# SOFTWARE DESIGN SPECIFICATION

## for

## INTERNSHIP MANAGEMENT SYSTEM

Version 1.0

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Submitted to: WEBEL (West Bengal Electronics Industry Development Corporation)

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# Contents

# 1 Introduction

## 1.1 Purpose

This Software Design Specification (SDS) document provides a detailed architectural and technical design for the Internship Management System (IMS) developed for WEBEL. It serves as a comprehensive guide for developers to implement a web-based solution that manages the entire internship lifecycle, from program creation by the Super Admin to application submission by Applicants, coordination by Department Coordinators, mentoring by Department Mentors, and final certification issuance.

## 1.2 Scope

The SDS encompasses the design of a robust system supporting three internship delivery modes (online, hybrid, offline) with three payment models each (free, paid by department, paid by student). The system handles the complete workflow, including program creation and management by the Super Admin, application processing and mentor assignment by Department Coordinators, task assignment and progress monitoring by Department Mentors, and application submission and task completion by Applicants.

## 1.3 Overview

This document provides detailed system architecture, comprehensive user interface designs, database schemas, process flows, wireframes, and implementation timelines. It aligns with WEBEL's requirements as specified in their internship notification portal.

# 2 System Architecture

## 2.1 High-Level Architecture

The IMS follows a modern three-tier architecture designed for scalability, security, and maintainability:
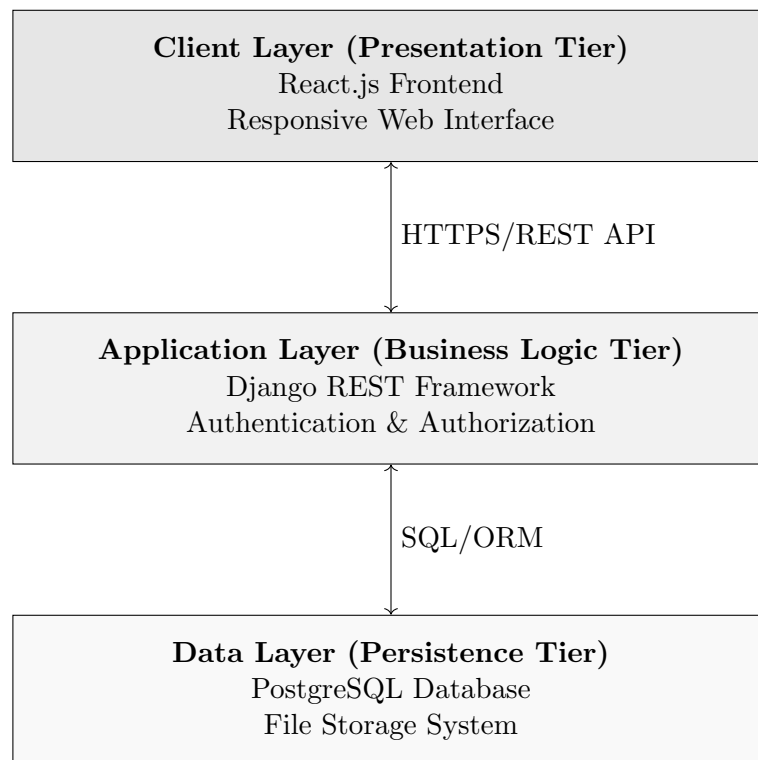


Figure 2.1: Three-Tier System Architecture

## 2.2 Component Interaction Diagram
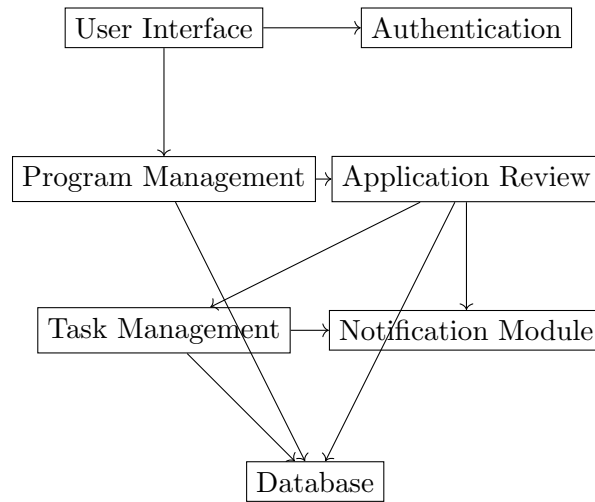


Figure 2.2: Component Interaction Diagram

## 2.3 Technology Stack

- **Frontend**: React.js with Material-UI for responsive design

- **Backend**: Django with Django REST Framework

- **Database**: PostgreSQL with optimized indexing

- **Authentication**: JWT-based authentication

- **File Storage**: AWS S3 or local file system

- **Email Service**: SMTP integration for notifications

- **Deployment**: Docker containers with nginx reverse proxy

# 3 User Interface Design

## 3.1 User Role Dashboard Designs

### 3.1.1 Super Admin Dashboard

```
┌──────────────────────────────────────────────────────────────┐
│  ┌────────────────────────────────────────────────────────┐  │
│  │            SUPER ADMIN DASHBOARD                        │  │
│  │            Welcome, Admin — IMS 2025                    │  │
│  └────────────────────────────────────────────────────────┘  │
│                                                              │
│         ┌──────────────────────────────────────────┐         │
│         │          Program Management              │         │
│         │          Active Programs: 5              │         │
│         │  Applications: 300 Create Program¿Create │         │
│         │            Program                        │         │
│         │            [View Insights]               │         │
│         └──────────────────────────────────────────┘         │
│                                                              │
│         ┌──────────────────────────────────────────┐         │
│         │        Department Management             │         │
│         │          Departments: 4                  │         │
│         │  Coordinators: 10 Add Dept/Coord¿Add     │         │
│         │          Dept/Coord                       │         │
│         │            [Manage]                       │         │
│         └──────────────────────────────────────────┘         │
│                                                              │
│            ┌──────────────────────────────┐                  │
│            │        System Stats          │                  │
│            │        Users: 500            │                  │
│            │        Mentors: 25           │                  │
│            │        Certificates: 120     │                  │
│            └──────────────────────────────┘                  │
│                                                              │
│         ┌──────────────────────────────────────────┐         │
│         │               Actions                     │         │
│         │ [Finalize Selection] [Generate Reports]  │         │
│         │            [System Config]               │         │
│         └──────────────────────────────────────────┘         │
│  ┌────────────────────────────────────────────────────────┐  │
│  │            Program Timeline                            │  │
│  │  Planning → Program Creation → Application → Assignment │  │
│  └────────────────────────────────────────────────────────┘  │
└──────────────────────────────────────────────────────────────┘
```

Figure 3.1: Super Admin Dashboard

### 3.1.2 Department Coordinator Dashboard

**COORDINATOR DASHBOARD**
Dept: Data Science — Program: IMS2025

**Stats**
Applications: 150
Pending: 20
Accepted: 100

**Mentor Management**
Mentors: 5
Available: 3 Add Mentor¿Add Mentor
[View All]

**Pending Applications**

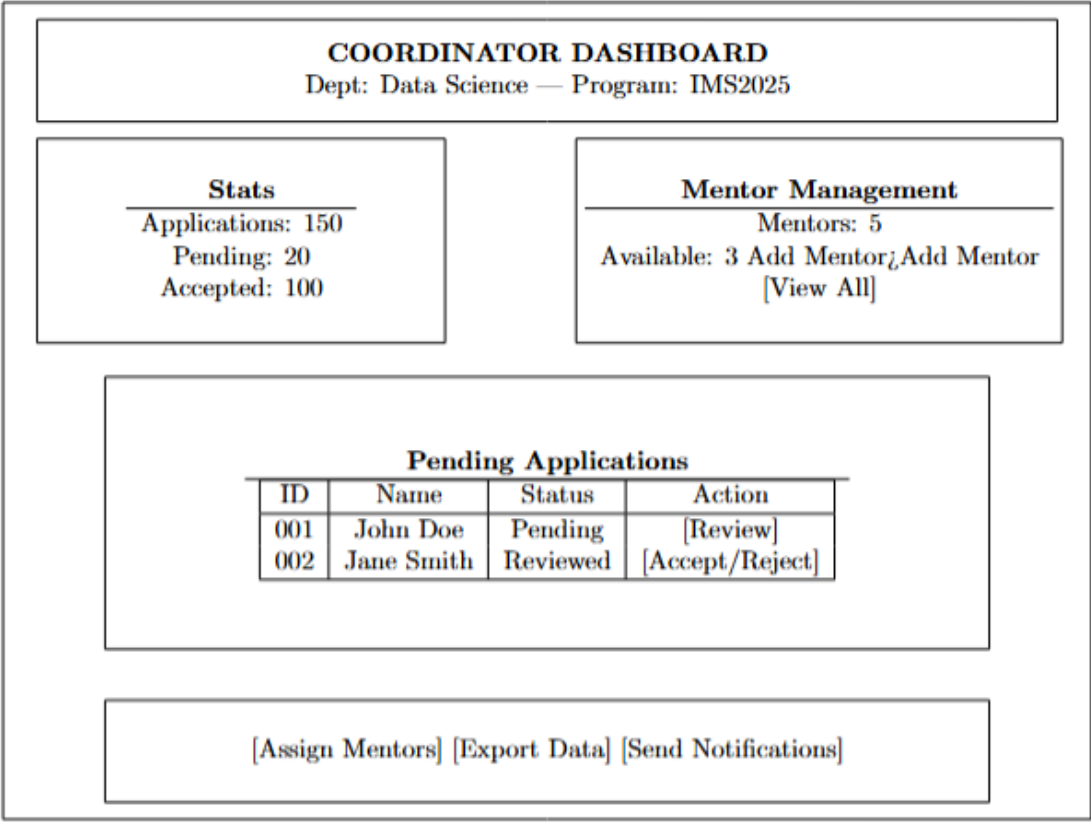| ID | Name | Status | Action |
|-----|------------|----------|-----------------|
| 001 | John Doe | Pending | [Review] |
| 002 | Jane Smith | Reviewed | [Accept/Reject] |

[Assign Mentors] [Export Data] [Send Notifications]

Figure 3.2: Department Coordinator Dashboard

Figure 3.2: Complete Workflow for Internship Management System
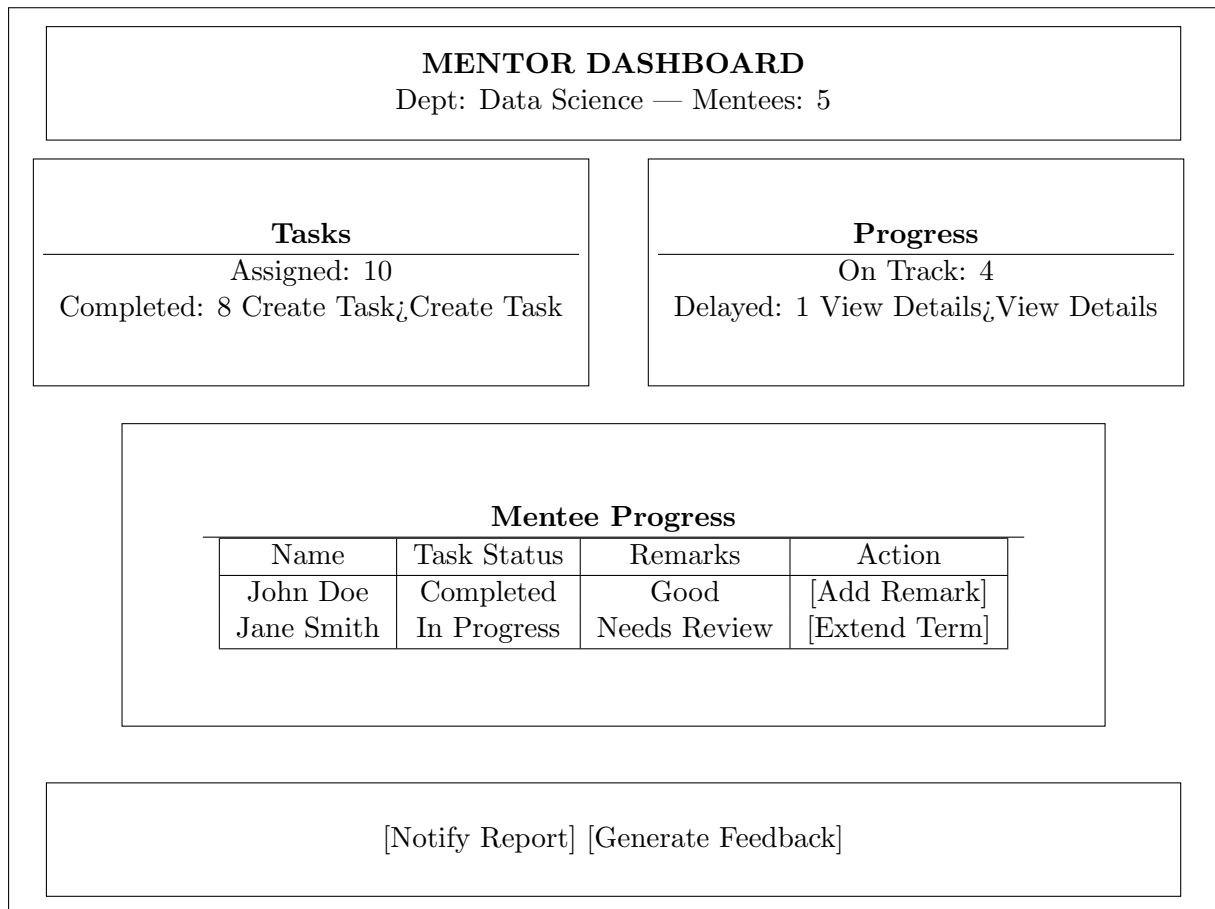
### 3.1.3 Department Mentor Dashboard

**MENTOR DASHBOARD**
Dept: Data Science — Mentees: 5

**Tasks**
Assigned: 10
Completed: 8 Create Task¿Create Task

**Progress**
On Track: 4
Delayed: 1 View Details¿View Details

**Mentee Progress**

| Name | Task Status | Remarks | Action |
|------|-------------|---------|--------|
| John Doe | Completed | Good | [Add Remark] |
| Jane Smith | In Progress | Needs Review | [Extend Term] |

[Notify Report] [Generate Feedback]

Figure 3.3: Department Mentor Dashboard

### 3.1.4 Applicant Dashboard

**APPLICANT DASHBOARD**
Welcome, John Doe — Application ID: IMS2025001

**Status**
Program: Data Science
Status: Accepted
Mentor: Assigned

**Tasks**
Pending: 2
Completed: 3 View Tasks¿View Tasks

**Documents**
Resume:   Uploaded
ID Proof:   Uploaded

**Notifications**
Mentor Assigned: Jane Smith
Task Due: 07/25/2025

**Timeline**
Applied → Accepted → Assigned → Completed
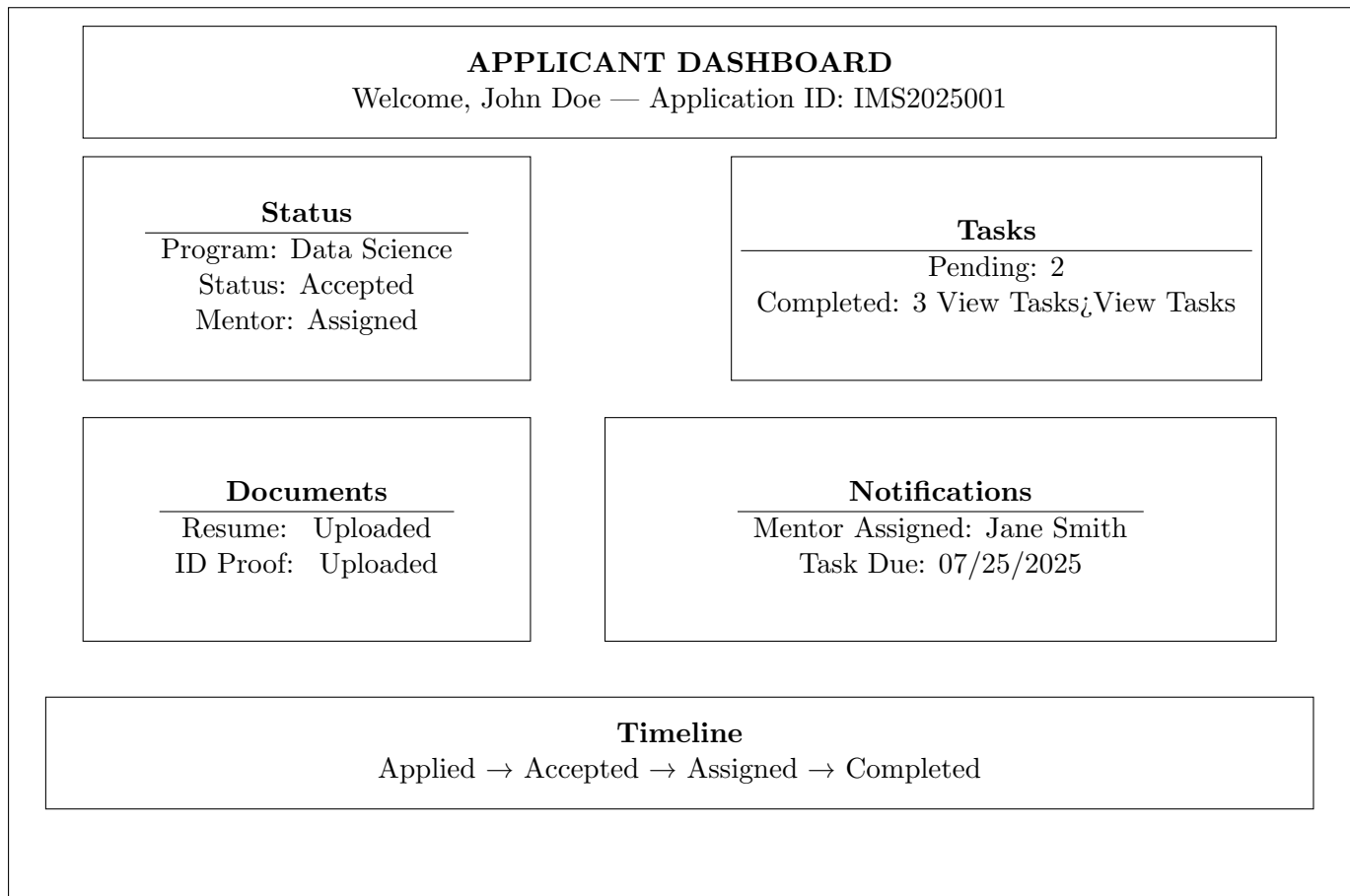
Figure 3.4: Applicant Dashboard

### 3.1.5 Application Notification Landing Page

**INTERNSHIP OPPORTUNITIES - WEBEL 2025**

**New Internship Alert!**

Program: Data Science and Machine Learning
Mode: Online/Hybrid/Offline
Application Deadline: 08/15/2025 Apply Now¿Apply Now
[View Details]

**Program Highlights**

Duration: 3 Months
Stipend: Free/Paid by Dept/Student Paid
Eligibility: UG/PG Students

[Login to Apply] [Register] — © 2025 WEBEL

Figure 3.5: Application Notification Landing Page

### 3.1.6 User Interface for Creating an Internship Program by the Super Admin

```
┌─────────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────────┐  │
│  │                                                   │  │
│  │         CREATE NEW INTERNSHIP PROGRAM             │  │
│  │                                                   │  │
│  └───────────────────────────────────────────────────┘  │
│                                                          │
│  ┌───────────────────────────────────────────────────┐  │
│  │                 Program Details                   │  │
│  │              Title: [_____]       │  │
│  │           Department: [Data Science ]             │  │
│  └───────────────────────────────────────────────────┘  │
│                                                          │
│  ┌───────────────────────────────────────────────────┐  │
│  │                    Schedule                       │  │
│  │           Start Date: [MM/DD/YYYY]                │  │
│  │           End Date: [MM/DD/YYYY]                  │  │
│  │           Duration: [3 Months ]                   │  │
│  └───────────────────────────────────────────────────┘  │
│                                                          │
│  ┌───────────────────────────────────────────────────┐  │
│  │                 Mode & Payment                    │  │
│  │                 Mode: [Online ]                   │  │
│  │    Payment Model: [Free ] Internship Amount: [X]  │  │
│  └───────────────────────────────────────────────────┘  │
│                                                          │
│  ┌───────────────────────────────────────────────────┐  │
│  │               Application Details                 │  │
│  │     Application Draft: [Upload Document ]         │  │
│  │     Application Requirements: [Python]            │  │
│  └───────────────────────────────────────────────────┘  │
│  ┌───────────────────────────────────────────────────┐  │
│  │                                                   │  │
│  │          [Save Draft] [Submit Program]           │  │
│  │                                                   │  │
│  └───────────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────────┘
```

Figure 3.6: User Interface for Creating an Internship Program

## 3.2 Application Process Wireframes

**EXAMINATION SCHEDULE**

### Exam Information

Date: January 15, 2025

Time: 10:00 AM - 12:00 PM

Duration: 2 Hours

Type: Online Proctored

Platform: WEBEL Exam Portal

### Instructions

- Stable internet connection required
- Government ID mandatory
- Camera and microphone access needed

[Download Admit Card] — [Test System] — [Contact Support]

Figure 3.7: Exam Schedule Interface

### 3.2.1 Application Form Wireframe

**INTERNSHIP APPLICATION FORM**

**Personal Information**
Name: [_____]
Email: [_____]
Phone: [_____]

**Education Details**
Institution: [_____]
Program: [UG/PG] Registration: [_____]
Year: [_____]

**Internship Type Selection**
Mode:   Online   Hybrid   Offline
Payment:   Free   Paid by Student   Paid by WEBEL

**Document Upload**
Resume: [Choose File] — Photo: [Choose File]
Certificates: [Choose File] — ID Proof: [Choose File]

[Submit Application]

Figure 3.8: Application Form Wireframe

# 4 Database Design

## 4.1 Enhanced Entity Relationship Diagram
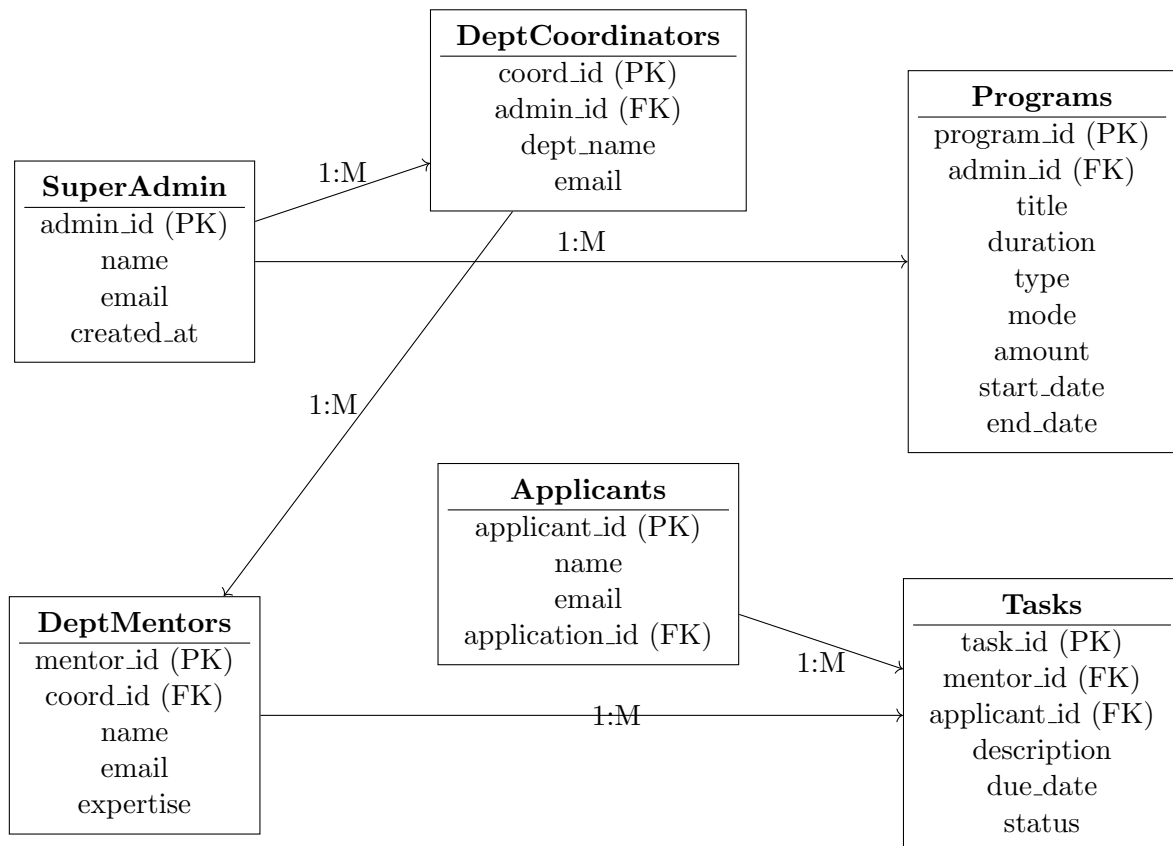


Figure 4.1: Enhanced Entity Relationship Diagram

## 4.2 Database Schema Tables

| Table Name | Primary Key | Foreign Keys | Description |
| --- | --- | --- | --- |
| SuperAdmin | admin_id | - | Stores Super Admin details |
| DeptCoordinators | coord_id | admin_id | Manages department-specific coordination |
| DeptMentors | mentor_id | coord_id | Tracks mentor profiles and assignments |
| Applicants | applicant_id | - | Stores applicant personal information |
| Programs | program_id | admin_id | Defines internship program details |
| Tasks | task_id | mentor_id, applicant_id | Manages tasks assigned to applicants |

Table 4.1: Comprehensive Database Schema

# 5 Process Flow Design

## 5.1 Complete Application Process Flow
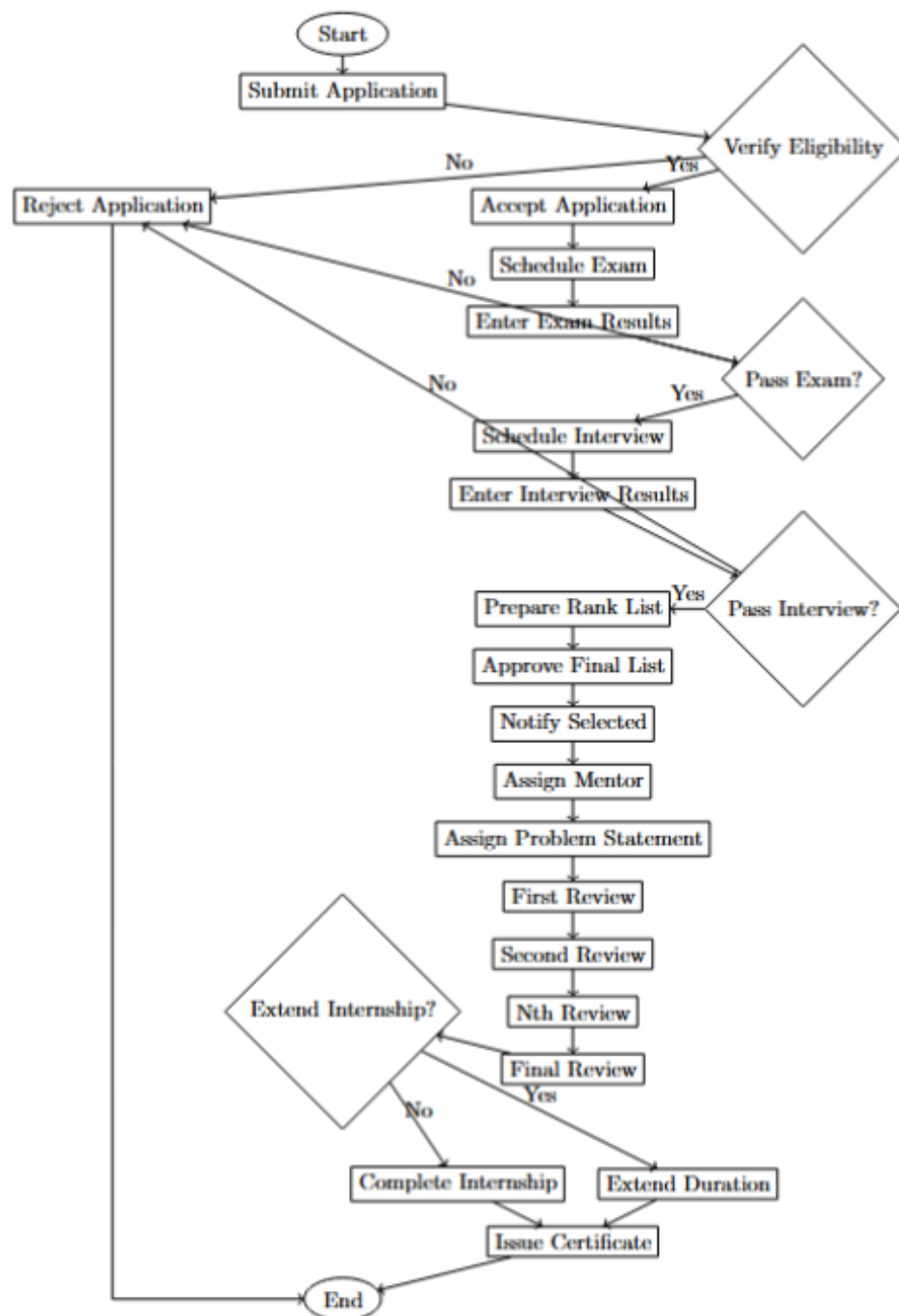


Figure 5.1: Complete Application Process Flow

# 6 System Features and Functionalities

## 6.1 Core Feature Matrix

| Feature | Super Admin | Dept Coord | Dept Mentor | Applicant |
|---|---|---|---|---|
| Program Creation | | × | × | × |
| Application Submission | × | × | × | |
| Application Review | × | | × | × |
| Task Assignment | × | × | | × |
| Progress Monitoring | × | | | |
| Certificate Generation | | × | × | × |
| User Management | | | × | × |

Table 6.1: Feature Access Matrix by User Role

## 6.2 Detailed Feature Specifications

### 6.2.1 Program Management Features

- **Program Creation**: Define title, department, duration, type, mode, amount, dates, and upload documents

- **Program Insights**: View applicant counts and force stop programs

- **Department Management**: CRUD operations for departments and coordinators

### 6.2.2 Application Management Features

- **Application Submission**: Apply via landing page with status updates

- **Review Process**: Accept/reject based on requirements

- **Mentor Assignment**: Assign mentors to accepted applicants

### 6.2.3 Task Management Features

- **Task Creation**: Assign tasks with deadlines

- **Progress Tracking**: Monitor and add remarks

- **Term Extension**: Extend internship with notification

# 7 User Interface Wireframes

## 7.1 Login and Authentication Flow



Figure 7.1: Login Page Wireframe

## 7.2 Application Form Detailed Wireframe

## 7.3 Document Upload Interface

**INTERNSHIP APPLICATION FORM - STEP 1 OF 3**

**Personal Information**

Full Name: [_____]

Email: [_____]

Phone: [_____]

**Educational Information**

Institution: [_____]

Program: [UG/PG] Reg No: [_____]

**Preferences**

Program: [Data Science ]

Mode: [Online ]

Progress:   (Step 1 of 3)

[← Previous] [Save as Draft] [Next: Upload Docs →]

Figure 7.2: Detailed Application Form Wireframe

**DOCUMENT UPLOAD - STEP 2 OF 3**

**Required Documents**

Resume (PDF, 2MB): [Choose] [Upload]

ID Proof (PDF/JPG, 2MB): [Choose] [Upload]

**Guidelines**

- PDF format (except photo)
- Size limits apply

[← Previous] [Save] [Next: Review →]

Figure 7.3: Document Upload Interface Wireframe

# 8 Data Flow Diagrams
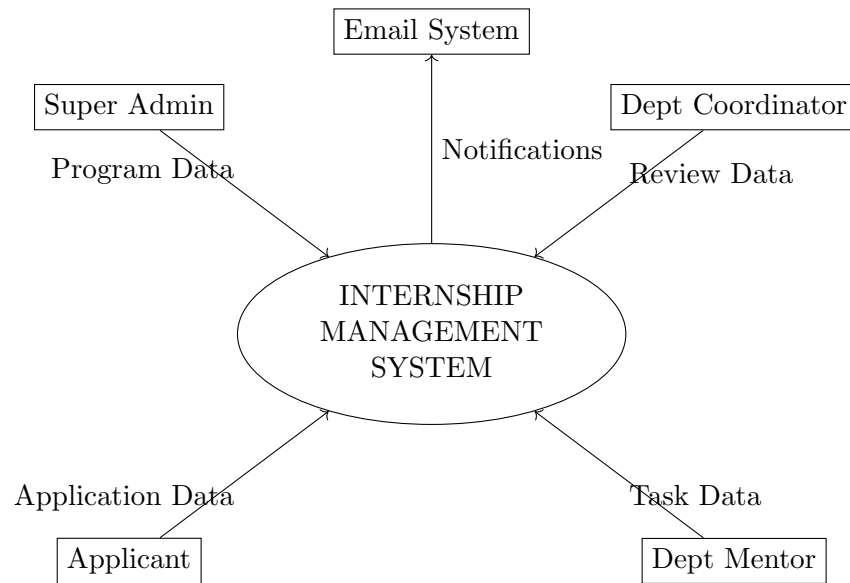
## 8.1 Level 0 Data Flow Diagram (Context Diagram)



Figure 8.1: Level 0 Data Flow Diagram

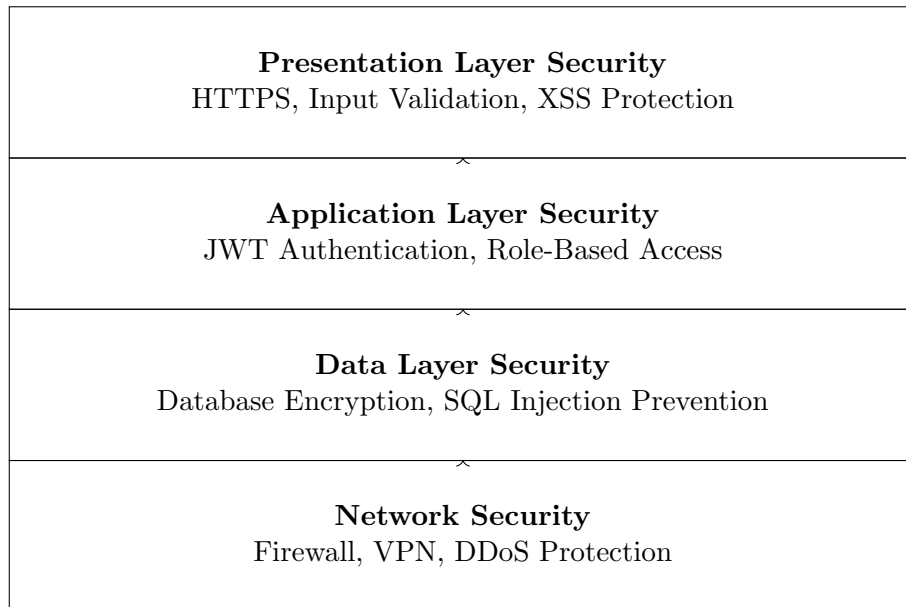# 9 Security and Access Control

## 9.1 Security Architecture



| | |
|---|---|
| **Presentation Layer Security** | |
| HTTPS, Input Validation, XSS Protection | |
| **Application Layer Security** | |
| JWT Authentication, Role-Based Access | |
| **Data Layer Security** | |
| Database Encryption, SQL Injection Prevention | |
| **Network Security** | |
| Firewall, VPN, DDoS Protection | |

Figure 9.1: Security Architecture Layers

## 9.2 Role-Based Access Control Matrix

| Resource/Action | Super Admin | Dept Coord | Dept Mentor | Applicant |
|---|---|---|---|---|
| Create Program | | × | × | × |
| Submit Application | × | × | × | |
| Review Applications | × | | × | × |
| Assign Tasks | × | × | | × |
| View Progress | | | | |
| Generate Certificates | | × | × | × |
| Manage Users | | | × | × |

Table 9.1: Access Control Matrix

# 10 Performance and Scalability

## 10.1 Performance Requirements

| Metric | Requirement | Target |
|---|---|---|
| Response Time | ¡ 3 seconds | ¡ 2 seconds |
| Concurrent Users | 1000 | 1500 |
| Database Query Time | ¡ 1 second | ¡ 0.5 seconds |
| File Upload Speed | 10 MB/min | 20 MB/min |
| System Availability | 99.5% | 99.9% |
| Page Load Time | ¡ 5 seconds | ¡ 3 seconds |
| API Response Time | ¡ 2 seconds | ¡ 1 second |

Table 10.1: Performance Requirements

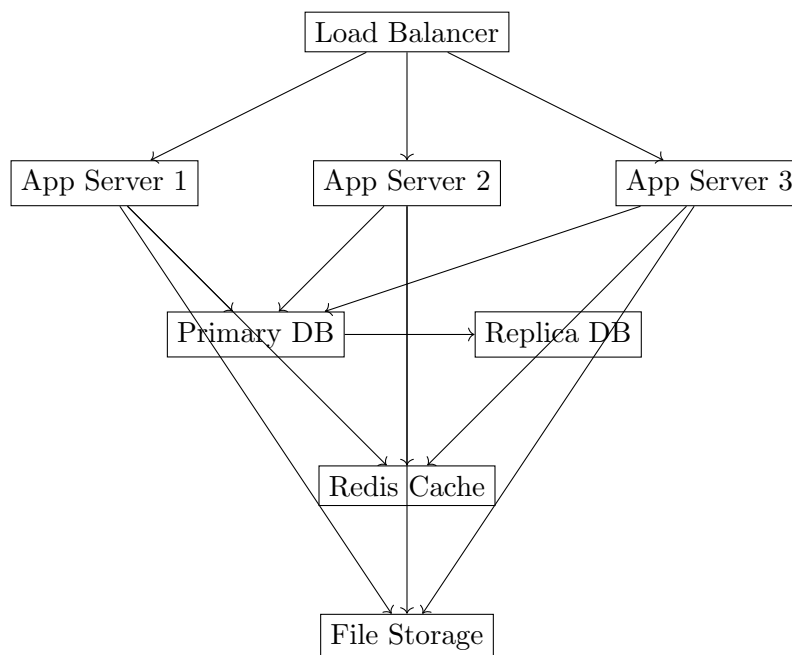## 10.2 Scalability Architecture



Figure 10.1: Scalability Architecture

# 11 Implementation Timeline
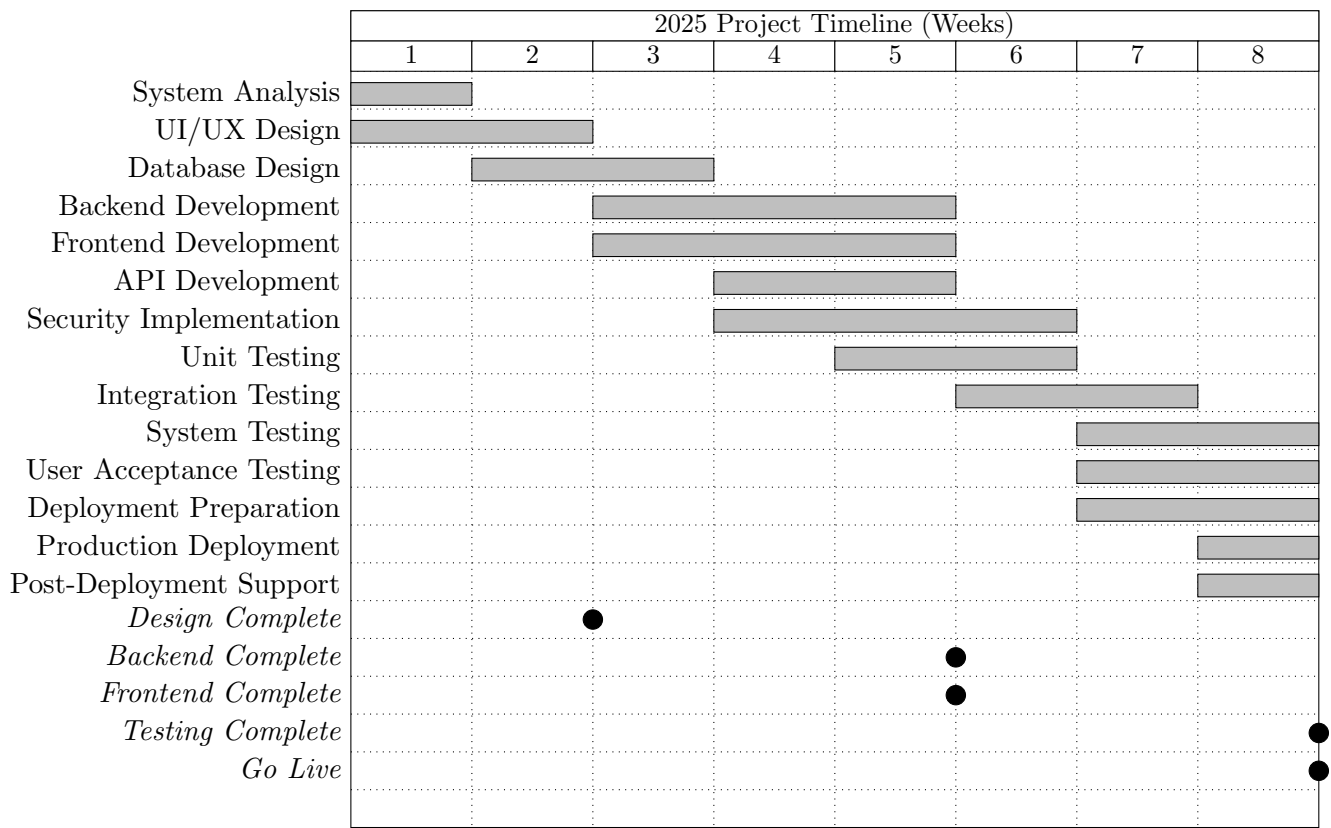
## 11.1 Detailed Project Schedule

| | 2025 Project Timeline (Weeks) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| System Analysis | ▩ | | | | | | | |
| UI/UX Design | ▩▩ | | | | | | | |
| Database Design | | ▩▩ | | | | | | |
| Backend Development | | | ▩▩▩ | | | | | |
| Frontend Development | | | ▩▩▩ | | | | | |
| API Development | | | | ▩▩ | | | | |
| Security Implementation | | | | ▩▩▩ | | | | |
| Unit Testing | | | | | ▩▩ | | | |
| Integration Testing | | | | | | ▩▩ | | |
| System Testing | | | | | | | ▩▩ | |
| User Acceptance Testing | | | | | | | ▩▩ | |
| Deployment Preparation | | | | | | | ▩▩ | |
| Production Deployment | | | | | | | | ▩ |
| Post-Deployment Support | | | | | | | | ▩ |
| *Design Complete* | | | ● | | | | | |
| *Backend Complete* | | | | | | ● | | |
| *Frontend Complete* | | | | | | ● | | |
| *Testing Complete* | | | | | | | | ● |
| *Go Live* | | | | | | | | ● |

Figure 11.1: Detailed Project Timeline

# 12 Risk Management

## 12.1 Risk Assessment Matrix

| Risk | Probability | Impact | Priority | Mitigation Strategy |
|---|---|---|---|---|
| Technical Complexity | High | High | Critical | Prototype early, expert consultation |
| Resource Availability | Medium | High | High | Cross-training, backup resources |
| Scope Creep | Medium | Medium | Medium | Clear requirements, change control |
| Security Vulnerabilities | Low | High | High | Security audits, penetration testing |
| Performance Issues | Medium | Medium | Medium | Load testing, optimization |
| Integration Challenges | Medium | High | High | Early integration, API documentation |
| Data Migration | Low | High | Medium | Backup strategies, pilot testing |
| User Acceptance | Low | Medium | Low | User involvement, training programs |

Table 12.1: Risk Assessment Matrix

## 12.2 Contingency Planning

- **Technical Risks**: Maintain fallback technologies and alternative implementation approaches

- **Resource Risks**: Establish partnerships with external development teams

- **Timeline Risks**: Prioritize core features and implement phased rollout

- **Quality Risks**: Implement comprehensive testing at each development stage

- **Security Risks**: Engage security experts and conduct regular audits

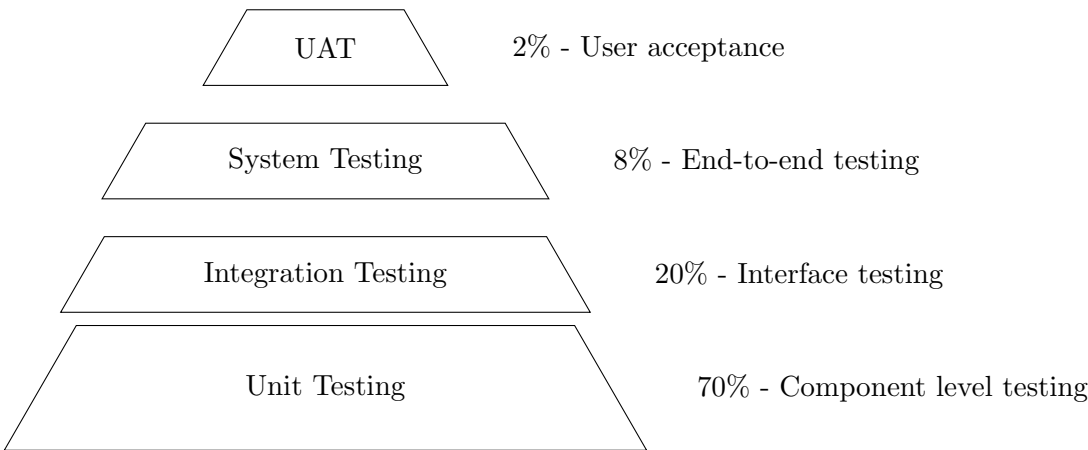# 13 Testing Strategy

## 13.1 Testing Approach



Figure 13.1: Testing Pyramid Strategy

## 13.2 Test Case Categories

| Test Category | Description | Test Cases |
|---|---|---|
| Functional Testing | Core feature validation | 150 |
| Security Testing | Authentication, authorization | 50 |
| Performance Testing | Load, stress, scalability | 30 |
| Usability Testing | User interface, experience | 40 |
| Integration Testing | API, database, external systems | 60 |
| Regression Testing | Existing functionality preservation | 80 |
| Browser Testing | Cross-browser compatibility | 25 |
| Mobile Testing | Responsive design validation | 20 |
| **Total** | | **455** |

Table 13.1: Test Case Distribution

# 14 Conclusion

This comprehensive Software Design Specification provides a detailed blueprint for implementing the Internship Management System for WEBEL. The document encompasses:

- A robust three-tier architecture designed for scalability and security, utilizing modern technologies such as React.js, Django, and PostgreSQL.

- Detailed user interface designs, including dashboards for applicants, coordinators, and administrators, as well as wireframes for key processes like application submission and document upload.

- An enhanced entity-relationship diagram and comprehensive database schema to support all aspects of the internship lifecycle.

- A complete process flow covering application submission, examination, selection, mentor assignment, progress tracking, and certification issuance.

- A detailed implementation timeline with resource allocation and risk management strategies to ensure timely and successful deployment.

- A security architecture and access control matrix to protect sensitive data and enforce role-based permissions.

- Performance and scalability requirements, supported by a scalable architecture with load balancing and caching.

- A structured testing strategy to validate functionality, security, performance, and usability across various scenarios.

The SDS aligns with WEBEL's internship program requirements as outlined in the notification (https://webel.in/Internship-programme-Data-Science-and-Machine-Learning-2025) and the provided application form. It provides a solid foundation for development, with flexibility for future enhancements such as additional internship types or advanced analytics. Feedback from WEBEL stakeholders is encouraged to refine the design further and ensure alignment with organizational goals. The project is scheduled to commence in March 2025, with a target go-live date by late 2025, pending approval and resource availability.