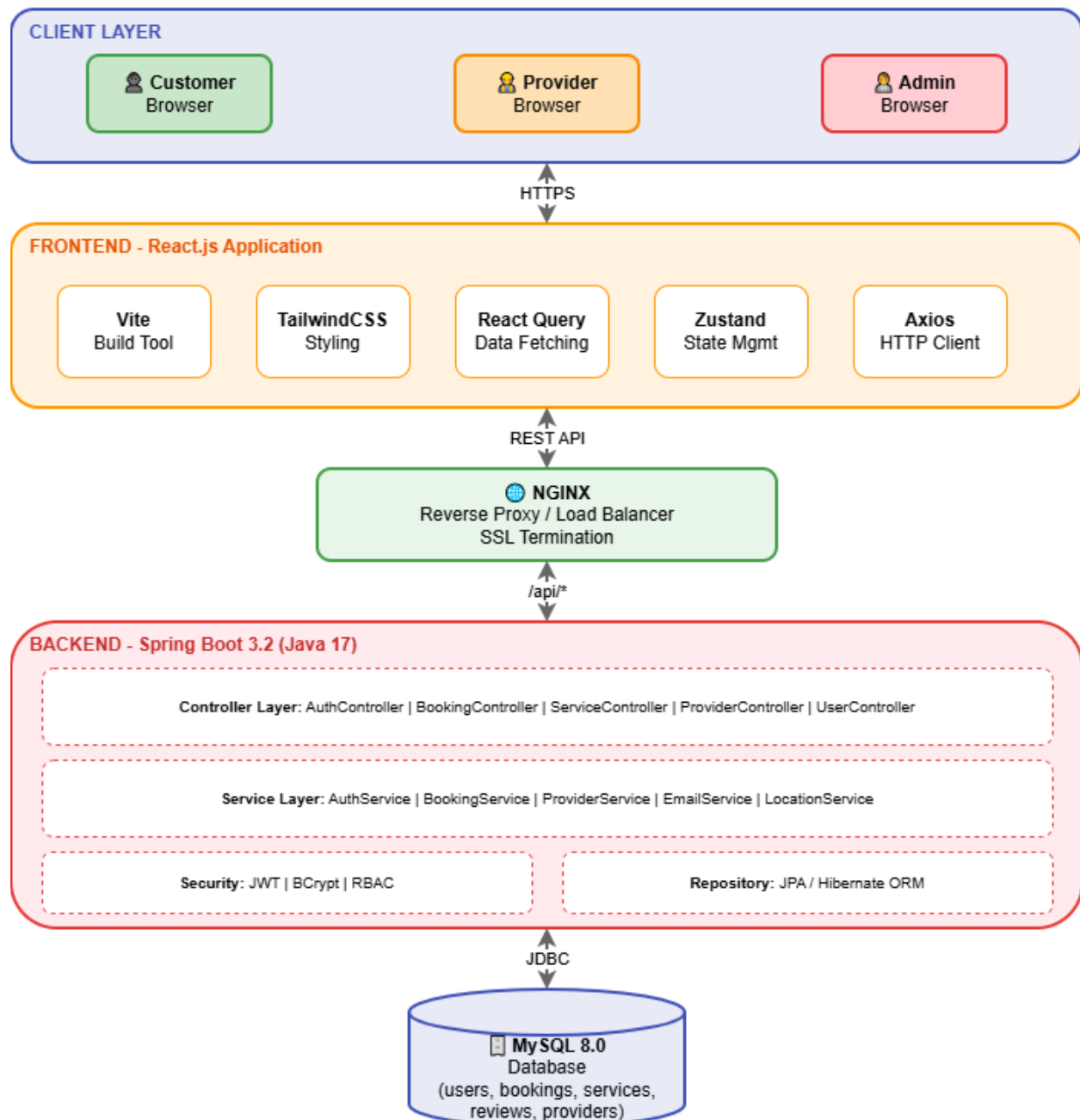


Figure 4.1: High-Level System Architecture showing the three-tier architecture with Client Layer (React.js), Application Layer (Spring Boot), and Data Layer (MySQL)

The HireLink system follows a three-tier architecture:

Client Layer: - React.js single-page application - Vite build tool for fast development - TailwindCSS for styling - Zustand for state management - React Query for data fetching

Application Layer: - Spring Boot 3.2 REST API - Spring Security for authentication - JWT token-based authorization - JPA/Hibernate for ORM

Data Layer: - MySQL 8.0 relational database - Optimized indexes for performance - Stored procedures for complex operations

4.2 Technology Stack

Layer	Technology	Version	Purpose
Frontend Framework	React.js	18.x	UI Component Library
Build Tool	Vite	5.x	Fast Development & Build
Styling	TailwindCSS	3.x	Utility-First CSS
State Management	Zustand	4.x	Lightweight State Store
API Client	React Query	5.x	Data Fetching & Caching
Backend Framework	Spring Boot	3.2.x	REST API Framework
Language	Java	17	Backend Programming
Security	Spring Security	6.x	Authentication & Authorization
ORM	Hibernate/JPA	6.x	Object-Relational Mapping
Database	MySQL	8.0	Relational Database
Containerization	Docker	24.x	Application Containers

5. Data Flow Diagrams (DFD)

5.1 Context Diagram (Level 0 DFD)

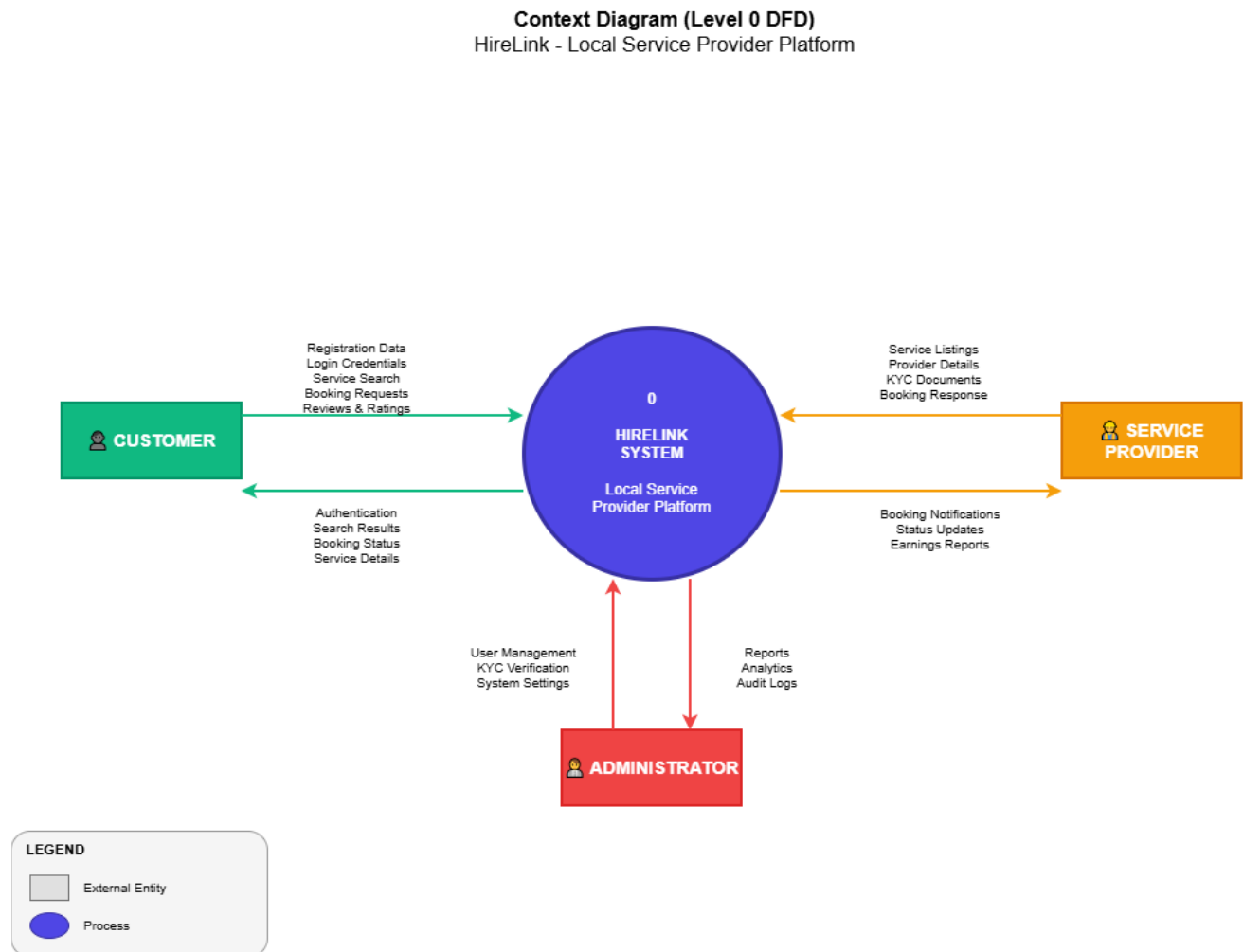


Figure 5.1: Context Diagram showing the HireLink system as a single process with three external entities: Customer, Service Provider, and Administrator

External Entities: - **Customer:** Sends registration data, login credentials, service search queries, booking requests, and reviews - **Service Provider:** Sends service listings, KYC documents, and booking responses - **Administrator:** Manages users, verifies KYC, and configures system settings

5.2 Level 1 DFD

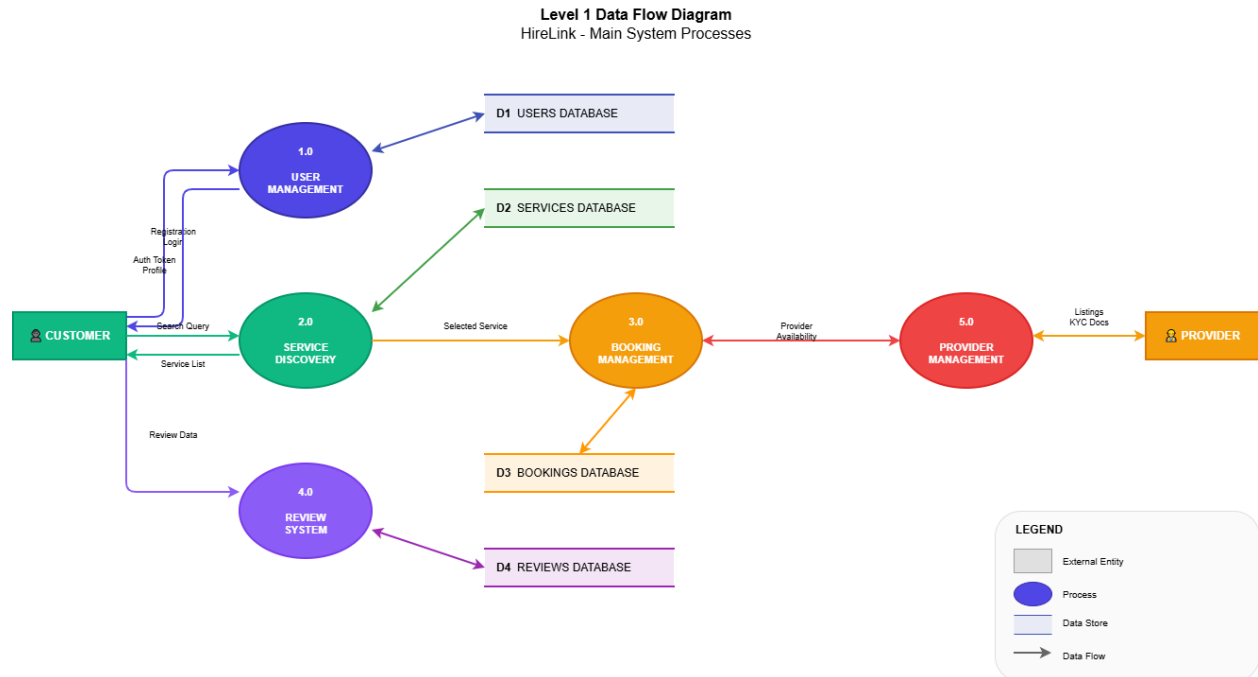


Figure 5.2: Level 1 DFD showing the main processes: User Management, Service Discovery, Booking Management, Review System, and Provider Management

Main Processes:

Process	Description
1.0 User Management	Handles registration, authentication, and profile management
2.0 Service Discovery	Manages service search and category browsing
3.0 Booking Management	Creates and manages service bookings
4.0 Review System	Handles ratings and reviews
5.0 Provider Management	Manages provider profiles and verification

Data Stores:

Data Store	Description
D1: Users Database	Stores user accounts and provider information
D2: Services Database	Stores service categories and listings
D3: Bookings Database	Stores booking records and status history
D4: Reviews Database	Stores customer reviews and ratings

5.3 Level 2 DFD - Booking Management

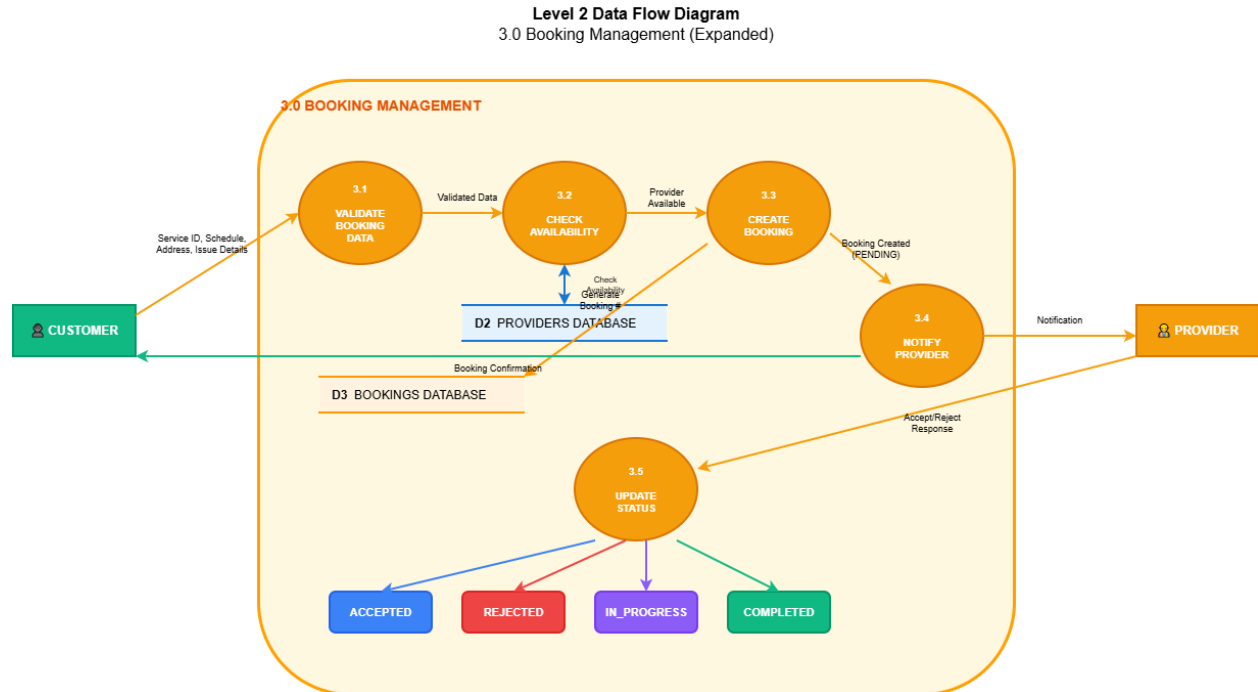


Figure 5.3: Level 2 DFD for Booking Management showing sub-processes: Validate Booking Data, Check Availability, Create Booking, Notify Provider, and Update Status

Sub-Processes:

Process	Description
3.1 Validate Booking Data	Validates customer input for booking
3.2 Check Availability	Verifies provider availability
3.3 Create Booking	Generates booking record with unique number
3.4 Notify Provider	Sends notification to assigned provider
3.5 Update Status	Manages booking status transitions

6. Entity-Relationship Diagrams

6.1 Complete ER Diagram

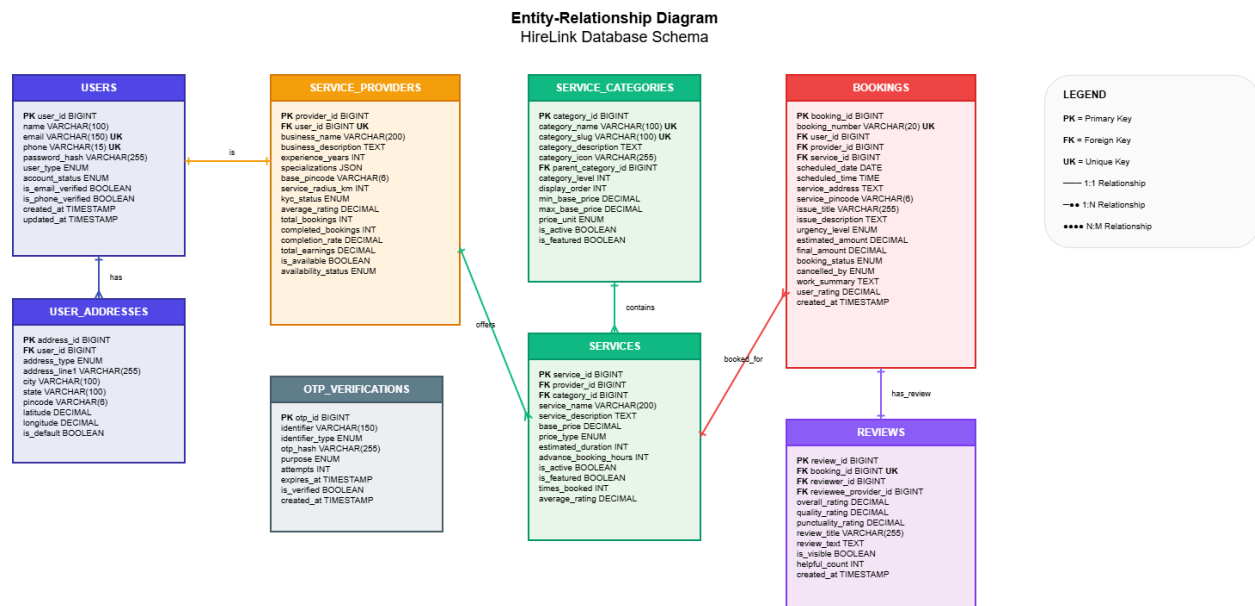


Figure 6.1: Entity-Relationship Diagram showing all database entities and their relationships

6.2 Entity Descriptions

Entity	Description	Key Attributes
USERS	All system users	user_id (PK), name, email, phone, user_type
USER_ADDRESSES	User address records	address_id (PK), user_id (FK), city, pincode
SERVICE_PROVIDERS	Provider business profiles	provider_id (PK), user_id (FK), business_name
SERVICE_CATEGORIES	Hierarchical categories	category_id (PK), category_name, parent_id
SERVICES	Service listings	service_id (PK), provider_id (FK), base_price
BOOKINGS	Service bookings	booking_id (PK), booking_number, status
REVIEWS	Customer reviews	review_id (PK), booking_id (FK), rating
OTP_VERIFICATIONS	OTP records	otp_id (PK), identifier, otp_hash

6.3 Relationship Summary

Parent Entity	Child Entity	Relationship	Cardinality
Users	UserAddresses	Has	1:N
Users	ServiceProviders	Is	1:1
Users	Bookings	Makes	1:N
Users	Reviews	Writes	1:N
ServiceProviders	Services	Offers	1:N
ServiceProviders	Bookings	Receives	1:N
ServiceCategories	Services	Contains	1:N
Services	Bookings	BookedFor	1:N
Bookings	Reviews	HasReview	1:1

7. Database Design

7.1 Data Dictionary

Table: users

Column	Data Type	Constraints	Description
user_id	BIGINT	PK, AUTO_INCREMENT	Unique user identifier
name	VARCHAR(100)	NOT NULL	User's full name
email	VARCHAR(150)	UNIQUE	Email address
phone	VARCHAR(15)	UNIQUE	Phone number
password_hash	VARCHAR(255)		BCrypt hashed password
user_type	ENUM	NOT NULL	CUSTOMER, PROVIDER, ADMIN
account_status	ENUM		ACTIVE, INACTIVE, SUSPENDED
is_email_verified	BOOLEAN	DEFAULT FALSE	Email verification status
is_phone_verified	BOOLEAN	DEFAULT FALSE	Phone verification status
created_at	TIMESTAMP	NOT NULL	Record creation time

Table: service_providers

Column	Data Type	Constraints	Description
provider_id	BIGINT	PK, AUTO_INCREMENT	Unique provider identifier

Column	Data Type	Constraints	Description
user_id	BIGINT	FK, UNIQUE	Reference to users table
business_name	VARCHAR(200)		Business/brand name
business_description	TEXT		Detailed description
experience_years	INT	DEFAULT 0	Years of experience
base_pincode	VARCHAR(6)		Primary service pincode
service_radius_km	INT	DEFAULT 10	Service coverage radius
kyc_status	ENUM		NOT_SUBMITTED, PENDING, VERIFIED
average_rating	DECIMAL(3,2)	DEFAULT 0	Average service rating
total_bookings	INT	DEFAULT 0	Total booking count
completed_bookings	INT	DEFAULT 0	Completed booking count
is_available	BOOLEAN	DEFAULT TRUE	Current availability

Table: bookings

Column	Data Type	Constraints	Description
booking_id	BIGINT	PK, AUTO_INCREMENT	Unique booking identifier
booking_number	VARCHAR(20)	UNIQUE, NOT NULL	Human-readable booking ID
user_id	BIGINT	FK, NOT NULL	Customer reference
provider_id	BIGINT	FK, NOT NULL	Provider reference
service_id	BIGINT	FK, NOT NULL	Service reference
scheduled_date	DATE	NOT NULL	Scheduled service date
scheduled_time	TIME	NOT NULL	Scheduled start time
service_address	TEXT	NOT NULL	Service location address
service_pincode	VARCHAR(6)	NOT NULL	Service location pincode
issue_title	VARCHAR(255)		Brief issue summary

Column	Data Type	Constraints	Description
issue_description	TEXT		Detailed issue description
urgency_level	ENUM	DEFAULT 'MEDIUM'	LOW, MEDIUM, HIGH
estimated_amount	DECIMAL(10,2)		Initial cost estimate
final_amount	DECIMAL(10,2)		Final billing amount
booking_statuses	ENUM	DEFAULT 'PENDING'	Current booking status
created_at	TIMESTAMP	NOT NULL	Booking creation time

7.2 Booking Status State Machine

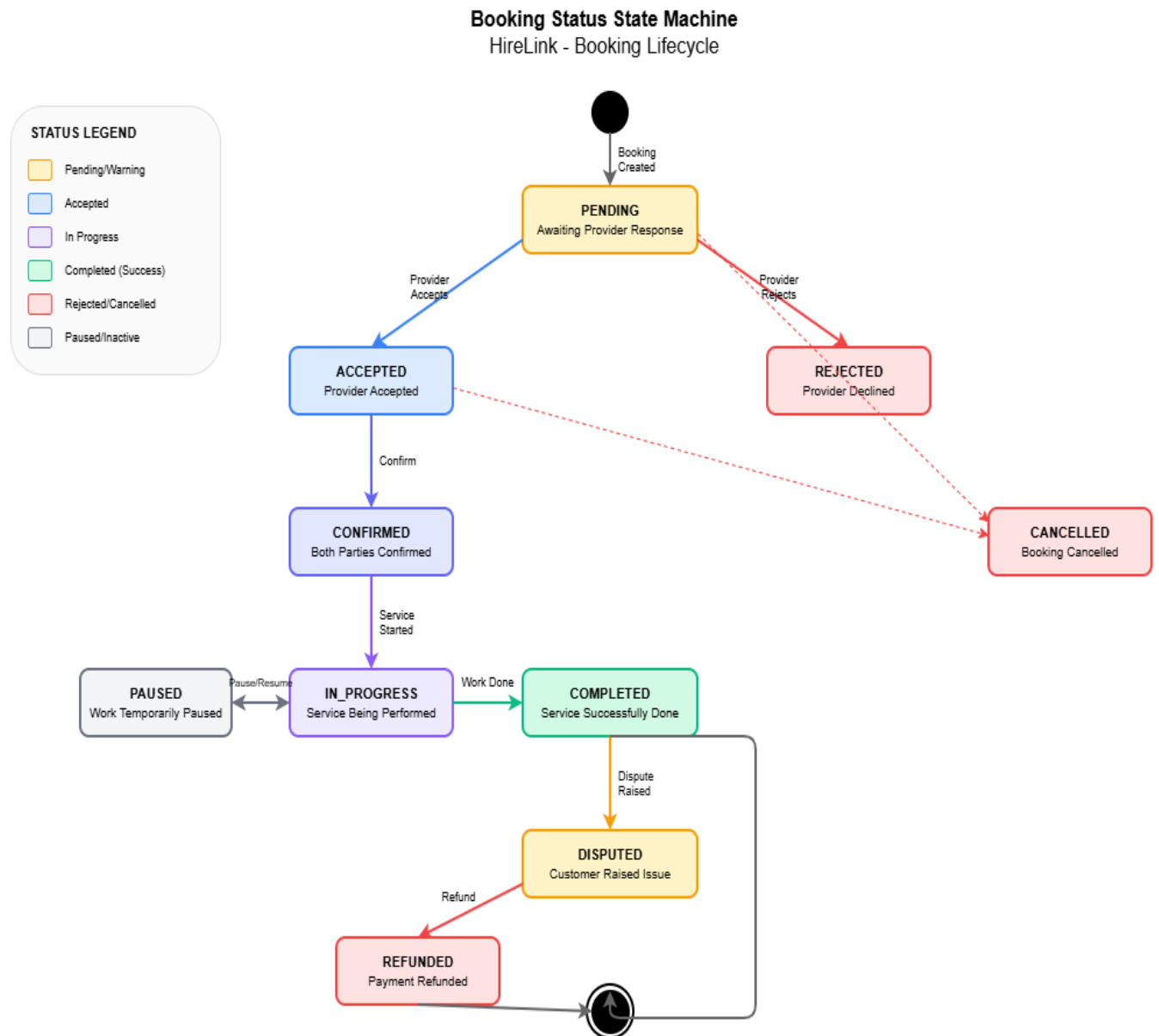


Figure 7.1: Booking Status State Machine showing all possible status transitions

Status Definitions:

Status	Description
PENDING	Initial state, awaiting provider response
ACCEPTED	Provider accepted the booking
REJECTED	Provider declined the booking
CONFIRMED	Booking confirmed by both parties
IN_PROGRESS	Service is currently being performed

Status	Description
PAUSED	Work temporarily paused
COMPLETED	Service successfully completed
CANCELLED	Booking cancelled by any party
DISPUTED	Customer raised a dispute
REFUNDED	Payment refunded after dispute

8. Workflow Diagrams

8.1 User Registration Workflow

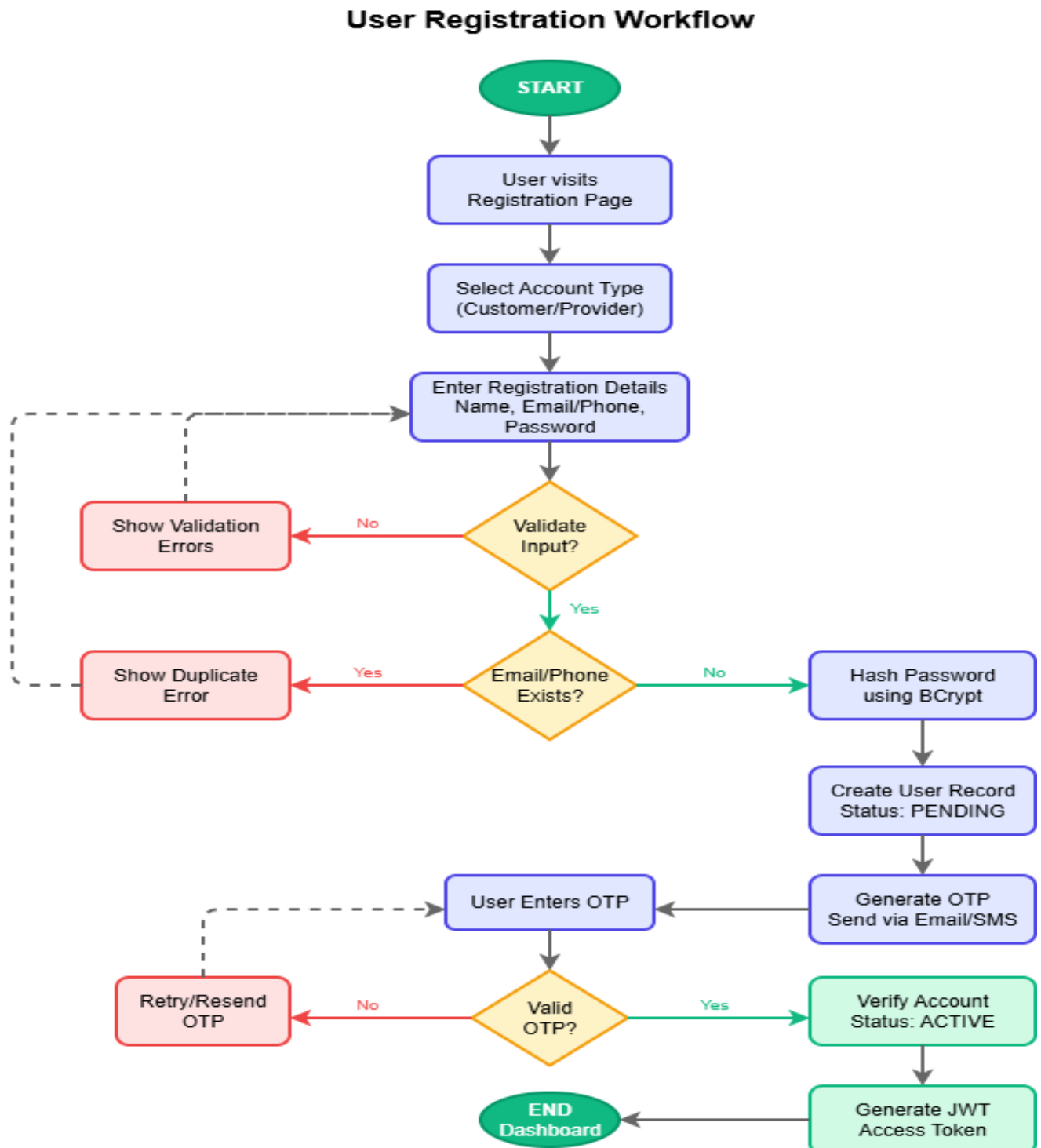


Figure 8.1: User Registration Flowchart showing the complete registration process from start to dashboard redirect

Workflow Steps:

1. User visits registration page
2. User selects account type (Customer/Provider)
3. User enters registration details (Name, Email/Phone, Password)
4. System validates input data
5. System checks for existing email/phone
6. System hashes password using BCrypt
7. System creates user record with PENDING status
8. System generates and sends OTP
9. User enters OTP
10. System verifies OTP
11. System activates account
12. System generates JWT token
13. User is redirected to dashboard

8.2 Service Booking Workflow

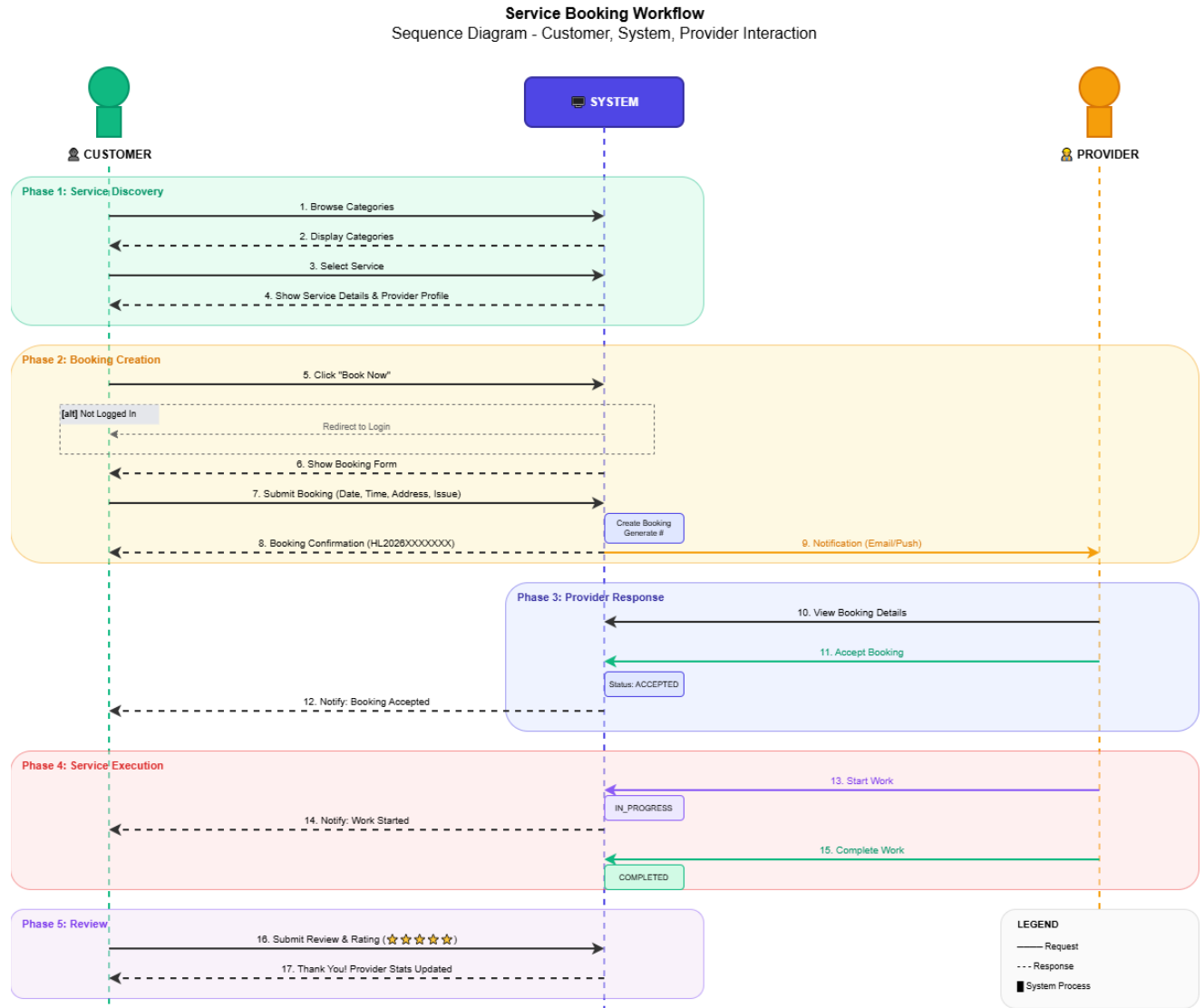


Figure 8.2: Service Booking Sequence Diagram showing interactions between Customer, System, and Provider

Workflow Phases:

Phase 1: Service Discovery - Customer browses categories - System displays available services - Customer selects service and views details

Phase 2: Booking Creation - Customer initiates booking - System validates login status - Customer enters booking details - System creates booking with PENDING status - System generates booking number (HL2026XXXXXX) - Provider receives notification

Phase 3: Provider Response - Provider reviews booking request - Provider accepts or rejects - System updates status - Customer receives notification

Phase 4: Service Execution - Provider starts work (IN_PROGRESS) - Provider completes work (COMPLETED) - Customer receives completion notification

Phase 5: Review - Customer submits review and rating - System updates provider statistics

9. Technical Specifications

9.1 Frontend Architecture

Project Structure:

```
frontend/
├── src/
│   ├── components/    # Reusable UI components
│   ├── pages/         # Page components (routes)
│   ├── services/      # API service layer
│   ├── context/       # State management
│   ├── styles/        # Styling configuration
│   ├── App.jsx        # Main application
│   └── main.jsx       # Entry point
├── public/            # Static assets
└── package.json       # Dependencies
```

Key Dependencies:

Package	Purpose
react	UI Component Library
react-router-dom	Client-side Routing
@tanstack/react-query	Data Fetching & Caching
zustand	State Management
axios	HTTP Client
tailwindcss	CSS Framework

9.2 Backend Architecture

Project Structure:

```
backend/
├── src/main/java/com/hirelink/
│   ├── controller/    # REST API controllers
│   ├── service/       # Business logic
│   ├── repository/    # Data access
│   ├── entity/        # JPA entities
│   ├── dto/           # Data transfer objects
│   └── security/      # Security components
```

```
| └─ exception/      # Exception handling
| └─ pom.xml         # Maven dependencies
```

Key Dependencies:

Dependency	Purpose
spring-boot-starter-web	REST API Framework
spring-boot-starter-data-jpa	Data Access Layer
spring-boot-starter-security	Authentication
mysql-connector-j	Database Driver
jjwt-api	JWT Token Generation
lombok	Boilerplate Reduction

10. API Documentation

10.1 API Overview

Base URL	Format	Authentication
/api	JSON	JWT Bearer Token

10.2 Authentication Endpoints

POST /api/auth/register

Request:

```
{
  "name": "John Doe",
  "email": "john@example.com",
  "phone": "9876543210",
  "password": "securePassword123",
  "userType": "CUSTOMER"
}
```

Response (201 Created):

```
{
  "success": true,
  "message": "Registration successful",
  "data": {
    "userId": 1,
    "name": "John Doe",
    "userType": "CUSTOMER"
  }
}
```


POST /api/auth/login

Request:

```
{
  "identifier": "john@example.com",
  "password": "securePassword123"
}
```

Response (200 OK):

```
{
  "success": true,
  "data": {
    "accessToken": "eyJhbGciOiJIUzI1NiIs... ",
    "refreshToken": "eyJhbGciOiJIUzI1NiIs... ",
    "tokenType": "Bearer",
    "expiresIn": 86400
  }
}
```

10.3 Booking Endpoints

POST /api/bookings

Request:

```
{
  "serviceId": 1,
  "providerId": 1,
  "scheduledDate": "2026-02-15",
  "scheduledTime": "10:00:00",
  "serviceAddress": "42, Shanti Nagar",
  "servicePincode": "560001",
  "issueTitle": "Ceiling Fan Not Working",
  "urgencyLevel": "MEDIUM"
}
```

Response (201 Created):

```
{
  "success": true,
  "data": {
    "bookingId": 1,
    "bookingNumber": "HL2026021500001",
    "bookingStatus": "PENDING",
    "estimatedAmount": 300.00
  }
}
```

10.4 API Error Responses

HTTP Code	Error Type	Description
400	Bad Request	Invalid input or validation failure
401	Unauthorized	Missing or invalid authentication
403	Forbidden	Insufficient permissions
404	Not Found	Resource does not exist
500	Internal Server Error	Server-side error

11. User Interface Design

11.1 Design Principles

1. **Responsive Design:** Mobile-first approach with breakpoints for tablet and desktop
2. **Consistent Visual Language:** Unified color palette, typography, and spacing
3. **Accessibility:** WCAG 2.1 compliant with proper contrast ratios
4. **Intuitive Navigation:** Maximum 3 clicks to reach any feature
5. **Feedback & Loading States:** Clear visual feedback for all user actions

11.2 Color Palette

Color Name	Hex Code	Usage
Primary-600	#4F46E5	Primary actions, links
Primary-700	#4338CA	Primary hover states
Accent-500	#F59E0B	CTA buttons, highlights
Success-500	#22C55E	Success states
Warning-500	#EAB308	Warning messages
Error-500	#EF4444	Error states
Gray-900	#111827	Primary text
Gray-500	#6B7280	Secondary text

11.3 Key Pages

Page	Description
Home	Hero section, service categories, featured providers
Categories	Grid of all service categories
Service Detail	Service information, provider profile, booking button
Booking Form	Date/time selection, address input, issue description
My Bookings	List of customer's bookings with status filters
Booking Detail	Complete booking information, status timeline

Page	Description
Provider Profile	Business info, services offered, reviews
Profile	User settings, addresses, preferences

12. Security Implementation

12.1 Authentication Flow

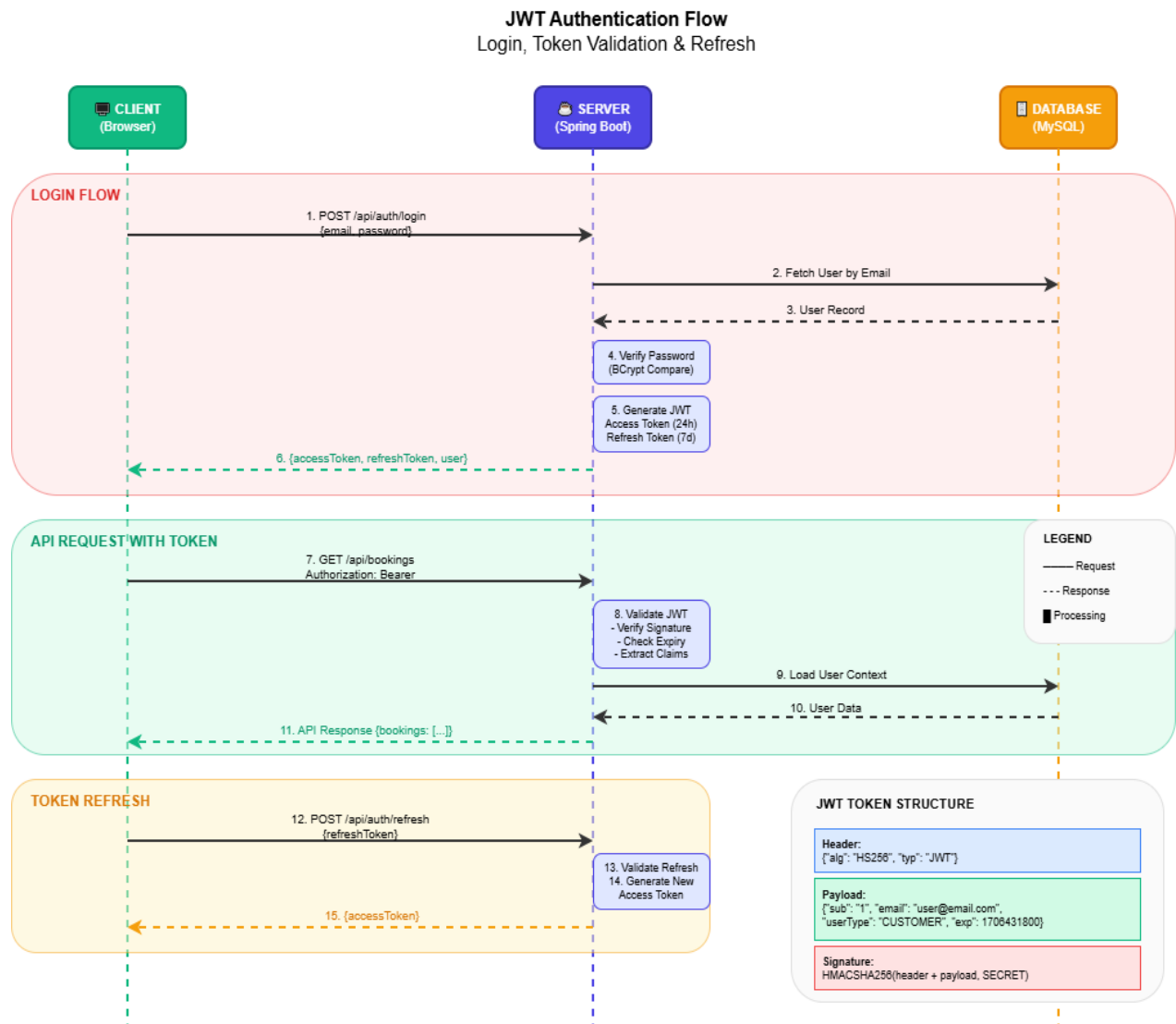


Figure 12.1: JWT Authentication Flow showing the login process and token validation

12.2 Security Measures

Aspect	Implementation
Password Storage	BCrypt with 12 rounds

Aspect	Implementation
Token Type	JWT (JSON Web Token)
Access Token Expiry	24 hours
Refresh Token Expiry	7 days
Input Validation	Jakarta Bean Validation
SQL Injection Prevention	JPA Parameterized Queries
XSS Prevention	React automatic escaping

12.3 Role-Based Access Control

Role	Permissions
CUSTOMER	View services, Create bookings, Write reviews
PROVIDER	Manage services, Accept/reject bookings
ADMIN	User management, KYC verification
SUPER_ADMIN	All permissions + System settings

13. Testing Strategy

13.1 Testing Pyramid

Level	Coverage	Framework
Unit Tests	80%	JUnit 5, Jest
Integration Tests	15%	Spring Boot Test
E2E Tests	5%	Cypress

13.2 Test Categories

Unit Tests: - Backend service methods - Repository operations - Frontend components - Utility functions

Integration Tests: - API endpoint testing - Database operations - Authentication flow

End-to-End Tests: - Complete user workflows - Cross-browser testing

14. Deployment Architecture

14.1 Deployment Diagram

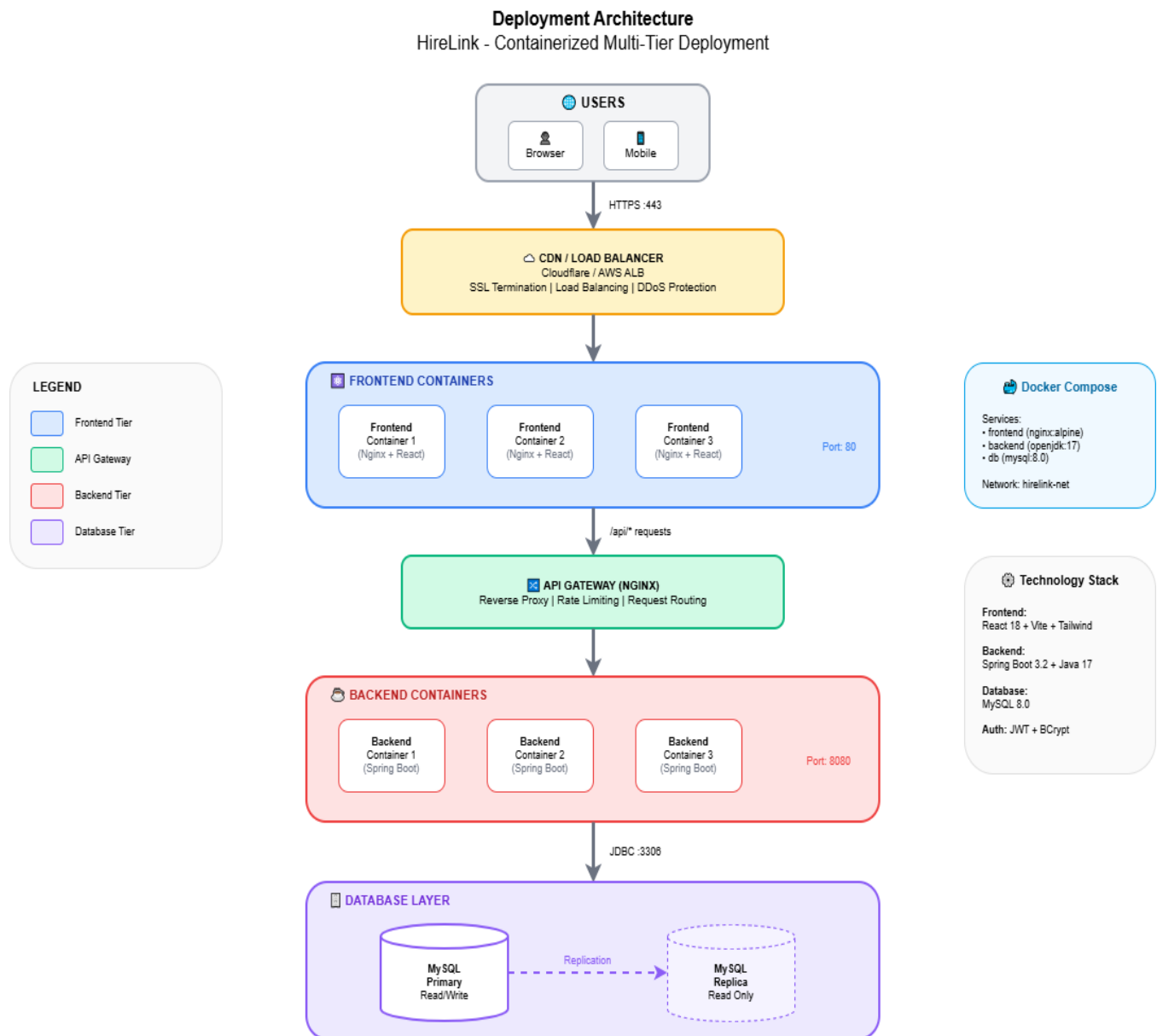


Figure 14.1: Deployment Architecture showing containerized services with load balancing

14.2 Docker Configuration

Services:

Service	Technology	Port
Frontend	Nginx + React	80
Backend	Spring Boot	8080

Service	Technology	Port
Database	MySQL 8.0	3306

14.3 Environment Configuration

Environment	URL	Purpose
Development	localhost:3000	Local development
Staging	staging.hirelink.in	Pre-production testing
Production	www.hirelink.in	Live application

15. Conclusion

15.1 Project Summary

HireLink successfully addresses the challenges in the home services industry by providing a comprehensive digital platform that connects customers with verified local service providers.

Key Achievements:

Objective	Status
User Registration & Authentication	✓ Complete
Service Category Management	✓ Complete
Booking System	✓ Complete
Provider Management	✓ Complete
Review System	✓ Complete
Location-Based Discovery	✓ Complete
Responsive UI	✓ Complete

15.2 Future Enhancements

1. Payment Gateway Integration (Razorpay/Stripe)
2. Real-Time Notifications (WebSocket)
3. Mobile Applications (iOS/Android)
4. AI Recommendations
5. Multi-Language Support
6. Analytics Dashboard

15.3 Lessons Learned

1. Spring Boot + React provides excellent developer productivity
2. Zustand offers simpler state management than Redux
3. Proper database normalization prevents scalability issues

4. Security should be implemented from the start
5. Docker significantly simplifies deployment

Appendices

Appendix A: Glossary

Term	Definition
JWT	JSON Web Token for authentication
KYC	Know Your Customer verification
OTP	One-Time Password
API	Application Programming Interface
CRUD	Create, Read, Update, Delete
ORM	Object-Relational Mapping

Appendix B: Demo Accounts

Role	Email	Password
Customer	priya.sharma@email.com	password123
Provider	ramesh.electrician@email.com	password123
Admin	admin@hirelink.in	password123

Appendix C: API Endpoints Summary

Method	Endpoint	Description
POST	/api/auth/register	User registration
POST	/api/auth/login	User login
GET	/api/categories	List categories
GET	/api/services/{id}	Service details
POST	/api/bookings	Create booking
GET	/api/bookings/my-bookings	User's bookings
PUT	/api/bookings/{id}/status	Update status
GET	/api/providers/{id}	Provider profile
POST	/api/bookings/{id}/review	Add review

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