



**Department of Computer Science  
Namal University, Mianwali**

**System Design Document  
Final Year Project Management System**

**Course Title:** Software Engineering

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# 1 Introduction

## 1.1 Purpose

This System Design Document gives a detailed blueprint for development of the Final Year Project Management System. It reduces the gap and works as a bridge between specified requirements in SRS and real world implementation. This document is comprehensive in system architecture, component design, interface specifications, and data models required to build the FYPMS.

This document gives the full system design for the Final Year Project Management System. It provides functional and non-functional requirements from the verified Software Requirements Specification in comprehensive architectural and behavioral design specifications. The system aims to automate and centralize the entire lifecycle of Final Year Projects at Namal University, replacing manual processes with a secure, scalable, and efficient digital platform.

## 1.2 Intended Audience

- **Development Team:** To know and understand the system architecture and component interactions design.
- **Project Stakeholders:** Students, supervisors, coordinators, and administrators to verify the completeness and understand functionality of the system.
- **Quality Assurance Team:** To make test cases that are designed based on design specifications.
- **Future Maintainers:** To understand the system structure and modular design.

## 1.3 Project Overview

FYPMS is a web-based application designed to automate and centralize the entire lifecycle of Final Year Projects at Namal University. The system replaces manual and spreadsheet-based processes with a secure, scalable and efficient digital platform that supports:

- Student Project Proposal Submission and Management
- Supervisor and Co-Supervisor Assignment and Feedback
- Project Document Management
- Evaluation Scheduling and Marks Submission
- Role-Based Dashboards for all stakeholders
- Notification and Announcement System
- Centralized Tracking

## 1.4 Design Approach

The system design follows these key principles:

- **Requirements-Driven:** Every design element traces back to SRS requirements
- **Modular Architecture:** Independent modules with clear interfaces
- **User-Centered Design:** Interfaces prioritize ease of use
- **Scalability and Maintainability:** Support for future enhancements
- **Security and Compliance:** Follow university policies and data protection standards

# 2 Design Assumptions and Constraints

## 2.1 Design Assumptions

Based on the SRS, the following assumptions help the system design:

1. **User Device Assumption:** All users will access the system via web browsers on computing devices (PCs, laptops, tablets, or smartphones) with internet connectivity
2. **Network Assumption:** Stable internet connectivity is available though performance may degrade during fluctuations
3. **Browser Compatibility:** Modern web browsers (Chrome, Firefox, Edge) will be used to access the system
4. **User Technical Proficiency:** Users have intermediate computing skills and basic web application knowledge
5. **Hosting Infrastructure:** The system will be hosted on reliable servers with scalability concepts

## 2.2 Design Constraints

### 2.2.1 Technical Constraints

- **Platform:** Web-based application accessible via standard web browsers
- **Technology Stack:** HTML, CSS, JavaScript with modern frameworks(React.js/Angular.js), Node.js backend, MySQL database.
- **Security:** Implementation of SSL/TLS encryption, role-based access control, and data encryption
- **Compatibility:** Must work across different devices and screen sizes

### 2.2.2 Regulatory Constraints

- **University Policies:** Must follow Namal University academic and administrative policies.
- **Data Protection:** Must follow data privacy regulations and university data protection policies.
- **Academic Standards:** Must align with FYP evaluation and assessment guidelines.

### 2.2.3 Operational Constraints

- **Availability:** 99% availability during academic sessions
- **Performance:** Response time under 5 seconds for most operations
- **Concurrent Users:** Support for at least 2,000 simultaneous users

## 3 Key Design Decisions

### 3.1 Architecture Style

The system will follow a **3-Tier Architecture**:

1. **Presentation Layer:** Web-based user interface accessible via browsers
2. **Application Layer:** Business logic and workflow management
3. **Data Layer:** Database management and storage

### 3.2 Technology Stack Decisions

Table 1: Technology Stack

Component	Technology Selection
Frontend	React.js with Material-UI components
Backend	Node.js with Express.js framework
Database	MySQL with Sequelize
Authentication	JWT (JSON Web Tokens) with role-based access
File Storage	AWS S3 or equivalent for document storage
Notification Service	Email integration with Nodemailer
Deployment	Docker containers on cloud platform

### 3.3 Database Design Strategy

- **Normalization:** Database normalized to 3NF to minimize redundancy
- **Relationships:** Clear foreign key relationships between entities
- **Indexing:** Strategic indexing on frequently queried fields
- **Backup Strategy:** Regular automated backups with recovery procedures

### 3.4 Security Design Decisions

1. **Authentication:** Multi-factor authentication for administrative users
2. **Authorization:** Role-based access control (RBAC) with granular permissions
3. **Data Encryption:** Encryption of sensitive data at rest and in transit
4. **Audit Trail:** Comprehensive logging of all critical operations

## 4 System Design Diagrams

### 4.1 Use Case Diagram

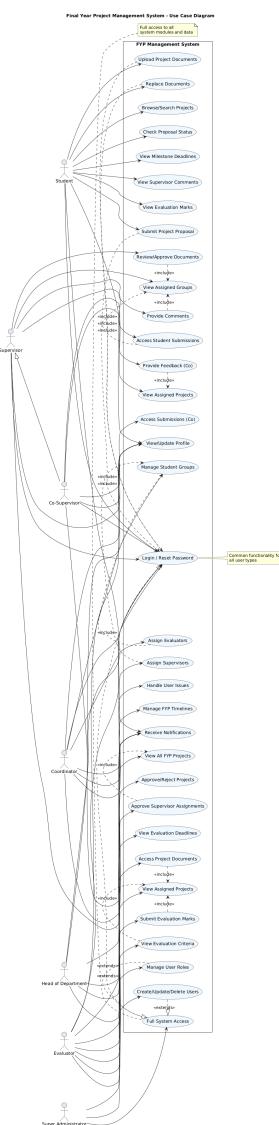


Figure 1: Use Case Diagram

## 4.2 Class Diagram

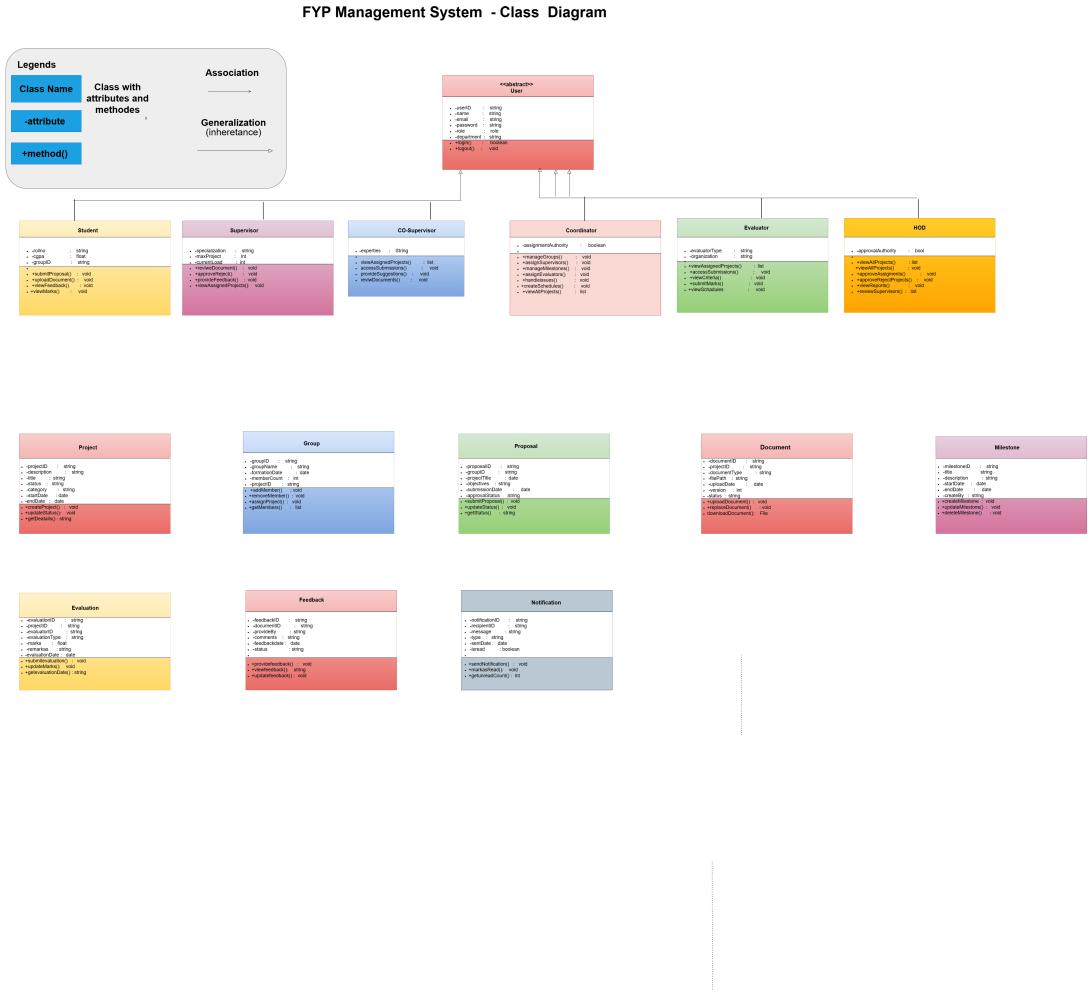


Figure 2: System Class Diagram

## 4.3 Sequence Diagrams

### 4.3.1 Student Project Submission Sequence

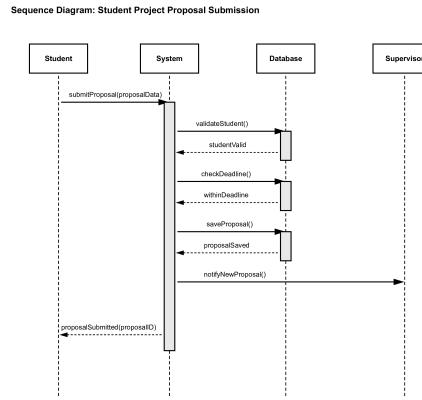


Figure 3: Student Project Submission Sequence Diagram

### 4.3.2 Supervisor Review and approval Sequence

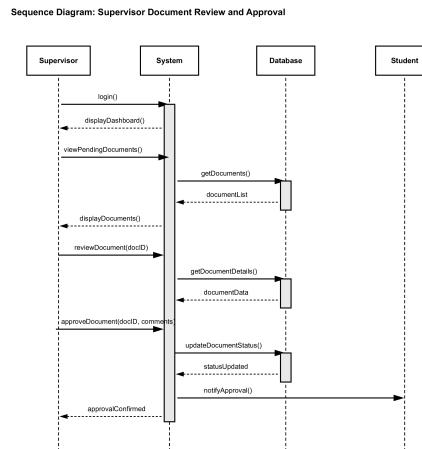


Figure 4: Supervisor Document Review Sequence Diagram

### 4.3.3 Coordinator supervisor assignment Sequence

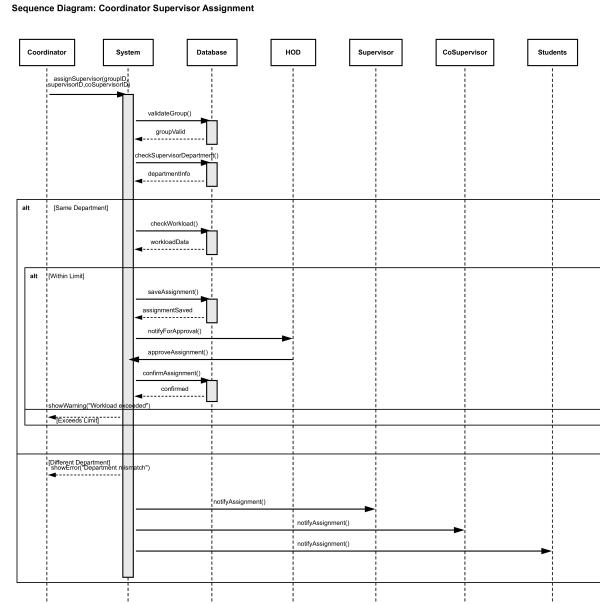


Figure 5: Coordinator Supervisor Assignment Sequence

### 4.3.4 Evaluation Marking Process

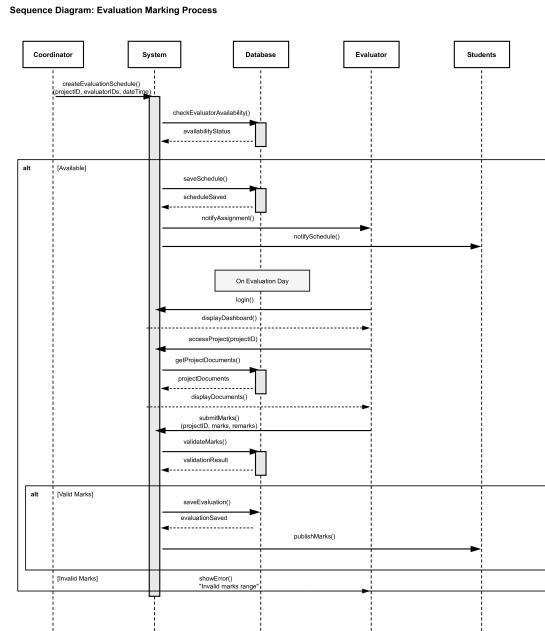


Figure 6: Evaluation Marking Process

#### 4.3.5 User login and Authentication

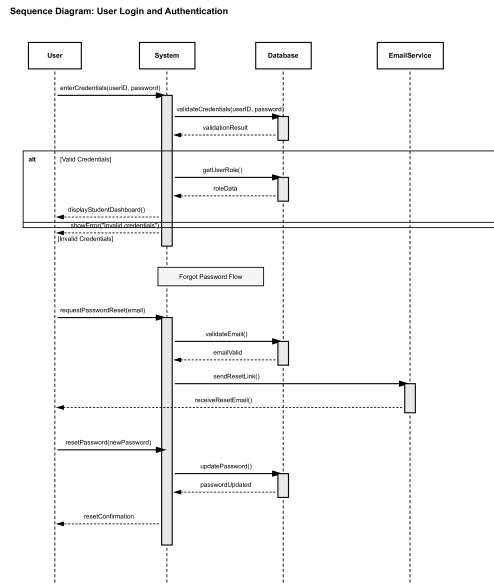


Figure 7: User Login and Authentication

#### 4.3.6 Milestone deadline Management

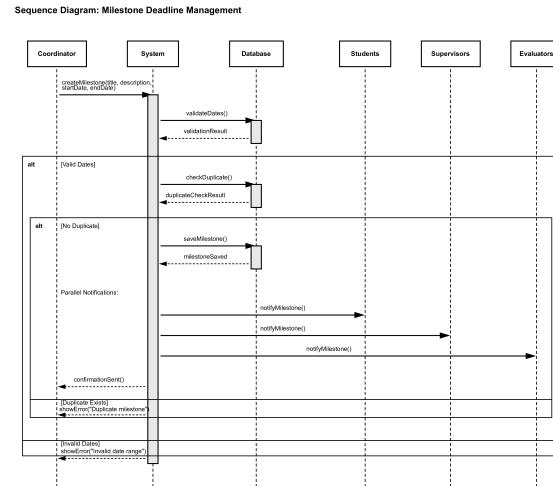


Figure 8: Milestone Deadline Management

#### 4.3.7 Issue Resolution Workflow

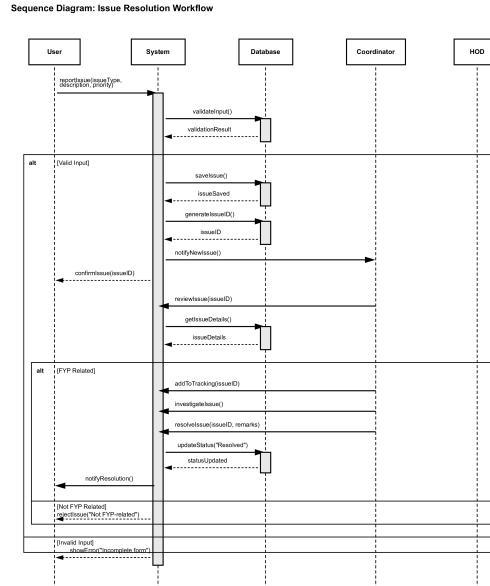


Figure 9: Issue Resolution Workflow

#### 4.4 Data Flow Diagram

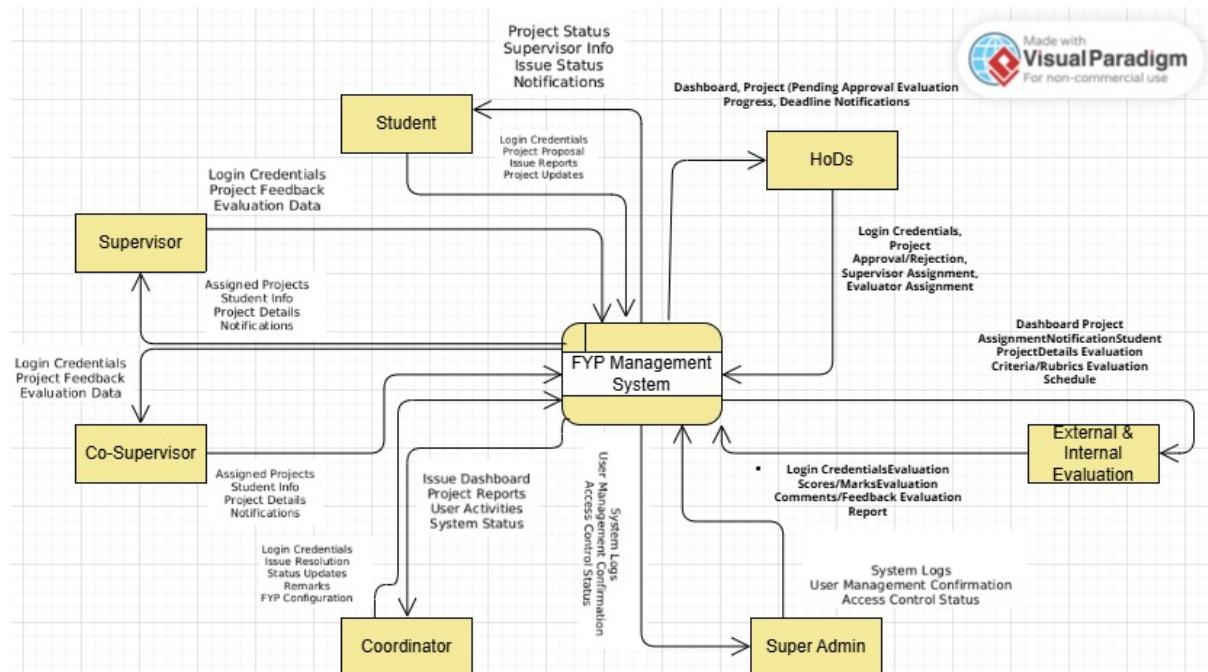


Figure 10: Level 0 Data Flow Diagram

## 4.5 Data Flow Diagram Level 1

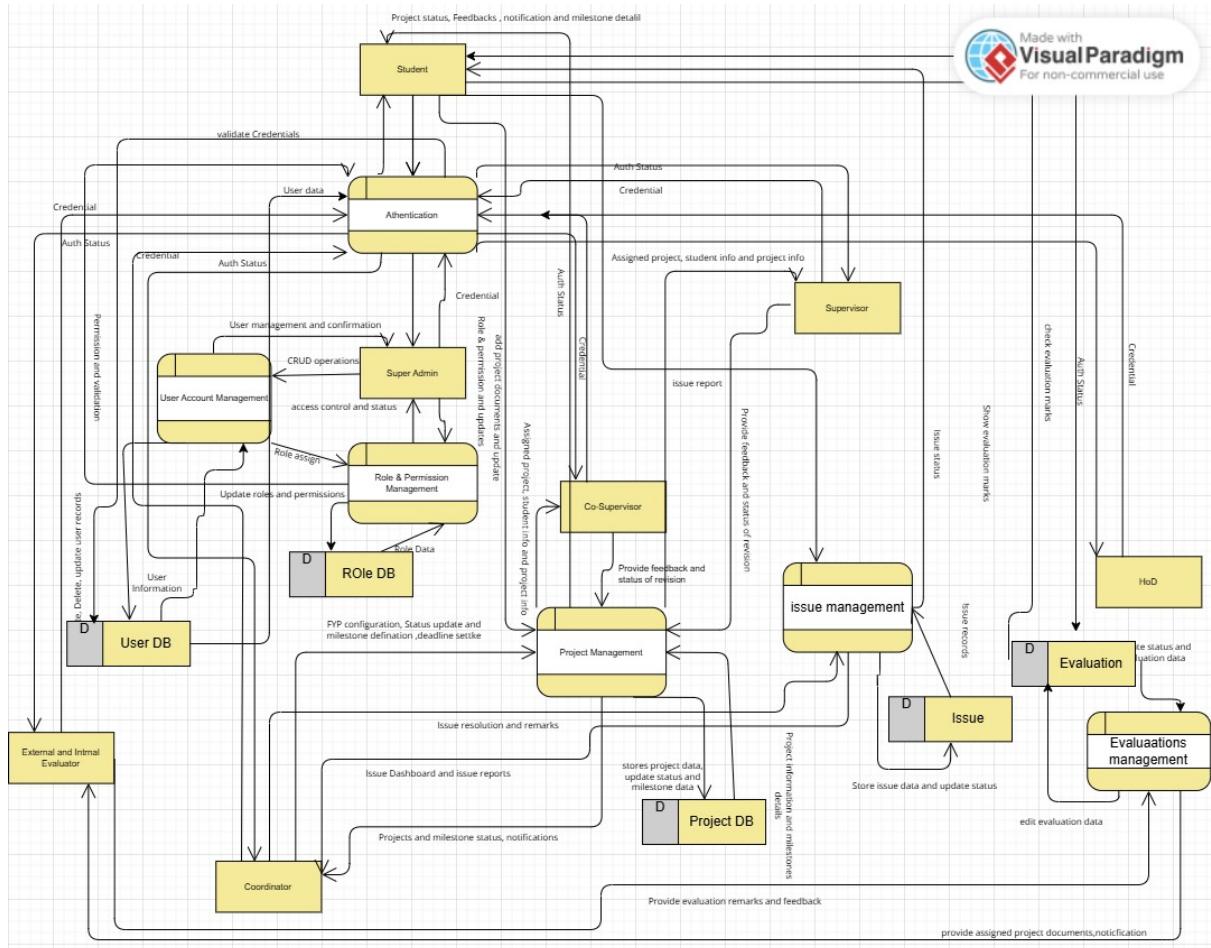


Figure 11: Level 1 Data Flow Diagram

#### 4.6 DFD level 2 Authentication

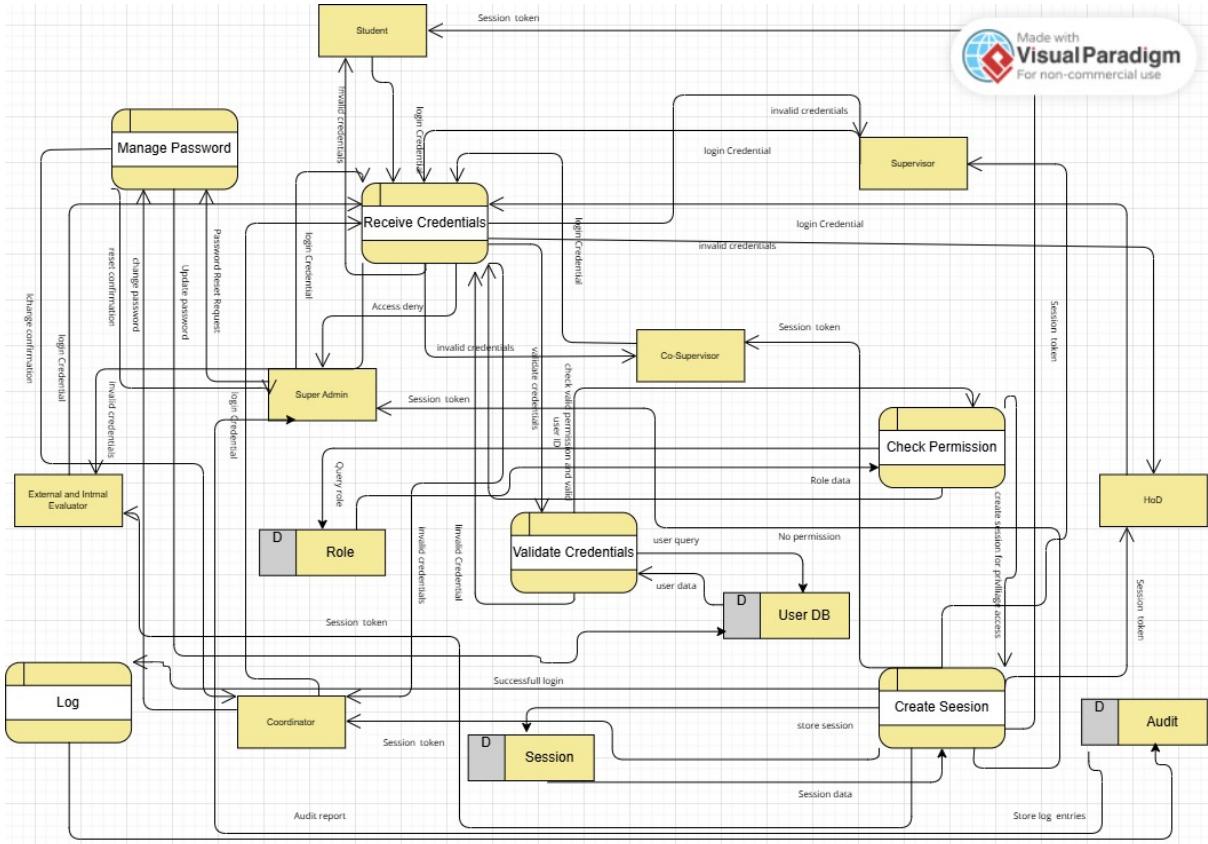


Figure 12: Level 2 Authentication DFD

## 4.7 DFD level 2 Project Management

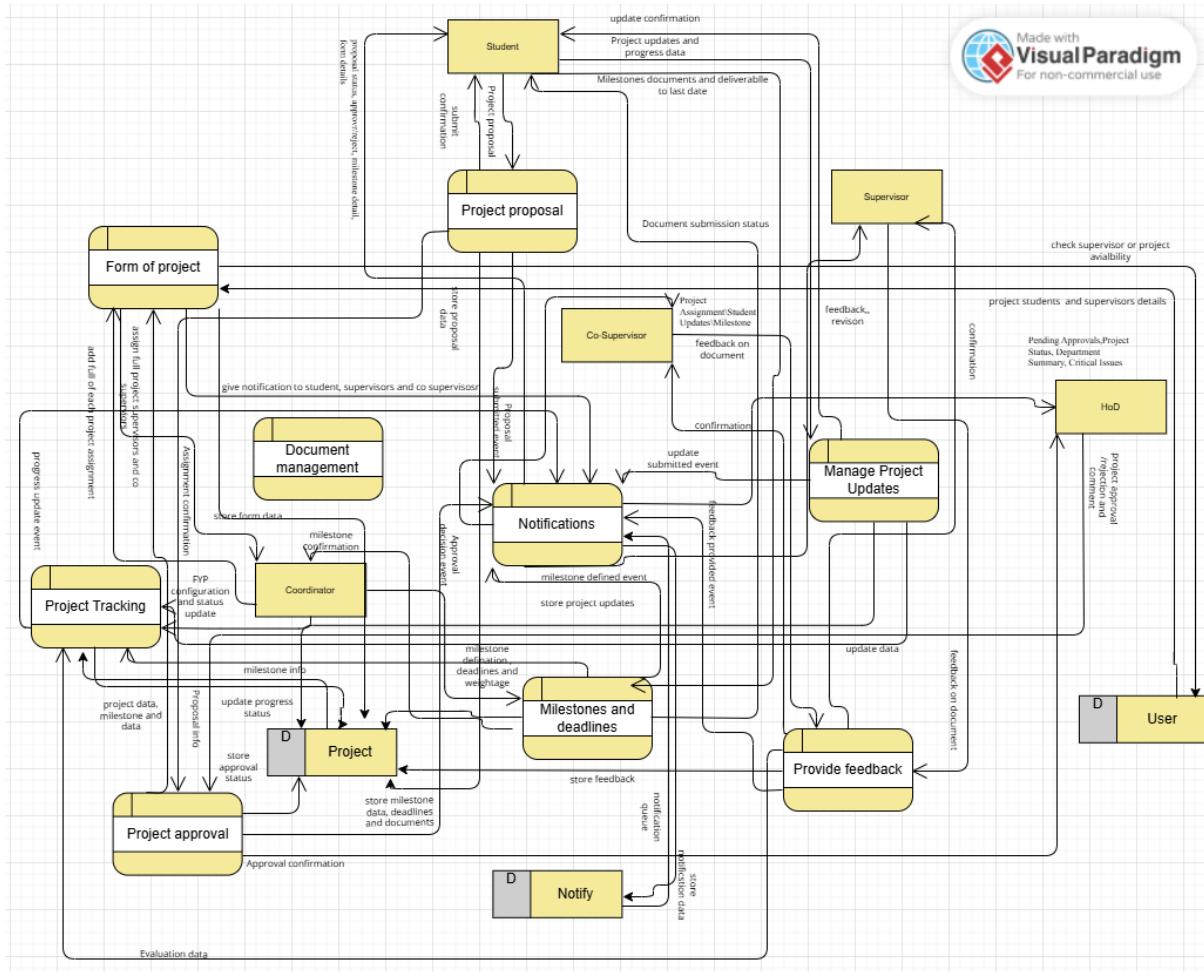


Figure 13: Level 2 Project Management DFD

## 4.8 DFD level 2 Role and Permission Management

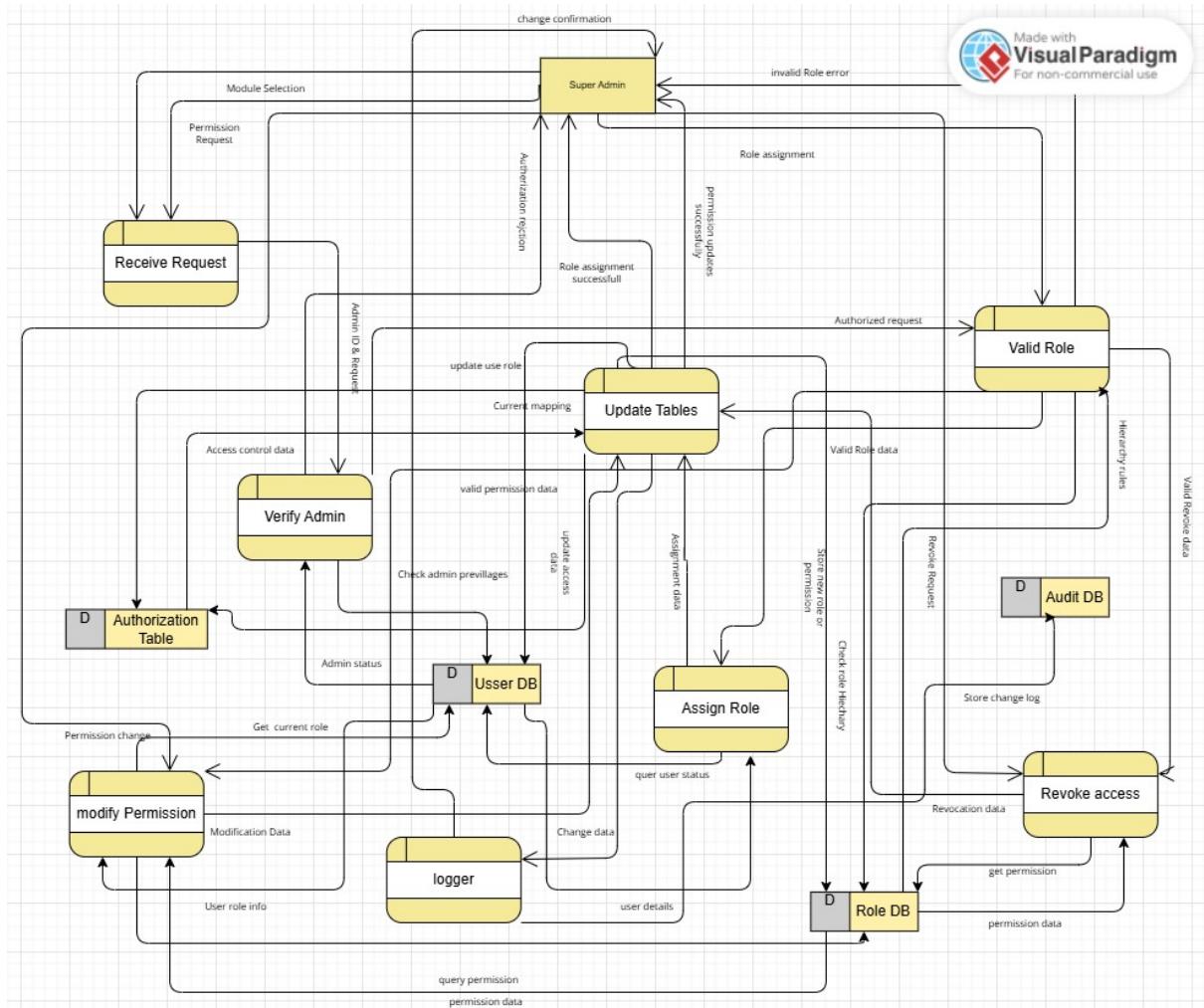


Figure 14: Level 2 Role Management DFD

## 4.9 DFD level 2 Issue management

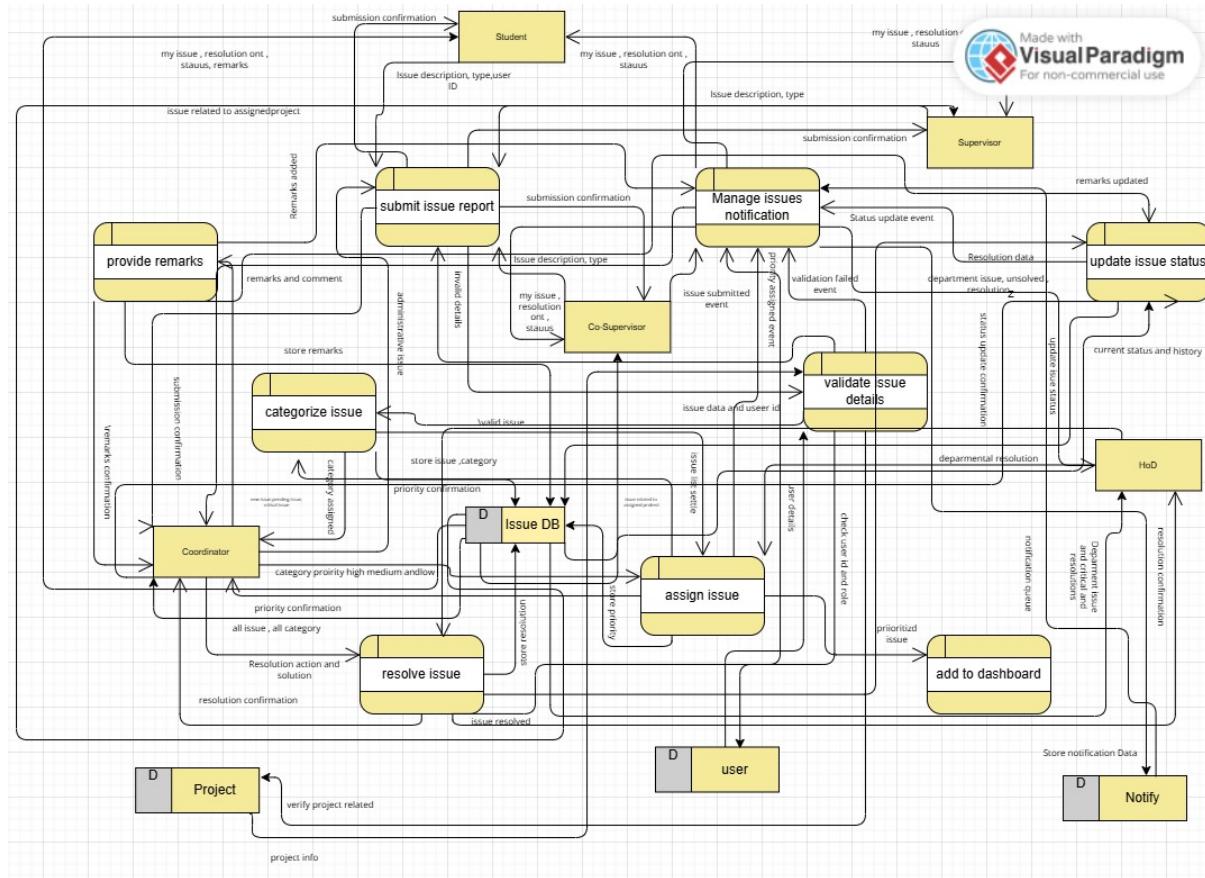


Figure 15: Level 2 Issue Management DFD

## 4.10 DFD level 2 Evaluation Management

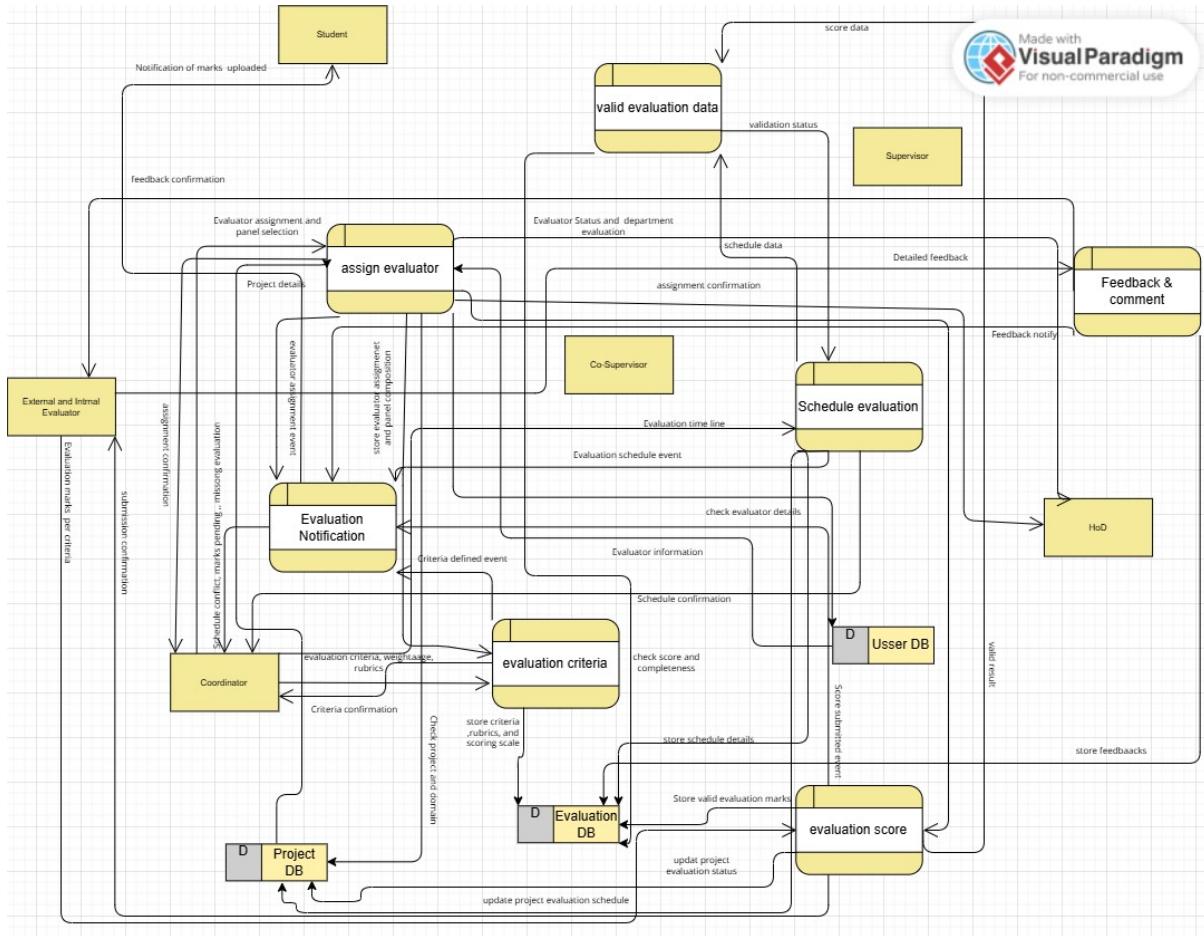


Figure 16: Level 2 Evaluation Management

## 4.11 Component Diagram

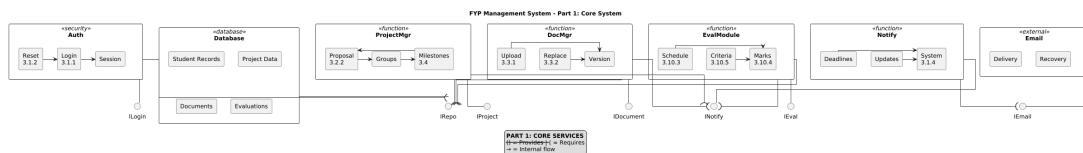


Figure 17: System Component Diagram

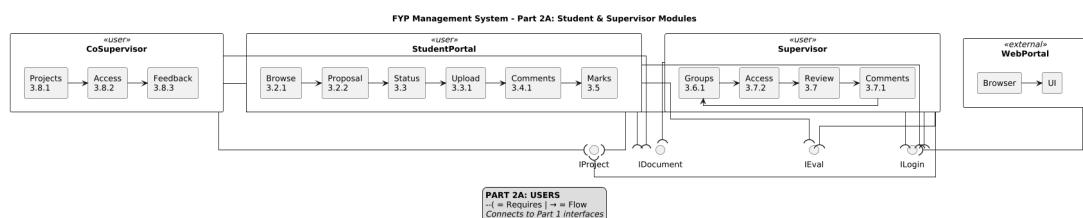


Figure 18: System Component Diagram

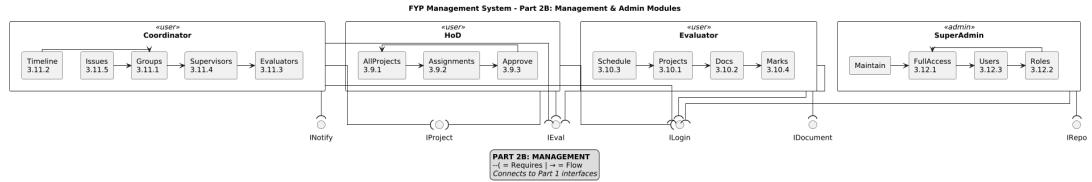


Figure 19: System Component Diagram

## 4.12 Activity Diagram : Student Project Proposal

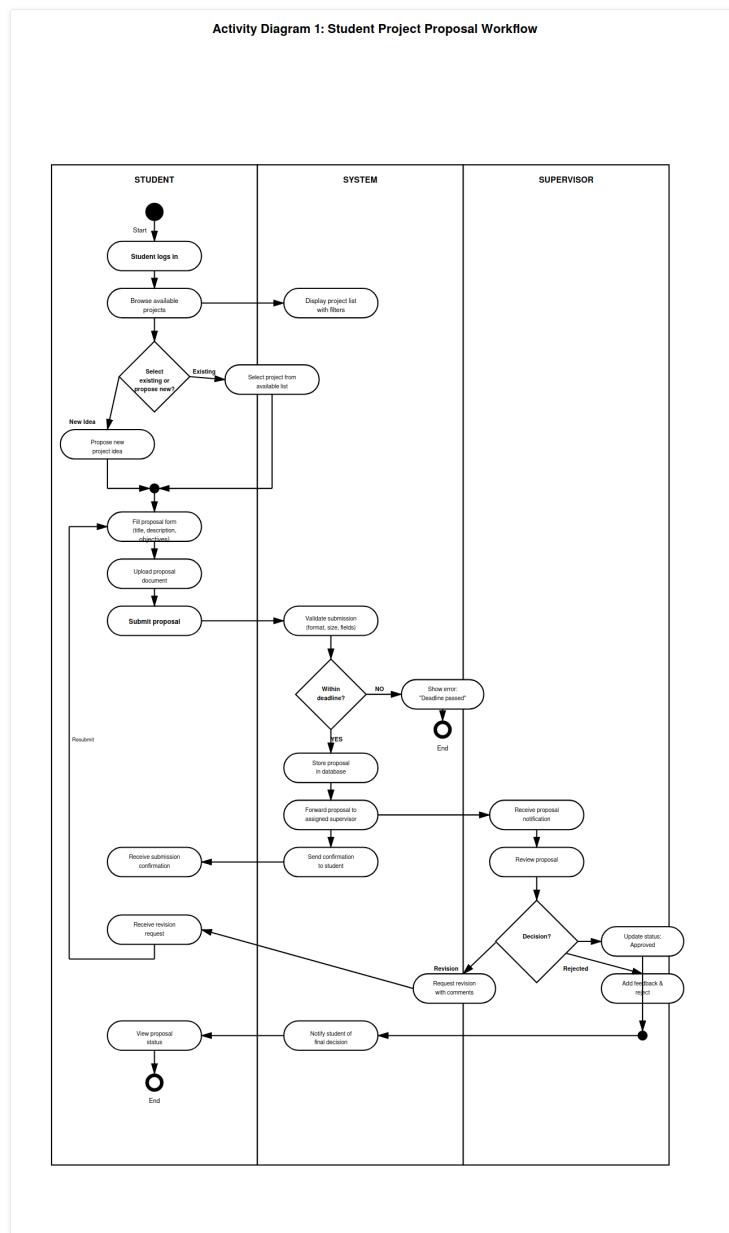


Figure 20: Student Project Proposal Activity Diagram

## 4.13 Activity Diagram: Document Submission

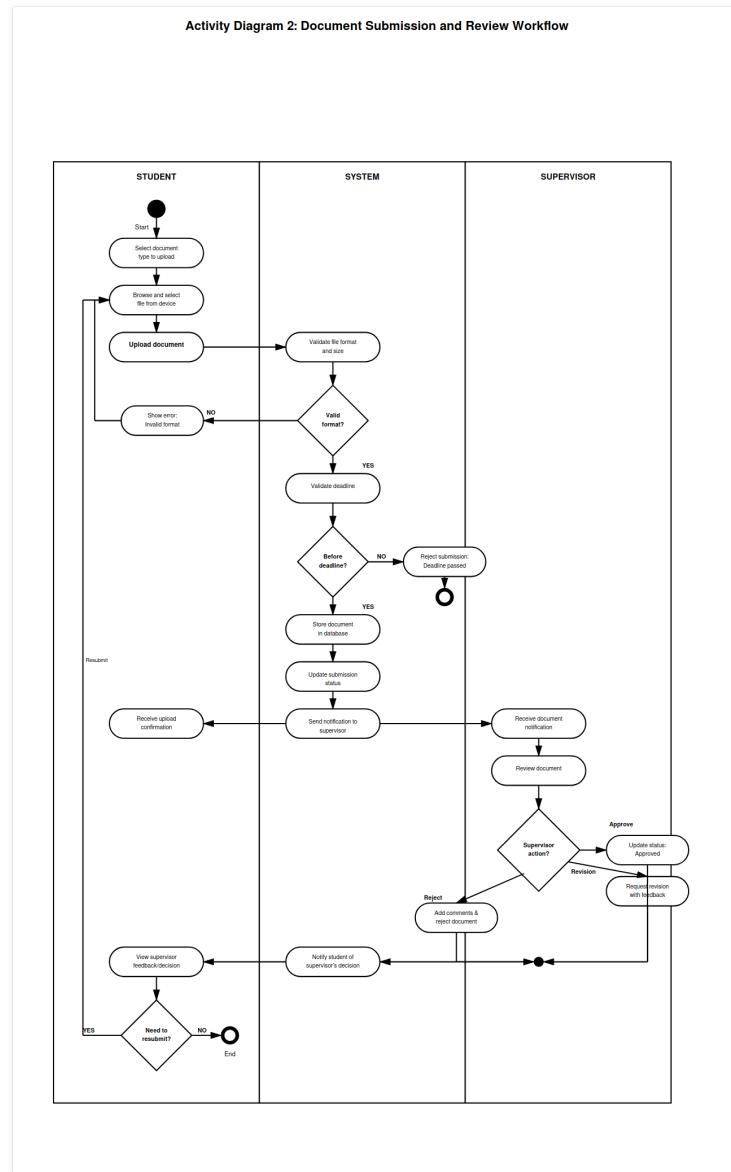


Figure 21: Document Submission Activity Diagram

## 4.14 Activity Diagram: Supervisor Assignment

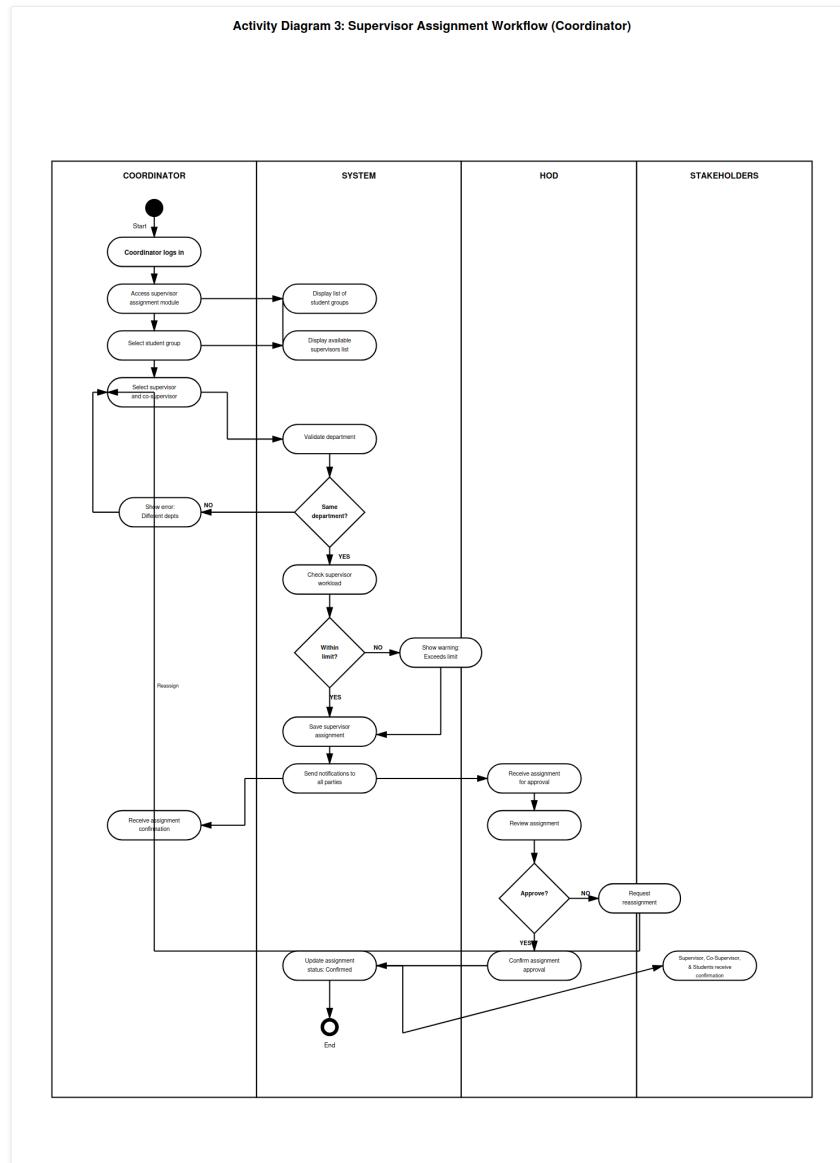


Figure 22: Supervisor Assignment Activity Diagram

## 4.15 Activity Diagram: Evaluation Schedule and marking

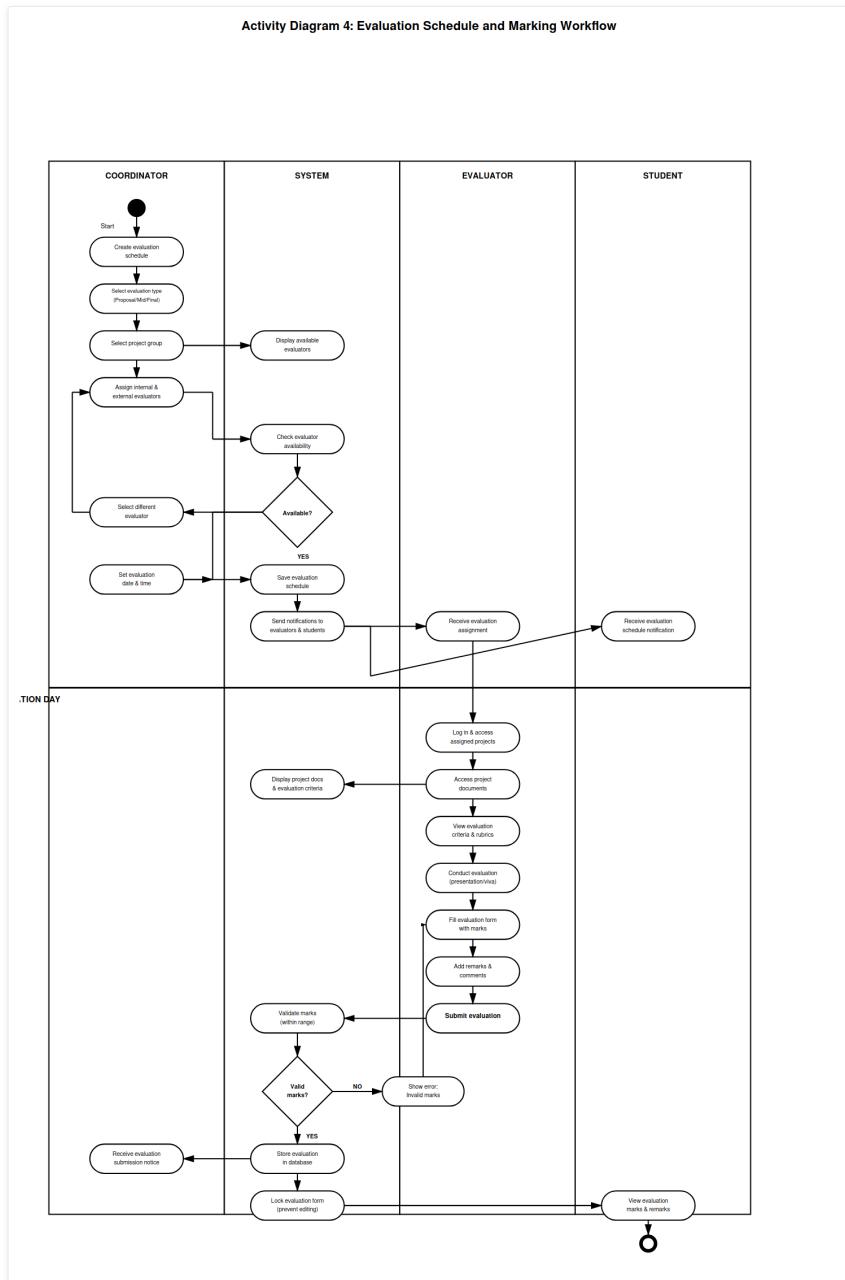


Figure 23: Evaluation Schedule and Marking Activity Diagram

## 4.16 Activity Diagram: Milestone Deadline Management

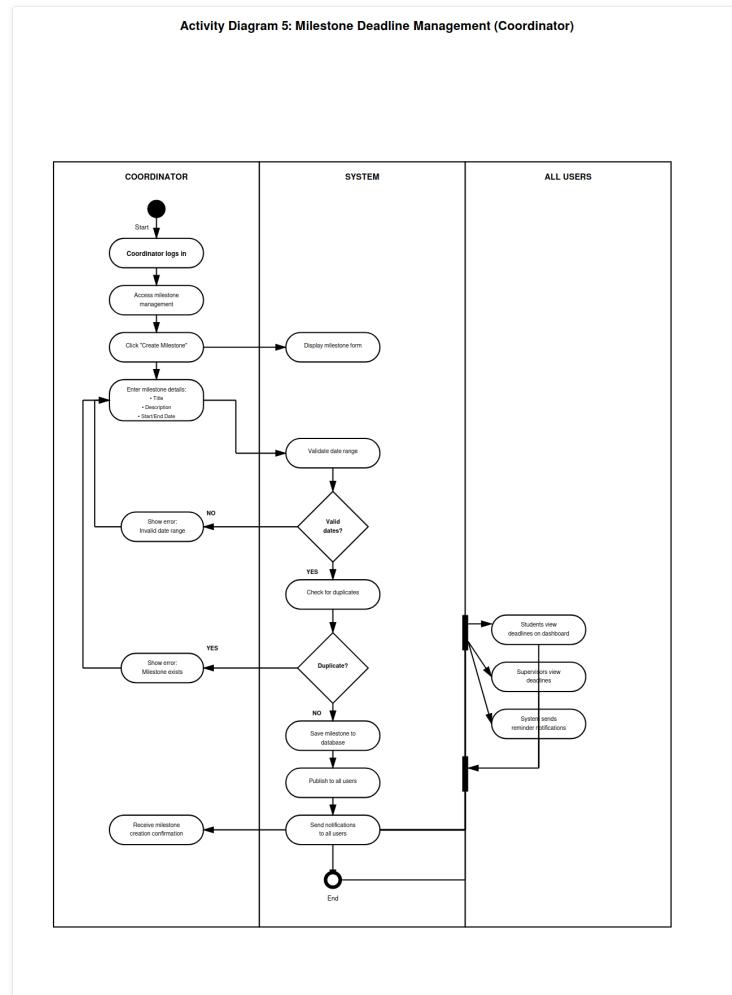


Figure 24: Milestone Deadline Management Activity Diagram

## 4.17 Activity Diagram: User login and Authentication

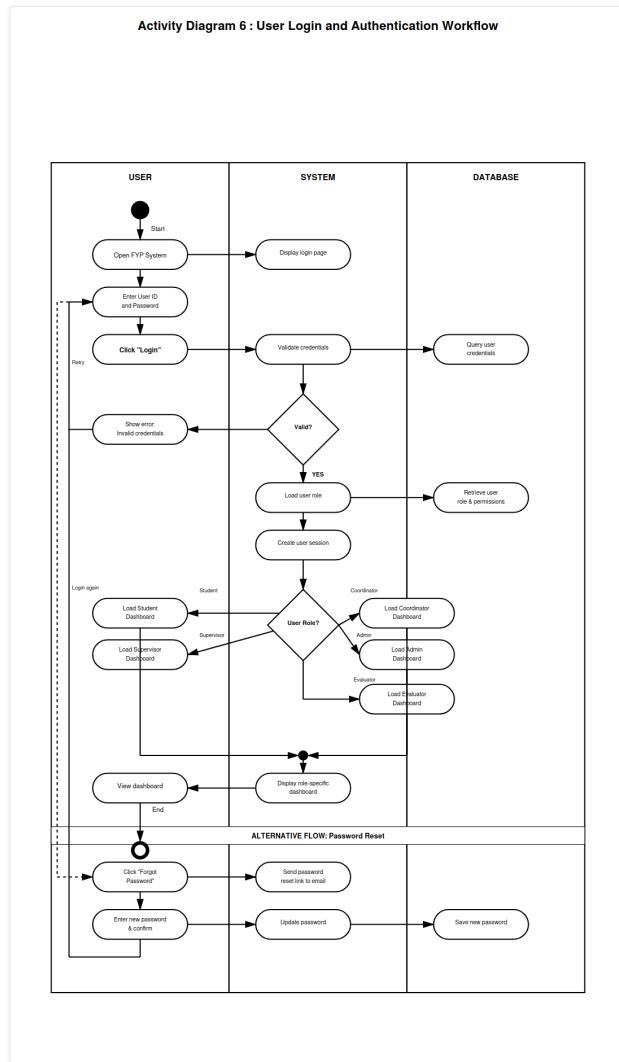


Figure 25: User Login and Authentication Activity Diagram

## 4.18 Activity Diagram: Issue Management

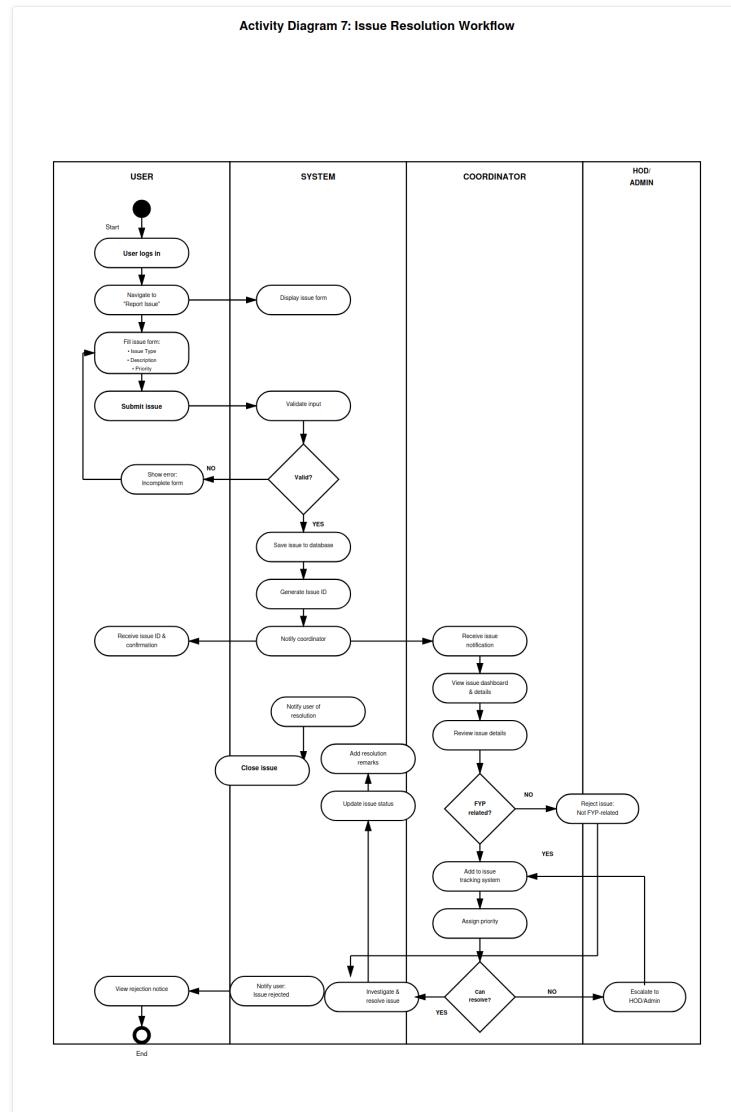


Figure 26: Issue Management Activity Diagram

## 5 Requirements–Design Traceability Matrix

## 6 Prototype and Implementation Links

### 6.1 Figma Prototype

- **Interactive Prototype:** <https://www.figma.com/proto/1QReuwjg4HxK0Fkg7NNT9h/FYP-MANAGEMENT-SYSTEM?node-id=76-3&t=a4kUQAXJPB92J0ym-1>
- **Design Components:** Includes all screens for:
  - Student Dashboard
  - Supervisor and Cosupervisor Interface

- Coordinator Panel
- Admin Control Panel
- Evaluator Interface

## Requirements Traceability Matrix

Req.	Requirement	Description	Design Artifacts
3.1.1	Login	Allow users to log in to the FYP Management System using university-provided credentials with role-based access	Activity Diagram 6, Sequence Diagram (Login), DFD L2 (Authentication), Use Case Diagram, Class Diagram (User)
3.1.2	Reset or Change Password	Allow users to reset forgotten passwords or change existing passwords with secure validation	Activity Diagram 6 (Alt Flow), Sequence Diagram (Forgot Password), DFD L2 (Authentication)
3.1.3	View and Update Personal Profile	Allow users to view and update their personal profile information including contact details	Use Case Diagram, DFD L0, Class Diagram (User attributes)
3.1.4	Receive System Notifications	Allow users to receive important notifications and announcements related to FYP activities based on their role	DFD L0, DFD L1, Class Diagram (Notification), Component Diagram (Notify)
3.2.1	Browse and Search Available Projects	Allow students to browse and search available FYP project ideas by title, domain, category, or supervisor	Use Case Diagram, DFD L2 (Project Management), Component Diagram (StudentPortal - Browse)
3.2.2	Project Proposal Submission and Management	Enable students to propose original project ideas or submit proposals for assigned projects with revision support	Activity Diagram 1, Sequence Diagram (Proposal), Use Case Diagram, DFD L2 (Project Management), Component Diagram (StudentPortal - Proposal), Class Diagram (Proposal)
3.3	Check Proposal Approval Status	Allow students to check the current status (Pending/Approved/Revision Required) of submitted project proposals	Activity Diagram 1, Use Case Diagram, DFD L2 (Project Management), Component Diagram (StudentPortal - Status)
3.3.1	Upload Project Documents	Enable students to upload various project-related documents (SRS, design docs, reports, final submissions)	Activity Diagram 2, Use Case Diagram, DFD L2 (Project Management), Component Diagram (DocMgr - Upload), Component Diagram (StudentPortal - Upload)
3.3.2	Replace Documents Within Deadlines	Allow students to replace previously submitted documents before submission deadlines with version control	Activity Diagram 2, DFD L2 (Project Management), Component Diagram (DocMgr - Replace)

<b>Req.</b>	<b>Requirement</b>	<b>Description</b>	<b>Design Artifacts</b>
3.4	View Project Milestone Deadlines	Display all project milestone deadlines defined by coordinators in chronological order	Activity Diagram 5, Use Case Diagram, DFD L2 (Project Management), Component Diagram (Milestones)
3.4.1	View Comments from Supervisors	Allow students to view feedback and comments from supervisors, co-supervisors, and industrial mentors	Activity Diagram 2, Use Case Diagram, DFD L2 (Project Management), Component Diagram (StudentPortal - Comments), Class Diagram (Feedback)
3.5	View Evaluation Marks	Enable students to view evaluation marks for proposal, mid-term, and final defense evaluations	Activity Diagram 4, Use Case Diagram, DFD L2 (Evaluation Management), Component Diagram (StudentPortal - Marks)
3.6.1	View Assigned Project Groups	Allow supervisors to view all assigned project groups with member details, titles, and milestones	Use Case Diagram, DFD L2 (Project Management), Component Diagram (Supervisor - Groups), Class Diagram (Supervisor)
3.7	Review and Approve/Reject Documents	Enable supervisors to review, approve, reject, or request revisions for submitted project documents	Activity Diagram 2, Sequence Diagram (Review), Use Case Diagram, DFD L2 (Project Management), Component Diagram (Supervisor - Review)
3.7.1	Provide Comments on Submissions	Allow supervisors to provide detailed written feedback and comments on student submissions	Activity Diagram 2, Sequence Diagram (Review), Use Case Diagram, Component Diagram (Supervisor - Comments), Class Diagram (Feedback)
3.7.2	Access Student Submissions	Enable supervisors to access and download all submitted project documents from assigned groups	Activity Diagram 2, Use Case Diagram, DFD L2 (Project Management), Component Diagram (Supervisor - Access)
3.8.1	View Assigned Projects (Co-Supervisor)	Allow co-supervisors to view assigned projects and student groups with project details	Use Case Diagram, DFD L2 (Project Management), Component Diagram (CoSupervisor - Projects), Class Diagram (Co-Supervisor)
3.8.2	Access Student Submissions (Co-Supervisor)	Enable co-supervisors to access and review project submissions from assigned groups	Use Case Diagram, DFD L2 (Project Management), Component Diagram (CoSupervisor - Access)
3.8.3	Provide Feedback and Suggestions	Allow co-supervisors to provide constructive feedback and improvement suggestions on submissions	Activity Diagram 2, Use Case Diagram, Component Diagram (CoSupervisor - Feedback), Class Diagram (Feedback)
3.9.1	View All FYP Projects	Enable HoD to view all departmental FYP projects with filtering by title, supervisor, status, or members	Use Case Diagram, DFD L0, DFD L1, Component Diagram (HoD - AllProjects)
3.9.2	Approve Supervisor Assignments	Allow HoD to review and approve/modify supervisor and co-supervisor assignments to student groups	Activity Diagram 3, Sequence Diagram (Assignment), Use Case Diagram, DFD L2 (Project Management), Component Diagram (HoD - Assignments)

<b>Req.</b>	<b>Requirement</b>	<b>Description</b>	<b>Design Artifacts</b>
3.9.3	Approve or Reject Projects	Enable HoD to approve or reject FYP project proposals based on departmental standards and policies	Activity Diagram 1, Use Case Diagram, DFD L2 (Project Management), Component Diagram (HoD - Approve)
3.10.1	View Assigned Projects for Evaluation	Allow evaluators to view the list of FYP projects assigned to them for assessment	Activity Diagram 4, Use Case Diagram, DFD L2 (Evaluation Management), Component Diagram (Evaluator - Projects)
3.10.2	Access Project Documents	Enable evaluators to securely access all project documents (proposals, reports, presentations)	Activity Diagram 4, Use Case Diagram, DFD L2 (Evaluation Management), Component Diagram (Evaluator - Docs)
3.10.3	View Evaluation Deadlines	Display evaluation deadlines and schedules in chronological order with reminders	Activity Diagram 4, Sequence Diagram (Evaluation), Use Case Diagram, DFD L2 (Evaluation Management)
3.10.4	Submit Evaluation Marks	Allow evaluators to submit scores, comments, and recommendations using predefined evaluation forms	Activity Diagram 4, Sequence Diagram (Evaluation), Use Case Diagram, DFD L2 (Evaluation Management), Component Diagram (Evaluator - Marks), Class Diagram (Evaluation)
3.10.5	View Evaluation Criteria	Enable evaluators to access detailed evaluation criteria, rubrics, and scoring guidelines	Activity Diagram 4, Use Case Diagram, DFD L2 (Evaluation Management)
3.11.1	Manage Student Groups	Enable coordinator to create/manage student groups with member assignments and complete project details	Use Case Diagram, DFD L1, DFD L2 (Project Management), Component Diagram (Coordinator - Groups), Class Diagram (Group, Project)
3.11.2	Manage FYP Timelines	Allow coordinator to create, update, and schedule project milestone deadlines with document requirements	Activity Diagram 5, Sequence Diagram (Milestone), Use Case Diagram, DFD L1, DFD L2 (Project Management), Component Diagram (Coordinator - Timeline), Class Diagram (Milestone)
3.11.3	Assign Evaluators and Schedules	Enable coordinator to assign internal/external evaluators to projects and create evaluation schedules	Activity Diagram 4, Sequence Diagram (Evaluation), Use Case Diagram, DFD L2 (Evaluation Management), Component Diagram (Coordinator - Evaluators)
3.11.4	Assign Supervisors	Allow coordinator to assign supervisors and co-supervisors to project groups with departmental validation	Activity Diagram 3, Sequence Diagram (Assignment), Use Case Diagram, DFD L2 (Project Management), Component Diagram (Coordinator - Supervisors)
3.11.5	Handle User Issues	Enable coordinator to manage and resolve FYP-related issues raised by all system users	Activity Diagram 7, Sequence Diagram (Issue), Use Case Diagram, DFD L2 (Issue Management), Component Diagram (Coordinator - Issues)
3.12.1	Full System Access	Provide super admin complete access to all modules, data, and administrative control functions	Use Case Diagram, DFD L0, DFD L2 (Role and Permission), Component Diagram (SuperAdmin - FullAccess)

Req.	Requirement	Description	Design Artifacts
3.12.2	Manage Roles and Permissions	Enable super admin to assign, modify, or revoke user roles and permissions with module-level access control	Use Case Diagram, DFD L2 (Role and Permission), Component Diagram (SuperAdmin - Roles), Class Diagram (User with roles)
3.12.3	Create/Update Users	<del>Adds</del> super admin to perform complete user account management (create, update, delete) with credential assignment	Use Case Diagram, DFD L2 (Role and Permission), Component Diagram (SuperAdmin - Users), Class Diagram (User)
3.13.1	Usability (User-Friendly Interface)	System shall provide intuitive web-based interface with clear navigation and minimal steps to complete tasks	All Activity Diagrams, All Sequence Diagrams, Component Diagram (WebPortal), DFD L0 (External Entities)
3.13.2	Reliability (99% Availability)	System shall maintain 99% uptime with data integrity, backup, and recovery mechanisms	Component Diagram (Database), DFD L1 (Data Stores)
3.13.3	Performance (Response Time)	System shall respond to user requests within 2-5 seconds and support 2000+ concurrent users	All Sequence Diagrams (timing), Component Diagram (Architecture)
3.13.4	Scalability	System architecture shall support increasing users and projects without major redesign through modular design	Component Diagram (Modular), Class Diagram (OOD)
3.13.5	Security (Authentication & Authorization)	System shall implement role-based access control, encrypted data storage, and secure communication (HTTPS/TLS)	Activity Diagram 6, Sequence Diagram (Login), DFD L2 (Auth), DFD L2 (Role), Component Diagram (Security)

## 7 Conclusion

### 7.1 Design Summary

The system design presented in this document provides a comprehensive blueprint for developing the Final Year Project Management System. The modular architecture, clear separation of concerns, and emphasis on security and scalability ensure that the system will meet both current and future requirements.

### 7.2 Key Achievements

- Complete mapping of SRS requirements to design components
- Scalable architecture supporting future enhancements
- Comprehensive security design protecting sensitive academic data
- User-centered interface design for diverse user groups
- Detailed technical specifications for implementation

### 7.3 Next Steps

1. **Implementation Phase:** Begin development based on this design document
2. **Code Review:** Regular code reviews to ensure adherence to design
3. **Testing:** Comprehensive testing including unit, integration, and user acceptance testing
4. **Deployment:** Gradual rollout with proper monitoring
5. **Training:** User training sessions for all stakeholder groups

### 7.4 Risk Mitigation

Table 3: Design Risk Mitigation Strategies

Risk	Impact	Mitigation Strategy
Performance under load	High	Load balancing, caching, database optimization
Security breaches	High	Regular security audits, penetration testing
Data loss	High	Automated backups, disaster recovery plan
User adoption	Medium	Comprehensive training, intuitive UI
Integration issues	Medium	API-first design, thorough testing

## 8 Appendices

### 8.1 Appendix A: References

1. IEEE Std 830-1984, IEEE Recommended Practice for Software Requirements Specifications
2. FYPMS Software Requirements Specification (SRS) - January 17, 2026