System Design Document

for

Namal Complaint Management System

Project Milestone 3

Version 1.0

January 18, 2026

Prepared by:

Dev Wizard Team

Sundeep Kumar	NUM-BSCS-2024-75
Rehan Tariq	NUM-BSCS-2024-66
Aimen Shafiq	NUM-BSCS-2024-04

Department of Computer Science
Namal University, Mianwali

CSC-225 – Software Engineering

Document Control

Document Title	System Design Document for Namal Complaint Management System
Project Name	NCMMS - Namal Complaint Management System
Version	1.0
Date	January 18, 2026
Status	Final
GitHub Repository	https://github.com/SundeepKumar07/NAMAL_COMPLAINT_PORTAL
Figma Prototype	https://www.figma.com/proto/eIbQy0a0riT1HzmyEeLnGn/
Meeting Minutes	https://docs.google.com/spreadsheets/d/12_TNwLXdpk1PAGiSt_56hTMgauhxBHHHwzzxx_vtbSQ/

Revision History

Date	Version	Description	Author
January 18, 2026	1.0	Initial Design Document	Dev Wizard Team

Contents

List of Figures

1 Introduction

1.1 Purpose

This System Design Document provides a comprehensive design specification for the Namal Complaint Management System (NCMMS). The document translates the requirements specified in the approved Software Requirements Specification (SRS) into a detailed system design that serves as a blueprint for implementation.

This document is intended for:

- Development team members who will implement the system
- System architects who need to understand the overall system structure
- Quality assurance team for validation and verification
- Project stakeholders for design review and approval
- Maintenance personnel for future system evolution

1.2 Scope

The design encompasses all aspects of the NCMMS system including:

- System architecture design
- Behavioral models showing system dynamics and workflows
- Structural models depicting system components and their relationships
- User interface design through interactive prototypes
- Complete traceability from requirements to design elements

1.3 Document Organization

This document is organized into the following sections:

Section 2: Design Assumptions and Constraints

Section 3: Key Design Decisions

Section 4: Behavioral Diagrams

Section 5: Structural Diagrams

Section 6: Requirements-Design Traceability

Section 7: Prototype Design

Section 8: Project Resources

Section 9: Meeting Summary

1.4 Design Methodology

The system design follows object-oriented design principles and uses standard UML notation. The design process involved:

1. Requirements Analysis - Review of approved SRS document
2. Behavioral Modeling - Creation of use case, data flow, sequence, and activity diagrams
3. Structural Modeling - Definition of system structure through class and component diagrams
4. Prototype Development - Creation of interactive Figma prototype
5. Stakeholder Validation - Review meetings with Requirement Provider
6. Traceability Analysis - Mapping of requirements to design elements

1.5 Reference Documents

1. Software Requirements Specification (SRS) for NCMMS, Version 1.0
2. IEEE Std 830-1984, IEEE Guide to Software Requirements Specifications
3. UML 2.5 Specification
4. NCMMS Project Proposal, Dev Wizard Team, November 2025

2 Design Assumptions and Constraints

2.1 Design Assumptions

2.1.1 User Environment Assumptions

1. Users have reliable internet access with minimum 1 Mbps bandwidth
2. Users have access to devices with modern web browsers
3. Three distinct user roles are sufficient: End User, Maintenance Staff, Administrator
4. End users possess basic computer literacy and can navigate web interfaces
5. All users have valid university email addresses for authentication
6. Most users have devices with camera capability for uploading complaint images

2.1.2 Operational Assumptions

1. Sufficient maintenance staff will be available to handle complaints
2. At least one administrator will be available during operational hours
3. System will handle average of 50-100 complaints per day
4. Peak usage will not exceed 100 concurrent users
5. Database will grow approximately 10,000 complaints per year

2.2 Design Constraints

2.2.1 Platform Constraints

1. System must be web-based application
2. Must support Chrome 90+, Firefox 88+, Safari 14+, Edge 90+
3. System must not require browser plugins or extensions
4. Must support responsive design for screen widths from 320px to 1920px+
5. System requires continuous internet connectivity

2.2.2 Performance Constraints

1. Page load time must not exceed 3 seconds
2. System must support minimum 100 concurrent users
3. Maximum file upload size: 5MB per image
4. Standard reports must generate within 10 seconds

2.2.3 Security Constraints

1. Passwords must meet complexity requirements (8+ characters, uppercase, lowercase, number, special character)
2. User sessions must expire after 24 hours or 30 minutes of inactivity
3. All sensitive data must be encrypted at rest and in transit
4. Role-based access control must be strictly enforced
5. All production traffic must use HTTPS protocol

2.2.4 Business Constraints

1. Project operates under student project budget constraints
2. Development must align with academic semester schedule
3. Team limited to 3 members
4. Design must be approved by Requirement Provider

3 Key Design Decisions

3.1 Three-Tier Architecture

Decision: Adopt a three-tier architecture with separation between presentation, business logic, and data layers.

Rationale:

- Clear separation of concerns
- Each tier can be scaled independently
- Easier to maintain and test
- Supports team collaboration

3.2 Role-Based Access Control

Decision: Implement three distinct user roles with specific permissions.

Rationale:

- Ensures security and data privacy
- Different users have different needs
- Simplifies permission management
- Aligns with organizational structure

3.3 Component Organization

Decision: Organize system into modular functional components.

Rationale:

- Each module has clear responsibility
- Modules can be developed independently
- Easier to test and debug
- Supports code reusability

4 Behavioral Diagrams

4.1 Use Case Diagram

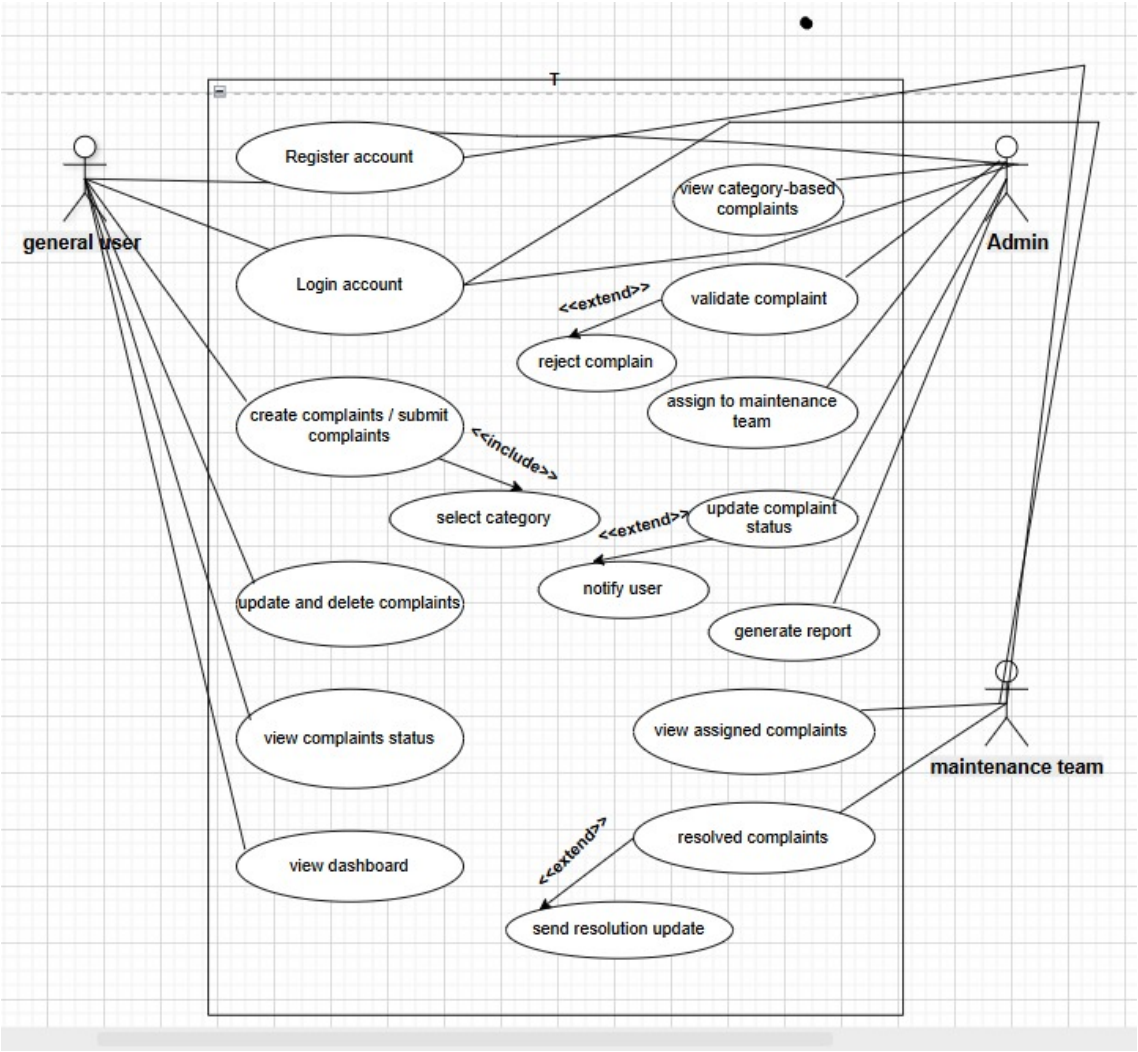

Figure 1: Use Case Diagram

4.2 Data Flow Diagrams

4.2.1 Level 0 - Context Diagram

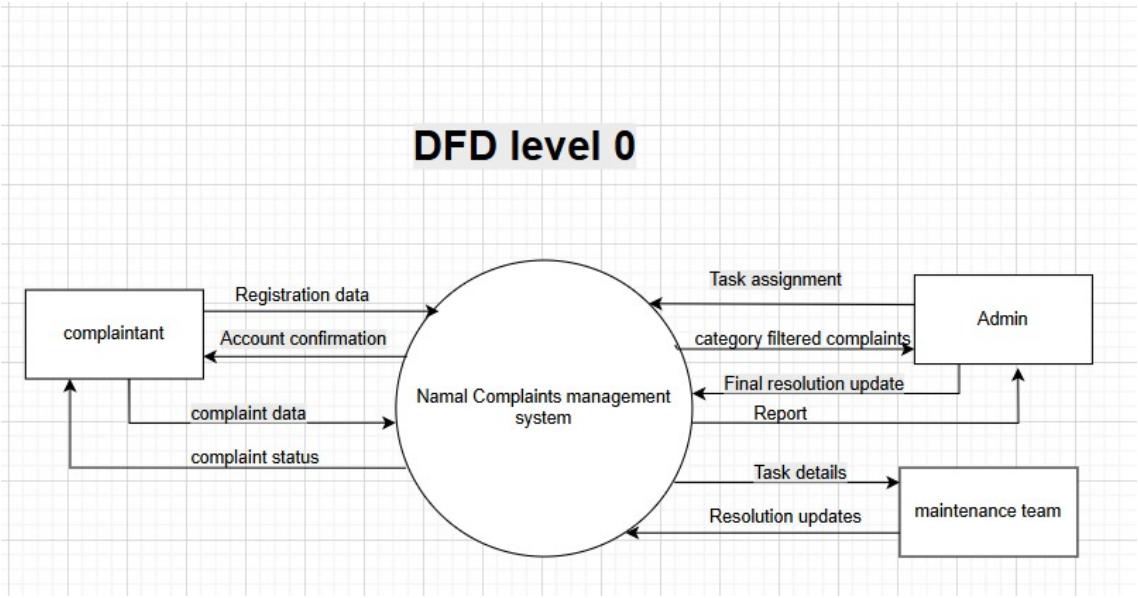

Figure 2: Data Flow Diagram - Level 0

4.2.2 Level 1 DFD

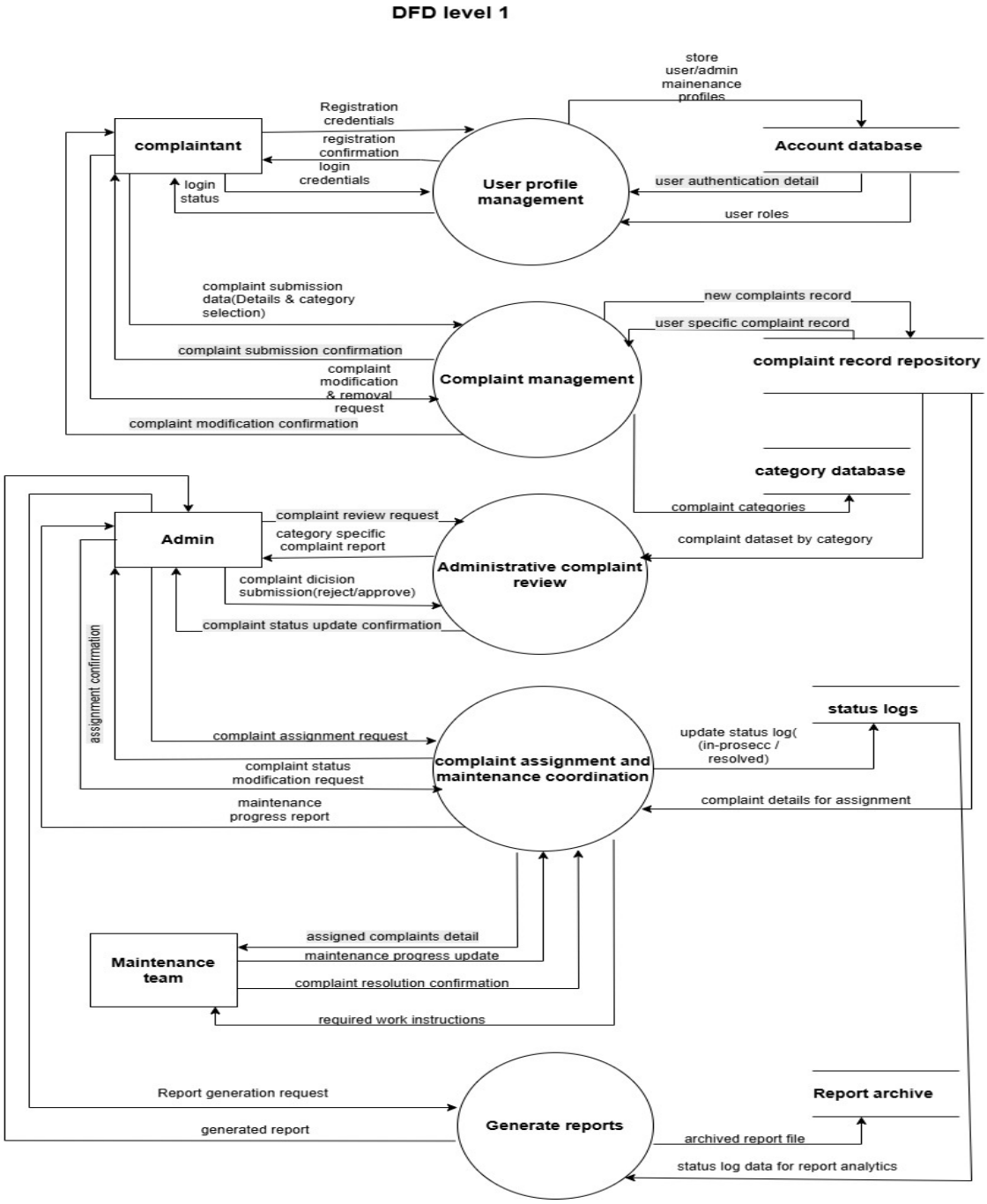

Figure 3: Data Flow Diagram - Level 1

4.2.3 Level 2 DFD

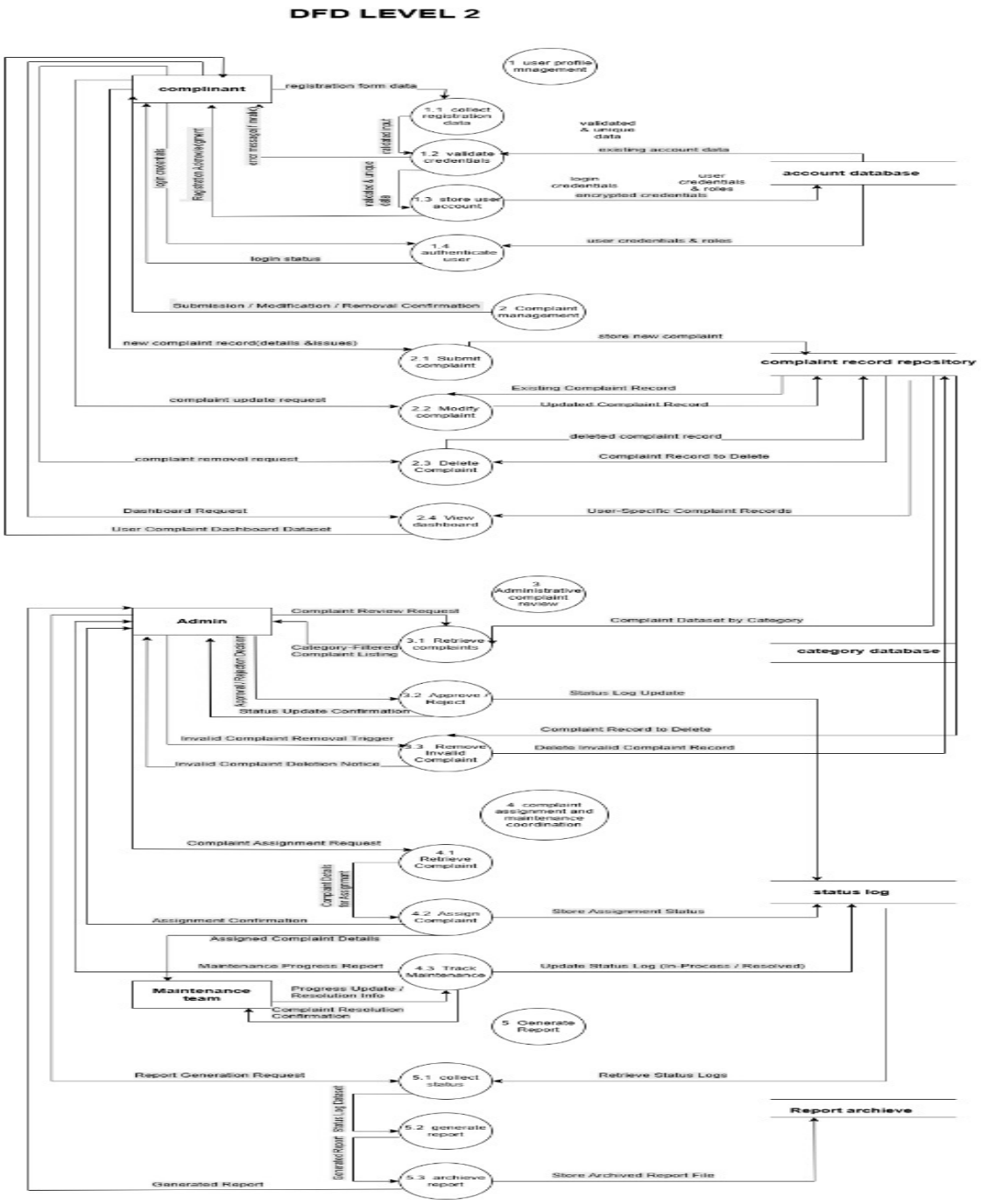

Figure 4: Data Flow Diagram - Level 2

4.3 Sequence Diagram

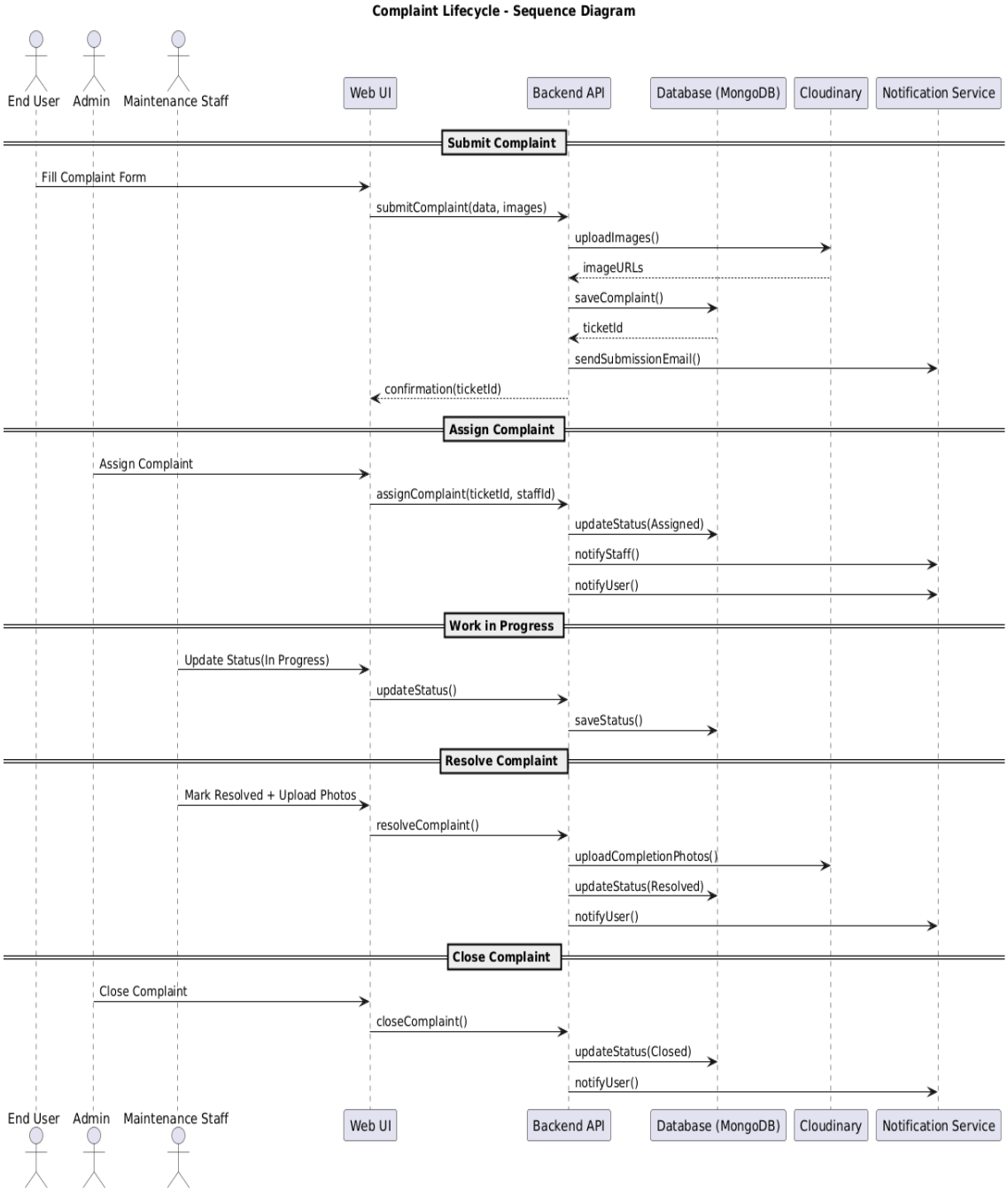

Figure 5: Sequence Diagram

4.4 Activity Diagrams

4.4.1 End User Activity Diagram

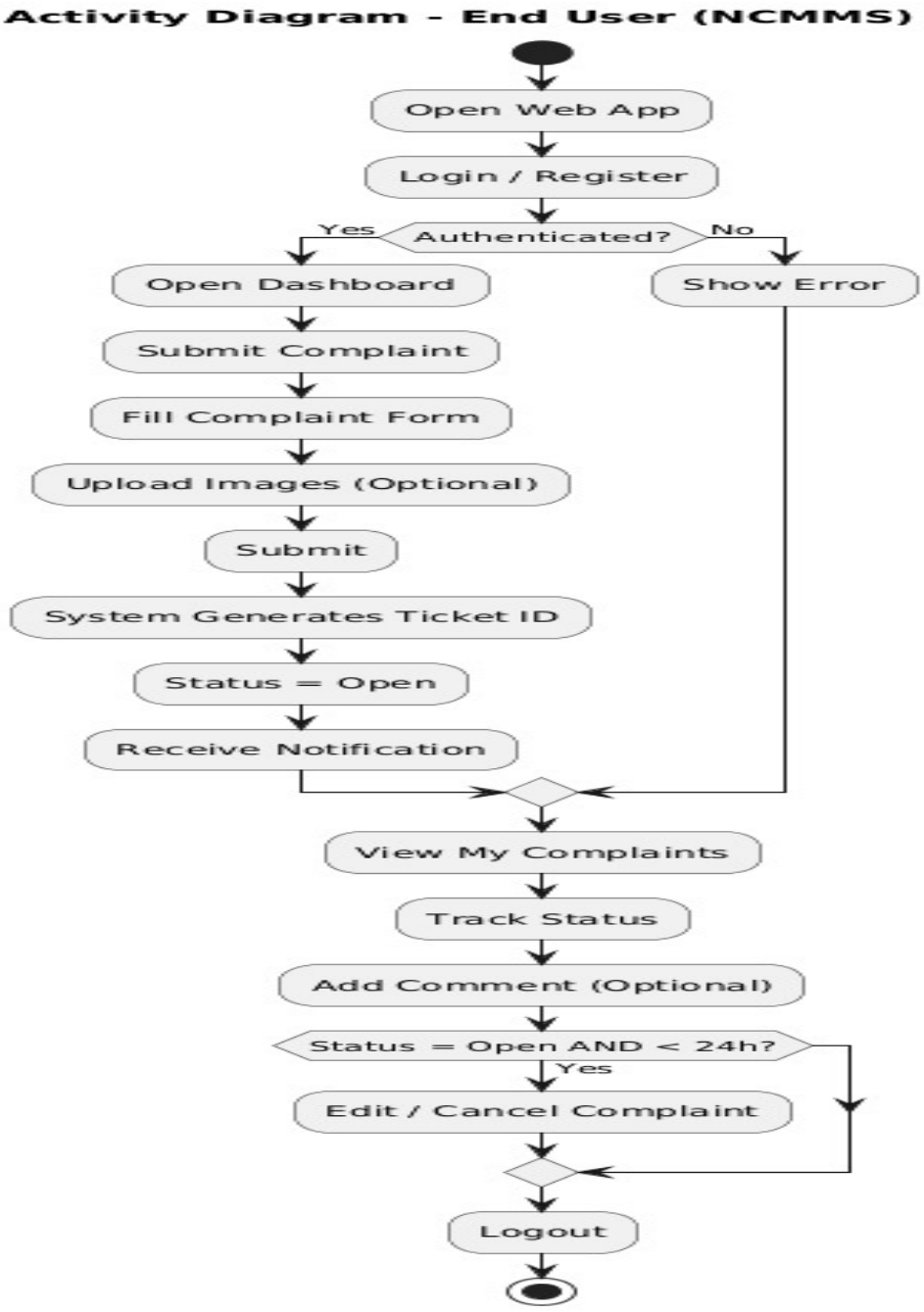

Figure 6: Activity Diagram - End User

4.4.2 Maintenance Staff Activity Diagram

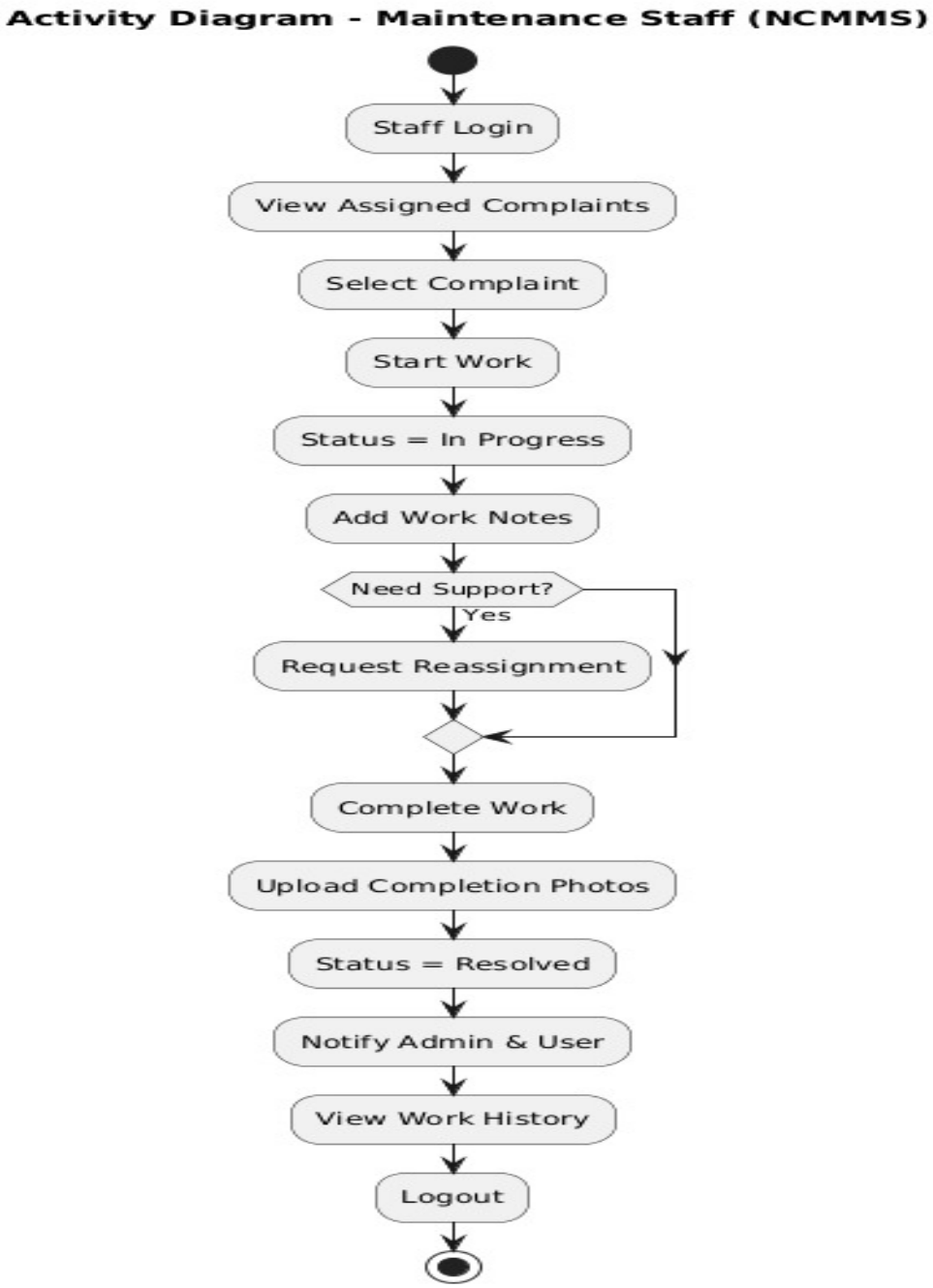

Figure 7: Activity Diagram - Maintenance Staff

4.4.3 Administrator Activity Diagram

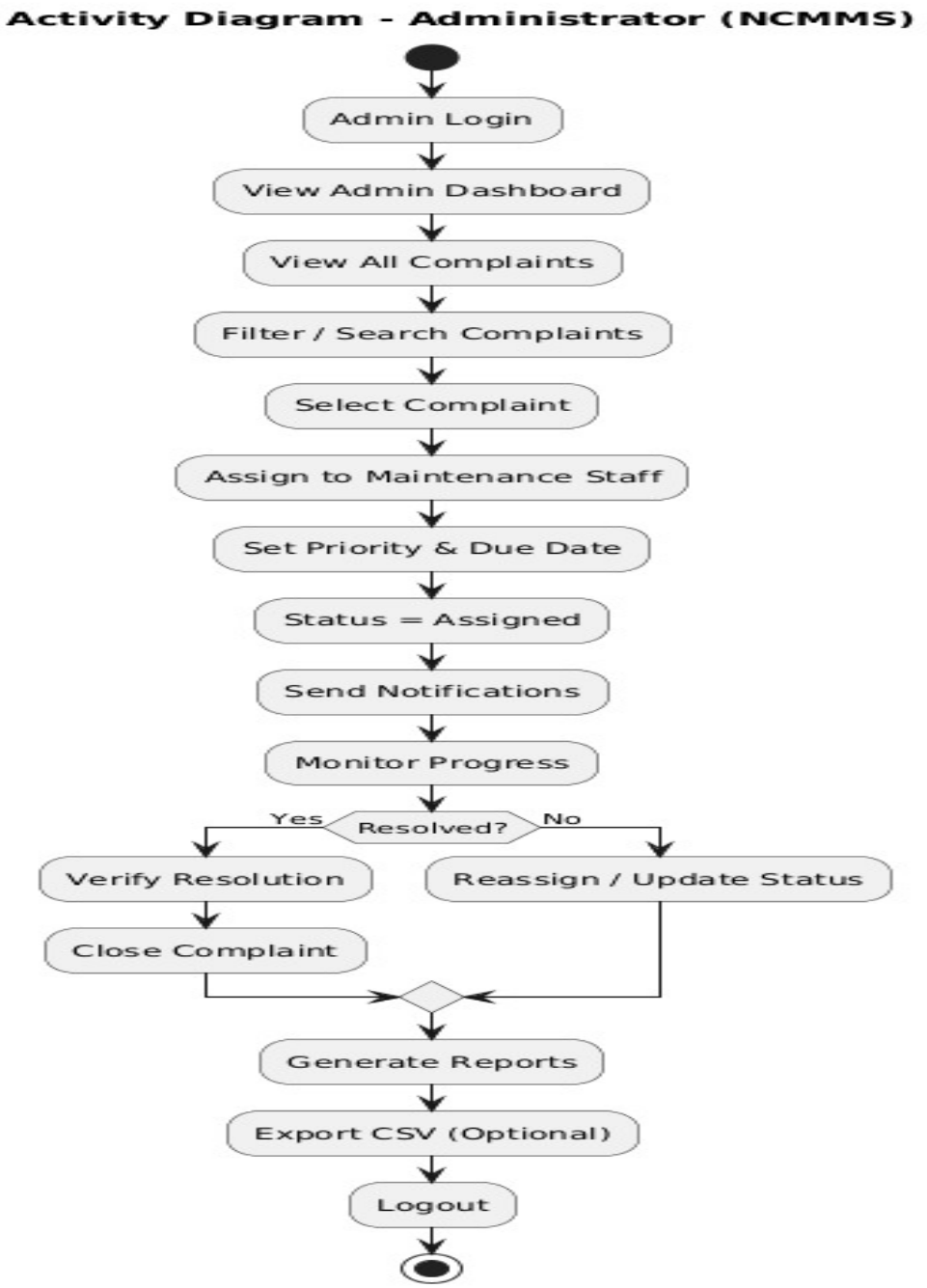

Figure 8: Activity Diagram - Administrator

5 Structural Diagrams

5.1 Class Diagram

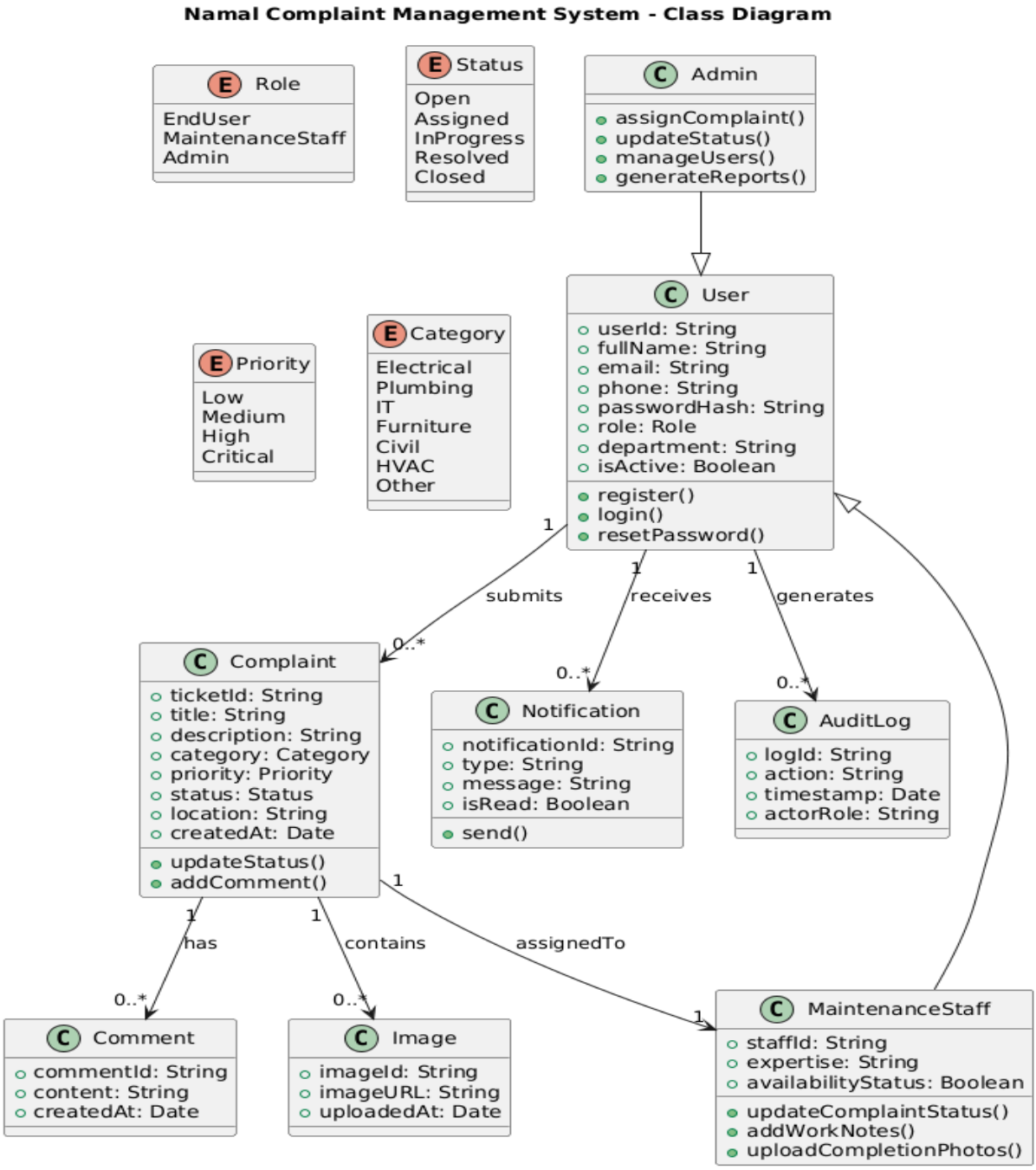

Figure 9: Class Diagram

5.2 Component Diagram

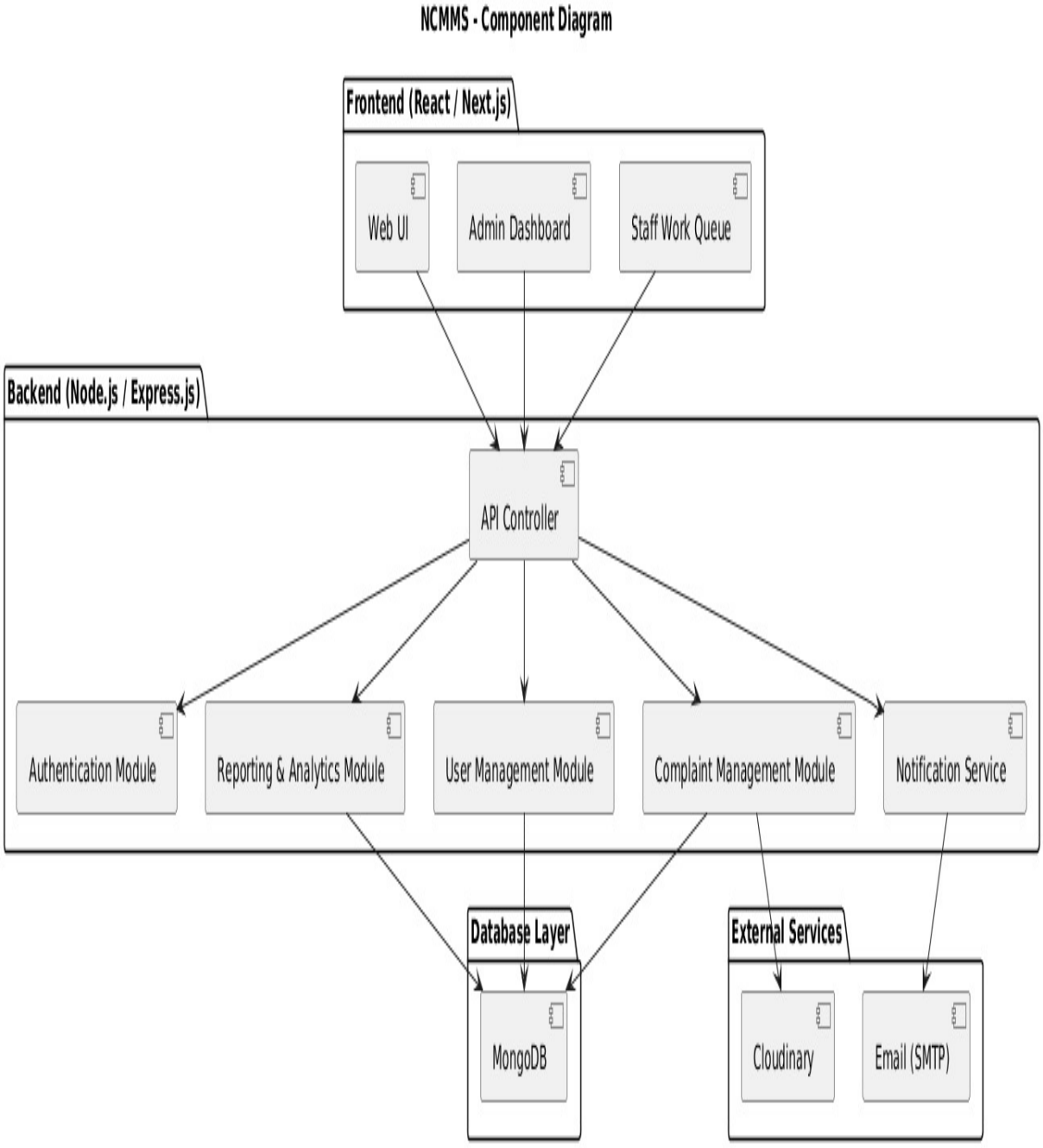

Figure 10: Component Diagram

6 Requirements-Design Traceability

Requirement Traceability Table (RTT) - NCMMS

Req ID	Requirement Description	Mapped Module / Component
FR-1.1	User Registration	Authentication Module, User Database
FR-1.2	Email Verification	Authentication Module, Email Service
FR-1.3	User Login	Authentication Module, JWT Service
FR-1.4	Password Policy Enforcement	Security Module
FR-1.5	Password Reset	Authentication Module, Email Service
FR-1.6	Session Management	JWT Service
FR-1.7	Role Based Access Control	Security Module
FR-2.1	Submit Complaint	Complaint Management Module
FR-2.2	Generate Ticket ID	Complaint Module
FR-2.3	Complaint Validation	Complaint Module
FR-2.4	Initial Complaint Status (Open)	Complaint Module
FR-2.5	View Own Complaints	User Dashboard
FR-2.6	View Complaint Details	Complaint Module
FR-2.7	Edit Pending Complaint	Complaint Module
FR-2.8	Cancel Complaint	Complaint Module
FR-2.9	Add Comment	Comment Module
FR-2.10	Search Complaints	Search & Filter Module
FR-3.1	View All Complaints	Admin Dashboard
FR-3.2	Assign Complaint to Staff	Admin Module
FR-3.4	Update Complaint Priority	Admin Module
FR-3.6	Close Complaint	Admin Module
FR-3.7	Reopen Complaint	Admin Module
FR-4.1	View Assigned Complaints	Staff Work Queue
FR-4.2	Update Complaint Status	Staff Module
FR-4.4	Upload Completion Photos	Staff Module, Cloudinary
FR-4.5	Request Reassignment	Staff Module
FR-5.1	Submission Notification	Notification Service, Email
FR-5.3	Status Change Notification	Notification Service
FR-6.1	Generate Reports	Reporting & Analytics Module
FR-6.4	Export Reports (CSV)	Reporting Module
AT-5	Authentication Security	Security Module
AT-17	UI Consistency	Frontend UI Components

Figure 11: Requirements-Design Traceability Table

7 Project Resources

7.1 GitHub Repository

All project artifacts including diagrams, documentation, and meeting records are maintained in the GitHub repository:

Repository URL:
https://github.com/SundeepKumar07/NAMAL_COMPLAINT_PORTAL

7.2 Figma Prototype

Complete interactive prototype is available on Figma:

Prototype URL:
https://www.figma.com/proto/eIbQy0a0riT1HzmyEeLnGn/Namal-Complaint-Management-System?node-id=1-3515&t=wrWLPespGuM6k1wc-1&scaling=min-zoom&content-scaling=fixed&page-id=0%3A1&starting-point-node-id=29%3A2&show-proto-sidebar=1

7.3 Meeting Minutes

Detailed meeting minutes are maintained in Google Sheets:

Meeting Minutes URL:
https://docs.google.com/spreadsheets/d/12_TNwLXdpk1PAGiSt_56hTMgauhxBHHHwzzxx_vtbSQ/edit?gid=0#gid=0

8 Meeting Summary

8.1 Meeting Overview

Two formal meetings were conducted with the Requirement Provider during this milestone to review and validate the system design.

8.2 First Meeting - Design Review

8.2.1 Key Discussion Points

- Presented initial design diagrams (use case, DFD, class diagram)
- Discussed system architecture and component organization
- Reviewed user interface mockups and navigation flow
- Gathered feedback on design approach and assumptions

8.2.2 Feedback Received

- Design approach approved with minor suggestions
- Recommended clearer visual hierarchy in user interfaces
- Suggested adding quick action buttons on dashboard

- Requested color-coding for complaint status and priority

8.2.3 Action Items

- Incorporate feedback into Figma prototype
- Refine sequence and activity diagrams
- Enhance dashboard design with suggested features
- Prepare complete interactive prototype for next meeting

8.3 Second Meeting - Prototype Demonstration

8.3.1 Key Discussion Points

- Demonstrated complete interactive Figma prototype
- Walked through all user flows for three roles
- Showed responsive design for different devices
- Reviewed final design diagrams and traceability

8.3.2 Feedback Received

- Interactive prototype approved for implementation
- User interface design meets expectations
- Navigation flow is logical and intuitive
- Color scheme and branding appropriate
- All major requirements covered in design

8.3.3 Approval Status

- System design approved by Requirement Provider
- Prototype validated for all user roles
- Design ready to proceed to implementation phase
- Minor refinements can be made during development

8.4 Design Validation

The system design has been validated through:

- Review of all UML diagrams with development team
- Two formal meetings with Requirement Provider
- Interactive prototype demonstration and testing
- Requirements traceability verification
- Stakeholder approval obtained

9 Conclusion

This System Design Document provides a comprehensive blueprint for implementing the Namal Complaint Management System. The design has been carefully crafted to:

- Meet all functional and non-functional requirements specified in the SRS
- Follow industry-standard design patterns and UML notation
- Ensure usability through validated interface prototypes
- Maintain complete traceability from requirements to design
- Address all design assumptions and constraints

The design has been validated through formal review meetings with the Requirement Provider and approved for implementation. All design artifacts including diagrams, prototypes, and documentation are available in the project repository.

With this design as foundation, the development team is prepared to proceed with system implementation in the next phase.

Document Prepared by:
Dev Wizard Team
Department of Computer Science
Namal University, Mianwali

Date: January 18, 2026