Software Requirements Specification

for

Complaint Management and Tracking System

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Department of Computer Science

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Chapter 1

Introduction

1.1 Purpose

1.1.1 Overview of the Document

This Software Requirements Specification (SRS) document provides complete description of Complaint Management and Tracking System to be developed for Namal University Mianwali. The primary goal is to guide the development process and ensure alignment with the expectations of all stakeholders, including project sponsors, developers, and users.

1.1.2 Purpose of the Document

The purpose of this SRS Document is to:

- Specify functional and non-functional requirements of the system.
- Serve as a reference for the development team to ensure the successful implementation of all features.
- Clarify the platform's objectives for all stakeholders, ensuring mutual understanding and alignment.

1.1.3 Intended Audience

The intended audience for this SRS document includes:

- **Stakeholders:** To validate that the system meets the needs of the organization and align it with organizational objectives.
- **Development team:** To understand the system and use detailed functional and non-functional requirements as a road map for implementation.
- **Project Managers:** To monitor development progress and ensure resource allocation aligns with project timelines and goals.
- **Quality Assurance Team:** To write test cases and validate the system.

1.2 Scope

1.2.1 Product Identification

Complaint Management and Tracking System is a mobile-based platform designed to digitalize the process of submitting and resolving complaints within the environment of Namal University. The system shall provide role-based access to various users to enhance communication between the complainants and campus administration.

What the System shall do:

1. Enable students, faculty and staff members to submit complaint regarding academic, administrative and technical issues.
2. Provide role-based access to users.
3. Support file attachments (images) for complaint submission.
4. Track the real-time status of complaints and get updates through mobile.

5. Enable system operators to view, resolve and update status of complaints.
6. Get user feedback on complaint resolution process.
7. Generate performance reports and analytics for review.

What the System shall not do:

1. The system shall not interact with external maintenance managers.
2. The system shall not provide budgeting features.
3. The system shall not support anonymous complaint submission (without the official email of Namal University).
4. The system shall not resolve complaints without human operators.
5. The system shall not be used for emergency or crisis management.

Benefits and Objectives:

1. The system reduces complaints resolution delays caused by manual management of complaints.
2. It provides transparency by enabling users to track complaints in real-time.
3. It enhances communication between complaint handlers and complainants through notifications and updates.
4. The system improves performance through reports and analytics.
5. It improves user satisfaction by timely resolution of complaints and feedback mechanisms.

1.3 Definitions, Acronyms, and Abbreviations

Table 1.1: Definitions and Abbreviations

Term/Abbreviation	**Definition**
SRS	Software Requirements Specification
CMTS	Complaint Management and Tracking System being specified in this document
Complaint	A formal request submitted by user describing an problem related to the campus.
Complainant	Students, Faculty and staff members who may submit a complaint through the system.
System Operator or Complaint Handler	Administrative personnel responsible for receiving, updating, and resolving complaints. Also referred to as Administrator.
RP	Requirement Provider
Complaint Status	The current state of a complaint like submitted, under review, resolved etc.
Active Directory	Microsoft's directory service that provides authentication and authorization services for Windows domain networks.
LDAP	Lightweight Directory Access Protocol. An application protocol for accessing and maintaining distributed directory information services.
DFD	Data Flow Diagram showing the flow of data through an information system.

1.4 References

[1] ANSI/IEEE Std 830-1984, *IEEE Guide to Software Requirements Specifications*, IEEE, 1984.

[2] Project Proposal: *Complaint Management and Tracking System*, CSC-225 Software Engineering, Namal University, 2025.

[3] Constitution of Islamic Republic of Pakistan, *Article 14*,Dignity of Man and Privacy of Home, 1973.

[4] Project Milestone 2 Description, CSC-225 Software Engineering, Namal University, November 2025.

1.5 Overview

The remaining SRS document consists of two chapters.
Chapter 2: This chapter describes the general factors that affect system its requirements such as, user characteristics, general constraints, and assumptions.
Chapter 3: This chapter describes the detailed technical specifications of the system like its functional and non-functional requirements, performance requirements and design constraints.

Chapter 2

General Description

This section provides a comprehensive overview of Complaint Management and Tracking System , its context within related systems, major functionalities, user characteristics, and the constraints under which it operates. Rather than specifying detailed requirements, this section sets the stage for understanding those requirements by offering relevant background and descriptive elements.

2.1 Product Perspective

The Complaint Management and Tracking System is a self-contained mobile application. It is not a replacement for an existing system but rather introduces a formalized digital workflow where none previously existed.

2.1.1 System Context

The CMTS exists within a larger university technology ecosystem and interfaces with the following external systems:

- University Authentication System: For user identity verification and role assignment. (Implementation method TBD - may use university LDAP, Active Directory, or custom authentication database).
- University Personnel Directory: For retrieving user information such as name, department, contact details, and role classification.

2.1.2 System Independence:

While the CCMTS interfaces with the above systems, it maintains its own:

- Complaint database and complaint lifecycle data
- User session management
- Business logic and workflow rules
- Mobile application interface

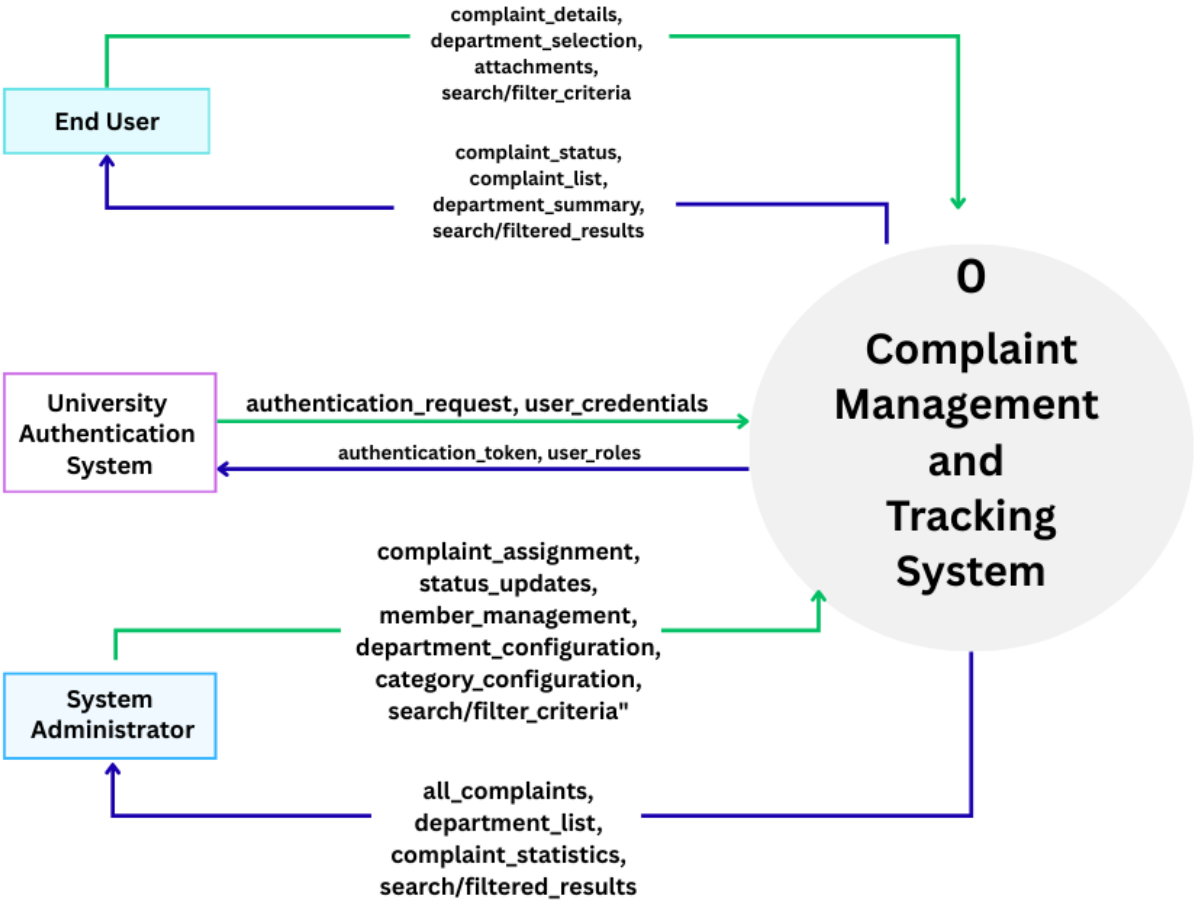

Figure 2.1: Context Diagram (Level 0 DFD)

2.2 Product Functions

The CCMTS shall provide the following major functional capabilities:

2.2.1 User Account Management:

1. User registration and authentication
2. Role-based access control (Student, Faculty, Staff, System Operator)
3. Profile management

2.2.2 Complaint Management

1. Complaint creation with category selection
2. File attachment support (images)
3. Automatic complaint ID generation
4. Real-time complaint status viewing

2.2.3 Workflow Management:

1. Complaint assignment to appropriate handlers
2. Severity level assignment
3. Status update capabilities for authorized personnel

2.2.4 Reporting and Analytics:

1. Performance reports generation
2. Resolution time analysis
3. Complaint sorting by category, status, time period

2.2.5 User satisfaction metrics:

1. Post-resolution feedback collection
2. Rating system for complaint handling quality

2.2.6 Administrative Functions:

1. User role management
2. Complaint category configuration
3. Data export capabilities

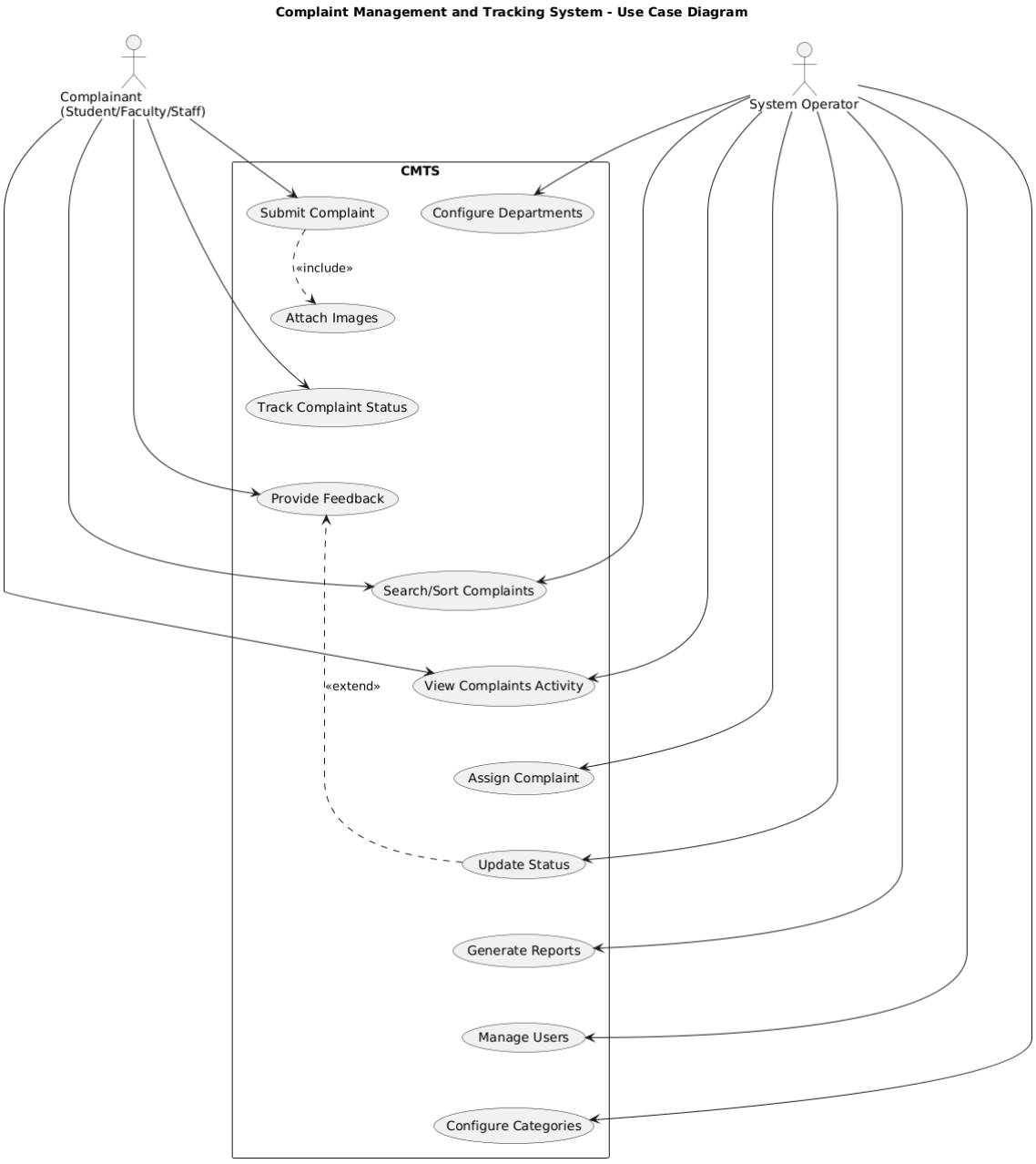

Figure 2.2: Use Case Diagram

2.3 User Characteristics

The CCMTS shall serve four distinct user classes with varying levels of technical expertise and system interaction patterns:

2.3.1 Students:

- **Educational Level:** Undergraduate students enrolled at Namal University
- **Technical Expertise:** Basic to intermediate mobile application usage skills; familiar with social media and messaging applications
- **System Usage Frequency:** Occasional (weekly to monthly, depending on need)
- **Primary Activities:** Submit complaints, track complaint status, provide feedback
- **Access Requirements:** Requires authenticated access with student credentials
- **Expected Volume:** Approximately 300-400 active student users

2.3.2 Faculty:

- **Educational Level:** Advanced degrees (Master's, PhD); teaching and research staff
- **Technical Expertise:** Intermediate mobile application usage skills; comfortable with professional communication tools

- **System Usage Frequency:** Occasional to moderate
- **Primary Activities:** Submit complaints regarding academic/workplace issues, track personal complaints, may participate in academic complaint resolution
- **Access Requirements:** Requires authenticated access with faculty credentials
- **Expected Volume:** Approximately 50-70 faculty users

2.3.3 Staff Members:

- **Educational Level:** High school to bachelor's degree; administrative and technical support personnel
- **Technical Expertise:** Basic to intermediate mobile application skills
- **System Usage Frequency:** Occasional (as needed for workplace issues)
- **Primary Activities:** Submit complaints regarding administrative/technical issues, may participate in complaint resolution within their domain
- **Access Requirements:** Requires authenticated access with staff credentials
- **Expected Volume:** Approximately 100-150 staff users

2.3.4 System Operators / Complaint Handlers (Administrators):

- **Educational Level:** Bachelor's degree or higher; administrative management personnel

- **Technical Expertise:** Intermediate to advanced mobile and web application skills; familiar with workflow management systems
- **System Usage Frequency:** Daily (continuous monitoring and management)
- **Primary Activities:** Review incoming complaints, assign complaints to appropriate personnel, update complaint status, communicate with complainants, generate reports, manage system configuration
- **Access Requirements:** Requires authenticated access with elevated administrative privileges
- **Expected Volume:** Approximately 5-10 administrative users

2.4 General Constraints

This section presents the key limitations and constraining factors that impact the design and development of the Complaint Management Tracking System (CMTS). The architecture of the system, functionality, and deployment plan are directly affected by all these limitations. Understanding these ensures that the end platform is compliant, efficient, scalable and responsive to the needs of the users.

2.4.1 Regulatory and Policy Constraints

The complaint management system must be functional with strict rules and institutional policies to protect sensitive information particularly those of the students and employees.

- **Data Protection Compliance:** The CMTS shall be required to comply with with constitutional provisions under Article 14 regarding privacy and protection of personal data. since the complaints may contain any academic or personal information about a student. This constraint requires user authentication and role based access controls which are described in Section 3.
- **University Governance Policies:** In addition to the federal law, the system must also adhere with the university policies on the issues of complaint resolution, data confidentiality and disciplinary measures. This shall be done through following such institutional regulations in the recording, and reporting of complaints.

2.4.2 Hardware and Platform Limitations

Being mobile-application, the system must be capable of addressing real-life hardware and connectivity constraints:

- **Platform Constraint:** The system shall be developed as a native or cross-platform mobile application supporting both iOS and Android operating systems. A mobile-first approach is mandatory.
- **Fluctuation of Network Connectivity:** There is a possibility of the user posting and/or reading complaints in areas of campus with bad or poor internet connectivity. The system should be capable of permitting the offline view of already loaded information and also handle the network failures gracefully so that system does not crash and the information is not lost.

- **Camera and Storage Access:** Since there may be a chance that the user would need to attach photographic evidence, the app shall demand the required camera and storage access on the mobile devices. This drives requirements for user permission procedures and permission control.

2.4.3 Interface Constraints

The CMTS entirely relies on the LDAP / Active Directory of the university to log-in the user. It cannot verify users independently. Such dependency means that the system shall be required to include error handling to handle the case where the authentication service shall be unavailable temporarily, without creating the impression that the system is stuck.

2.4.4 Operational Constraints

- **Concurrent Access:**It should be able to allow numerous users including complainants and administrators to view and edit complaints simultaneously. This necessitates a keen database handling in Section 3.
- **Multi-platform Support:** The system needs to operate on Android and iOS phone platforms and in this regard, the system needs to be designed to support both. This has an influence on its speed and the number of features that it can offer, and these are recorded in the technology stack in Section 3.
- **University IT Infrastructure:** The system must be integrated into the existing IT configuration at the university,

in accordance with security regulations such as firewalls, as well as utilizing the existing servers. This affects the deployment process of the system, back up scheduling, and the frequency at which the system shall be available.

2.4.5 Audit and Compliance Functions

- **Audit Trail Requirements:** It shall be necessary to document all details regarding complaints as it is not only legally but also institutionally mandatory. Whenever the complaint is made, changed, updated or viewed, the system should record the individual who made the complaint, changed it, updated it, or looked at it.
- **Record Retention Policies:** Laws and rules of the university might implement complaints records to stay in 5-7 years. So it is required that system shall store the data, keep it for its life cycle and destroy it safely once the time elapses.
- **Reporting and Analytics:** Admins and compliance staff should have reports and trend analysis. This implies that the database should be capable of processing rapid queries, data validation and data exporting.

2.4.6 Access Control and Security Constraints

- **Role-Based Access Control:** Various users like students, faculty, staff, and administrators should have different levels of system access and data visibility. This states the need for role based accessed described in section 3.

- **Data Confidentiality Levels:** The complaint may be the general comment or severe. Each type of complaint requires a different level of confidentiality, security and special treatment of sensitive complaints.
- **Secure Communication:** Any data that is being transmitted between the mobile application and the server should be encrypted to prevent interception mandating requirements for data encryption and security in Section 3.

2.4.7 Criticality and Reliability Considerations

- **System Availability:** CMTS is not life critical system, yet, it may receive time sensitive safety complaints. Thus, requirements for downtime, backup, and disaster recovery are formulated formulated in Section 3.
- **Data Integrity:** Loss or corruption of complaint data of individuals can cause complications. Hence, system shall have good database transactions, backups, data checks, and recovery facilities.
- **Graceful Degradation:** When portions of the system are malfunctioning such as the login or the database, the system must continue functioning as effectively as possible rather than crashing. During crisis, good error handling, fallbacks and communication with the user are required.

2.4.8 Development and Maintenance Constraints

- **Scalability Requirements:** The system must be scalable to support user growth form initially hundreds to thousands as time passes. This constraint drives architectural design,

database design and server infrastructure that enable horizontal scaling.

- **Maintenance Windows:** Updates are to be done at a time when there is low system usage often in the night or during weekends. This shall necessitate zero-downtime updates, cautious database migrations and compatibility of the mobile app and API versions.
- **Project Timeline:** The project shall be completed within the 12-month academic project timeline as specified in the project proposal, divided into 14 two-week sprints.
- **Budget:** The system shall utilize open-source technologies and free-tier cloud services. No commercial software licenses shall be required.
- **Language:** The primary system language shall be English. Support for additional languages (Urdu) may be considered as a future enhancement.
- **Scrum Methodology:** Development shall follow the Agile Scrum framework with bi-weekly sprint cycles, sprint reviews with the Requirement Provider, and iterative delivery of functional increments.

These limitations constitute the functional and non-functional requirements in 3. All constraints elaborate the reasons to define requirements in a way that the system shall perform well within its operational, regulatory and technical or operational environment.

2.5 Assumptions and Dependencies

The following assumptions and dependencies affect the requirements specified in this document. Changes to these factors may necessitate revision of system requirements.

2.5.1 Assumptions

- **Network Infrastructure Stability:** The university maintains a stable campus network infrastructure with adequate bandwidth to support mobile application usage by 1000 concurrent users.
- **User Authentication Management:** User authentication credentials (usernames, passwords) are managed by the university authentication system or can be securely stored in the CMTS database.
- **User Device Compatibility:** All users possess smartphone devices (iOS version 12.0 or higher, or Android version 8.0 or higher) capable of running modern mobile applications.
- **UI and Taxonomy Approval:** The Requirement Provider shall provide final approval of user interface designs and complaint category taxonomy by Sprint 6 (Month 3).
- **Operator Training:** System Operators (administrative staff) shall receive training on system operation prior to production deployment.
- **Hosting Infrastructure Availability:** The university IT department shall provide hosting infrastructure and database server access by Sprint 10 (Month 5).

- **Financial System Independence:** The complaint resolution process does not require integration with financial systems or procurement workflows.

2.5.2 Dependencies

- **Authentication System Specification:** Final system requirements depend on the university providing technical specifications for the authentication system (e.g., LDAP schema, API endpoints, or alternative authentication methods) by Sprint 4.
- **Complaint Category Taxonomy:** The complete list of complaint categories and subcategories shall be provided by the Requirement Provider by Sprint 5.
- **Personnel Directory Access:** User profile information population depends on access to the university personnel directory or provision of user data exports by Sprint 4.
- **Mobile App Store Accounts:** Deployment to the iOS App Store and Google Play Store depends on the university providing appropriate developer accounts or approval for student team accounts by Sprint 13.
- **Hosting Infrastructure Provisioning:** Production deployment depends on timely provisioning of server infrastructure, database instances, and network configuration by the university IT department.
- **Third-Party Libraries:** The system depends on the continued availability and compatibility of selected open-source libraries and frameworks.

- **Requirement Provider Availability:** Sprint reviews and requirement clarifications depend on bi-weekly availability of the Requirement Provider as stipulated in the project proposal agreement.
- **Testing Device Availability:** Comprehensive testing depends on the availability of diverse iOS and Android devices for compatibility validation.

Chapter 3

Specific Requirements

3.1 Functional Requirements

3.1.1 User Authentication

3.1.1.1 User Login

Introduction

The system shall verify users (students, faculty, and staff) with the help of university-generated credentials via the mobile application interface.

Inputs

- The user shall give the system a university-assigned username.
- The user shall be required to enter a university-issued password into the system.
- The system shall support a preference of Remember Me.

Processing

- The system shall authenticate the credentials typed in by the system with either the university authentication system or the stored user records.
- The system shall pull out the role of the user (Student, Faculty, Staff) out of the database.
- The system shall access the department and profile data of the user.
- The system shall capture the time of the login and the device details.
- The system shall freeze the account after five failed attempts to log in.

Outputs

- The system shall redirect the user to the mobile app home screen once he/she has successfully logged in.
- Information about the users (name, role) shall be shown on the home screen.
- The system shall show invalid credentials error message.
- The system shall show the lockout message when the account is temporarily locked and should contact the IT support.

3.1.1.2 Logout

Introduction

The system shall enable users to log out the mobile application in a safe manner.

Inputs

- The user shall provide a log out request to the system.

Processing

- The system shall wipe off any stored user information on the device.
- The system shall log out the time.

Outputs

- The system shall redirect the user to the login screen.
- The system shall show a confirmation message.
- The system shall erase any sensitive information on the device memory.

3.1.2 Complaint Submission

3.1.2.1 View Department List

Introduction

The system shall provide a list of each active department to users to enable them choose a department to file complaints.

Inputs

- The system shall identify the request of the logged-in user to form a new complaint.
- The system shall accept a search query to narrow down on departments, optionally.

Processing

- The system shall extract all the departments that are open in database.
- The system shall automatically order the departments in alphabetical order.
- Departments shall be filtered according to search query provided the system.
- The system shall show the number of departments to the user.

Outputs

- The system shall show a list of active departments that is scroll-able.
- The system shall contain department name and brief description of each department.
- The system shall show search results in case search query was entered.
- In the case of absence of any search results, the system shall show No departments found.

3.1.2.2 Select Complaint Tracker

Introduction

The system shall enable the users to choose a particular tracker (complaint category) in the selected department.

Inputs

- The system shall take a selection of a department.
- The system shall take a search query optionally to filter trackers.

Processing

- The system shall bring all the active trackers that belong to the chosen department.
- The system shall categorize trackers either by relevance or in an alphabetical manner.
- The system shall be able to filter trackers according to search query provided.
- The system shall be loaded with tracker descriptions and requirements.

Outputs

- It shall show a list of available trackers to the chosen department.
- The system shall enable the user to choose a tracker to continue.

3.1.2.3 New Complaint

Introduction

The system shall enable users to add and file a new complaint with all the necessary information.

Inputs

- The user shall be allowed to input a complaint subject/title into the system (compulsory, limited to 200 characters).
- The system shall receive a detailed description of the complaint (compulsory, 2000 characters maximum).
- The system shall accommodate the choice of priority levels (Normal, High, Urgent).
- The system shall take room number (not mandatory, with a limit of 50 characters).
- The system shall take estimated preference (option, in hours/days) of resolution time.
- The system shall be open to file attachments (not compulsory, maximum 5 files, 2MB each).
- The system shall receive camera (non-obligatory, up to 5 photos) photos.
- Photos in the gallery (Optional, 5 photos) shall be accepted in the system.

Processing

- The system shall ensure that all the necessary fields are complete.
- The system shall ensure that subject length is not more than 200 characters.
- The system shall ensure that there is no more than 2000 characters of description.

- The system shall authenticate file attachments based on size (not more than 2MB each) and file type (images: JPG, PNG).
- The system shall compress images when they are bigger than the size limit even when they are readable.
- The system shall create a distinct id of complaint.
- The status of default shall be established as New.
- The system shall fix the date of complaint raised as the current timestamp.
- The system shall identify the complainant with the user who has logged in.
- All the data on complaints shall be stored in the database.
- The system shall upload and save file attachment to file storage system.
- The system shall give alert to system administrators regarding new complaint.

Outputs

- The system shall show a successful message including the created complaint ID.
- The system shall show the complaint created in the user complaint list.
- The system shall redirect the user to the complaint details page.

- There shall be error messages indicating failures of validation in the system.

3.1.2.4 Capture Photo from Camera

Introduction

The system shall enable the user to take pictures directly through the device camera when they are making a complaint.

Inputs

- The system shall respond to the request of the user to take photo.
- The device shall be asked by the system to give permission to the camera.
- The system shall be able to receive camera obtained photo.

Processing

- The system shall verify whether permission to the cameras is approved.
- The system shall enter into the native camera interface of the device.
- The system shall authenticate the photo format it has been captured in.
- The system shall compress the photo in case it is bigger than 2MB.
- The system shall generate a preview in the form of a thumbnail.

- Until the complaint is made, the photo shall be stored temporarily by the system.

Outputs

- The interface of a camera shall be shown in the system.
- The system shall show a preview of the photo that has been taken.
- An option to retake or use the photo shall be displayed in the system.
- The system shall include the photo on the list of the complaint attachments.
- The system shall show error message when the permission of the camera is denied.
- This system shall be showing error message in case photo capture is not successful.

3.1.2.5 Select Photos in Gallery

Introduction

The system shall enable a user to choose some of the photos already stored in the device gallery when making a complaint.

Inputs

- The system shall be able to identify request of user to pick photos in gallery.
- The device shall be requested to access/store photos on the system.

- The system shall not reject the chosen photos in gallery.

Processing

- The system shall be used to verify whether storage/photo permission is allowed.
- The system shall open the photo picker interface of the device.
- The system shall support the possibility of choosing several photos (a total of 5 including camera photos).
- The system shall authenticate the photo formats (JPG, PNG).
- The system shall authenticate every photo size (max 2MB).
- The system shall reduce the size of photos beyond the size limits.
- The system shall generate previews in form of thumbnails.
- Photos shall be temporarily stored in the system till when a complaint is made.

Outputs

- The photo picker interface shall be shown on the system.
- The system shall show the thumbnails of photos picked.
- The system shall show the number of photos (e.g. 3 out of 5 photos are chosen).

- In case of denying permission, the system shall show the error message.
- Where photo limit is crossed, the system shall show error message.
- The system shall show error message in case of invalid files forms or size.

3.1.3 Tracking and Management of Complaints

3.1.3.1 Functional Requirement: View My Complaints

Introduction

The list of all complaints given by the logged-in user shall be shown in the system.

Inputs

- The system shall identify the identifier of the logged in user.
- The system shall be optional in terms of taking filter criteria (status, priority, date range).
- The system shall be able to receive optional sort preferences (date, priority, status).

Processing

- The system shall extract all the complaints posted by the user out of the database.
- Applied filters in the system shall be used.

- The system shall classify complaints according to user choice (default to be the latest).
- The system shall load information about complaints (summary) (ID, subject, status, priority, date).
- The system shall involve the total number of complaints, pending complaints, and resolved complaints.

Outputs

- The system shall show a list of complaints of the user that can be scrolled.
- The system shall show complaint ID, subject, badge of status, badge of priority and the date of complaint submission of a complaint.
- The system shall be color-coded in terms of status (e.g., blue New, yellow In Progress, green Resolved).
- Status icons shall be displayed in the system to be identified quickly.
- The system shall show total numbers on the top (e.g. 12 Total 5 Pending 7 Resolved).
- In case the user does not have complaints, the system shall show No complaints found message.
- The system shall support pull-to-refresh which shall refresh the list.
- The system shall enable the user to tap on any complaint so as to see the comprehensive details.

3.1.3.2 View Complaint Details

Introduction

The system shall be showing all details of a chosen complaint.

Inputs

- The system shall take in a complaint ID by the user.

Processing

- The database shall be contacted to retrieve all the complaint data in the database.
- Associated department and tracker information shall be retrieved by the system.
- The system shall be able to get all status change history.
- All comments and updates shall be retrieved by the system.
- All the files and photos attached shall be retrieved by the system.
- The system shall confirm user authorization to the view of the complaint.

Outputs

- ID of the complaints shall be boldly written on the top of the system.
- The system shall include the complaint subject/title.
- There shall be visual indicator of current status on the system.

- Priority level shall be shown as color coded in this system.
- The system shall portray information of department and tracker.
- The system shall show room number where necessary.
- The system shall show description of complaints in full text.
- The system shall show submission time and date.
- The system shall indicate information of assigned handlers provided they are there.
- The resolution time shall be estimated and displayed in the system in case it is set.
- The system shall show all the photos attached in the form of scroll-able thumbnails.
- The system shall include the viewing of all attached files as downloadable links.
- Full status change timeline/history shall be shown on the system.
- All the comments and updates shall be shown chronologically in the system.
- The system shall have the facility of adding comments or other information.

3.1.3.3 Filter Complaints by Status

Introduction

The system shall permit the users to filter their complaints based on their status (New, In Progress, Resolved, Rejected, etc.).

Inputs

- The system shall receive status filter choice by the user.
- The system shall allow several status choices at the same time.

Processing

- The system shall accept and retrieve complaints that correspond to the desired status(s).
- The system shall have other active filters in case.
- The system shall record the number of complaints.

Outputs

- The system shall show filtered list of complaints.
- The system shall show number of complaints filtered.
- The system shall include an alternative of clearing filters.
- In case filter does not find any results, the system shall show No complaints found.

3.1.3.4 Filter Complaints by Priority

Introduction

The system shall enable the users to filter their complaints on the basis of priority level (Normal, High, Urgent).

Inputs

- The system shall be accepting priority filter choice by the user.
- The system shall receive several priority choices at the same time.

Processing

- The system shall extract complaints that are of a corresponding level of priority(s) chosen.
- The system shall have other active filters as it may or may not have.
- The system shall refresh the number of complaints.

Outputs

- Lists of filtered complaints shall be shown on the system.
- The system shall show number of complaints filtered.
- The system shall show filter badges that are in use.
- An option to clear filters shall be given in the system.

3.1.3.5 Date-range Filter Complaints

Introduction

The system shall enable the users to narrow down their complaints according to date of submission.

Inputs

- The user shall feed in start date in the system.
- The system shall accept end date as inputted by the user.
- The system shall have fast filter features (Today, This Week, This Month, Last 3 Months).

Processing

- The system shall ensure that end date must not be earlier than the start date.
- The system shall be able to fetch the complaints within the date range that is selected.
- Other active filters shall be maintained in the system.

Outputs

- The system shall show date picker interface.
- The system shall have the quick filter buttons of popular date ranges.
- The system shall show sifted complaints list.
- The system shall show the date range that is chosen.
- The system shall offer an option of clearing the date filter.

3.1.3.6 Search Complaints

Introduction

The system shall permit the user to search the complaints using a keyword either in subject or description.

Inputs

- The system shall receive search key terms on the part of the user.

Processing

- The system shall also query the complaint subjects with keywords (case insensitive).
- The system shall scan complaint description with similar keywords (insensitive to case).
- The system shall access any similar complaints.
- The system shall be in ranking relevance results.

Outputs

- The system shall show a search bar on the top of complaints list.
- The system shall show similar complaints as entered by the user (live search).
- The system shall indicate the similar keywords in the results.
- The system shall show number of search results.
- The system shall show No results found in case no matches are found in search.
- The system shall have the clear search option.

3.1.3.7 Sort Complaints

Introduction

The system shall enable the user to categorize his or her complaints depending on various criteria.

Inputs

- The system shall allow the selection of sort criterion (Date - Newest First, Date - Oldest First, Priority - High to Low, Status).

Processing

- The system shall rank the list of complaints by choice.
- The system shall have active filters during the sorting.

Outputs

- The system shall show sorting options (dropdown or bottom sheet).
- The system shall present list of complaints sorted.
- The system shall show the sort criterion that is in use.
- The system shall uphold preference of sorting to the session.

3.1.4 Communication and Updates

3.1.4.1 Add Comment to Complaint

Introduction

The system shall enable the users to post comments or other information to their complaints.

Inputs

- A complaint ID shall be accepted by the system.
- The system shall take up comment text whereby the user can combine 1000 characters (maximum).
- The comment shall be optional in accepting file attachments hidden in the system.

Processing

- The system shall check that it has the comment text that is not empty.
- The system shall authenticate the comment length (up to 1000 characters).
- File attachments that are provided must be validated by the system.
- The system shall save the comment in the database that shall be linked to the complaint.
- The system shall retain comment timestamp and information of the author.
- The system shall provide notification to system administrators of new comment.

Outputs

- A comment input box on the details page of the complaint shall be brought out within the system.

- The system shall show the newly added comment at once on the comments box.
- The system shall show the comment with the date of the comment and author signifier of You.
- A success message shall be shown in the system as Comment added.
- The system shall show error messages to failures in validation.

3.1.4.2 View Complaint Comments

Introduction

The system shall show all the updates and comments about a complaint in chronological order.

Inputs

- Complaint ID shall be accepted by the system.

Processing

- The system shall extract all the comments of the complaint in the database.
- The system shall also access messages about system generated status updates.
- The system shall list all the comments and updates in a chronological order (oldest or latest according to the desire of the user).
- Each comment shall load the author information in the system.

Outputs

- The system shall show the entire comments in a scroll able form.
- The system shall show the comments including their author, role, date and comment.
- The system shall show you in case of comments left by the logged-in user.
- The system shall show system administrator or the role name of the comments of the admins.
- Attached files or photos in comments shall be displayed in the system.
- In case there are no comments, the system shall show No comments yet.

3.1.4.3 View Attachments

Introduction

The system shall enable the users to access and download complains photos and files that are attached.

Inputs

- The system shall receive a file/ photo choice of the user.

Processing

- The file shall be accessed in the storage.
- The system shall check on user authorization to access file.

- System shall identify the type of file (image, PDF, or so on).

Outputs

- The system shall have image thumbnails in a horizontal scroll able gallery.
- Images shall be opened in full-screen viewer once tapped on the system.
- The system shall enable swiping through different pictures.
- The system shall be able to offer file download to device option.
- The system shall show file name and file sizes.
- In case there is an error in loading file, the system shall show an error message.

3.1.4.4 Receive Push Notifications

Introduction

The system shall send push alerts to user whenever there is a significant update on complaints.

Inputs

- The system shall track the changes in complaint status..
- The system shall identify resolving of complaints.
- The system shall identify assignment of complaints.

Processing

- It is the system that shall produce suitable notification message depending on the type of event.
- The system shall indicate the owner of the complaint (user who posted it).
- The system shall be used to push notification to the registered devices of the user.
- The system shall retain notification in the notification history of the user.

Outputs

- The system shall provide push notification on the device of user with:
  - Title of the notification (e.g., Complaint Update, Complaint Resolved)
  - Short message (e.g., "Your complaint title 12345 has changed its status to In Progress)
  - Complaint ID
- The system shall either make notification sound/vibration depending on device settings.
- When the notification is tapped, the system shall open the details of the particular complaint.
- Count of notification badges on app icon shall be indicated in the system.

3.1.4.5 View Notifications List

Introduction

The system shall show a list of the received notifications by the user.

Inputs

- The system shall be able to identify the request made by the user to access notifications.

Processing

- The system shall get all the notifications of the user that is logged in.
- All notifications shall be sorted into date (newest first).
- The system shall indicate notifications as read upon viewing.

Outputs

- The system shall also show a scroll-able list of notifications.
- Each notification shall be shown in the system with notification icon, text, and time.
- The system shall make a differentiation between read and unread notices (vowel text or visual mark on unread).
- The system shall also provide relative timestamps (e.g., 2 hours ago, Yesterday, Jan 15).

- The system shall enable user to touch on notification to display related complaint.
- In case of empty list, the system shall show No notifications message.
- The system shall be able to feature option to mark all as read.
- The system shall give an option of notifying the old notifications.

3.1.5 Feedback and Rating

3.1.5.1 Prompt for Feedback

Introduction

The system shall automatically remind the users to leave feedback when their complaint has been indicated that it has been resolved.

Inputs

- The system shall recognize the status change of complaint to resolved or accepted or closed.
- The system shall identify the owner of complaint.

Processing

- This system shall ensure that this complaint has not been submitted in the form of feedback.
- The system shall produce a notification of feedback request.

- The system shall provide push notification to the user.
- Feedback shall be shown on the app as part of the system.
- A reminder on the system shall be activated to remind again after 48 hours in the event of no feedback being made.

Outputs

- The system shall send push notification containing the message: Your complaint number 12345 is resolved. Please provide feedback."
- The system shall have a feedback banner on the complaint details page.
- A clear button of Provide Feedback shall be shown in the system.
- On button tap, the system shall open the feedback form.

3.1.5.2 Submit Complaint Feedback

Introduction

The system shall enable the users to leave feedback and rating on complaints that were resolved.

Inputs

- The system shall receive a complaint ID.
- The system shall accommodate the overall satisfaction rating (1-5 stars).
- Ratings of certain aspects may be accepted in the system:

  - Response Time (1-5 stars)
  - Quality of Communication (1-5 stars)
  - Resolution Quality (1-5 stars)
- The system shall welcome voluntary text feedback/comments (up to 500 characters).

Processing

- The system shall authenticate that overall rating is given (compulsory).
- The system shall authenticate the text feedback length in case it is given.
- The system shall capture feedback in the database that is related to the complaint.
- The system shall indicate the complaint as feed back.
- The ratings shall be updated system analytics by the system.
- The system shall alert the administrators on feedback postings (particularly, low ratings).

Outputs

- The feedback form shall be shown in the system containing:
  - Star rating interface in general satisfaction.
  - Rating interfaces of particular aspects.
  - Text input box of further remarks.

– "Submit" button

- The system shall give visual feedback upon tapping stars (highlight selected stars).
- The system shall show the number of characters to be used in text feedback (e.g., 250/500 characters).
- Success message shall be displayed on the system: Thank you, your feedback. after submission.
- The feedback prompt shall be concealed in the system upon submission.
- The system would present the feedback submitted on complaint details page.

3.1.5.3 View Submitted Feedback

Introduction

The system shall enable the users to see the feedback they have already made in complaints that have been resolved.

Inputs

- The system shall receive an ID of complaint.

Processing

- The system shall get feedback data of the complaint.
- The system shall ensure the existence of feedback.

Outputs

- The system shall provide feedback section on details of complaint page with:
  - Cumulative rating in form of stars.
  - Ratings on specific aspects in form of stars.
  - Text feedback/comments
  - Submission date
  - "Your Feedback" header
- In the case where there is no feedback, the system shall show Feedback not provided yet.
- The system shall provide the opportunity to edit a feedback within 7 days of receiving it.

3.1.6 User Profile

3.1.6.1 View User Profile

Introduction

The system shall show the profile information of the user who is logged in.

Inputs

- The system shall identify the request of the user to access profile.

Processing

- The system shall load user profile information in the database.
- The system shall calculate the statistics of user complaints.

Outputs

- The system shall show profile screen having:
  - User's full name
  - University user number
  - Department
  - Email address (where system available)
  - Account creation date
  - Complaint statistics:
    - Total complaints submitted
    - Active complaints
    - Resolved complaints
    - Average resolution time
- The system shall show the profile image of a blank picture, or an icon.
- The system shall have an Editing button to do the editable fields.

3.1.6.2 View Complaint Statistics

Introduction

The system shall show statistics regarding complaint history and the history of resolving the complaints submitted by the user.

Inputs

- The system shall identify the request of user to see statistics.

Processing

- The system shall provide an access to all complaints of the logged user.
- Statistics shall be calculated in the system:
  - Total complaints submitted
  - Status complaints (New, In Progress, Resolved, Rejected, etc.)
  - Priority (Normal, High, Urgent) complaints.
  - Average resolution time
  - Fastest resolution time
  - Longest resolution time
  - Means of satisfaction rating awarded.
  - The most popular complaint trackers.

Outputs

- The system shall show statistics dashboard that contains:
  - Overview cards indicating essential indicators.
  - Timeline of the trend of complaint submissions with time.
  - The average resolution time indicator.
  - Summary of satisfaction ratings.
- The system shall enable filtering of statistics according to date.
- The system shall offer alternative to export statistics report.

3.1.7 Offline Functionality

3.1.7.1 Network Status Detection

Introduction

The system shall be constantly checking the presence of network connections and alert users.

Inputs

- The system shall observe the status of network connection of the devices.

Processing

- The system shall identify the loss of network connection.
- The system shall be able to tell when network connection is re-established.
- The system shall feed UI indicators on network status.

Outputs

- The system shall show a connection status (e.g. banner or icon).
- When there is no network, the system would show the indicator Offline.
- The system shall notify by showing On line confirmation on restoration of connection.
- The system shall be able to switch color or grayscale when not working.

3.1.8 App Settings and Help

3.1.8.1 Access App Settings

Introduction

The system shall offer a settings screen whereby users shall be able to set the preferences of the app.

Inputs

- The system shall identify the request of the user to get settings.

Processing

- The system shall get existing app settings and preferences.
- The system shall categorize settings.

Outputs

- The system shall show settings screen that has categories:
  - Display (theme, text size)
  - Privacy (use of data, cache records)
  - Contact (help, report an issue, terms)
  - Help and Support (Frequently Asked Questions, technical support)
  - Logout
- The system shall also have toggle switches and a choice of each setting.
- The system shall be able to implement changes as soon as it is clicked on or clicked on Save.

3.1.8.2 View Help and FAQs

Introduction

The system shall have assistance documentation and frequently asked questions to users.

Inputs

- The system shall identify the request of a user to see help content.

Processing

- The system shall fetch the help content and FAQs either in the local storage or server.
- The system shall classify the content into categories.

Outputs

- The system shall show help screen that contains:
  - Getting Started guide
  - How to submit a complaint
  - Status of complaints: How to keep track.
  - Recording complaint statuses.
  - How to provide feedback
  - Support contacts
  - Support contact information
  - Frequently asked questions which are expandable.
- The system shall offer search through in help contents.

- The system shall enable the users to access support directly through help screen.

3.1.9 Handling of errors and guidance to the user

3.1.9.1 Display User-Friendly Error Messages

Introduction

Error messages shall be presented in a clear and easy-to-use manner in case of problems with the system.

Inputs

- The system shall identify errors whenever any operation is being conducted.

Processing

- The system shall determine the nature and reason of mistake.
- The system shall give relevant user-friendly error message.
- The system shall record the details of technical errors to be used in debugging.

Outputs

- The system shall provide error messages which:
  - Discuss in simple terms what went wrong.
  - Provide practical recommendations to eliminate the problem.
  - Avoid technical jargon

  - appropriate icons (warning, error) should be used.

- Examples:
  - "Unable to submit complaint. Please have a look at your internet connection and try again.
  - "File size too large. Please pick a smaller image of less than 2MB.
  - "Something went wrong. Error: Please try later.

3.1.9.2 Validate User Input

Introduction

The system shall authenticate anything that is entered by a user in real time and give immediate feedback.

Inputs

- The system shall scan user entry in every field of form.

Processing

- The system shall authenticate length, format and content in the form of user typing.
- The system shall use field-specific rules of validation.

Outputs

- The system shall show inline messages of validation right after fields.
- The system shall be color coded (red when there is an error or green when there is a correct input).

- The system shall not activate submit buttons until all the necessary fields are satisfactory.
- Examples:
  - Subject field: Required (unless empty)
  - Description field: 20 character min or 450/2000 character left
  - File upload: “File too large. Maximum size is 2MB”
- Red borders shall be displayed around invalid fields in the system.

3.1.9.3 Confirm Destructive Actions

Introduction

The system shall need to have confirmation with the user prior to implementing the destructive actions.

Inputs

- The system shall be able to identify the destructive action (delete draft, discard changes) initiated by the user.

Processing

- The machine shall stop the operation.
- Confirmation dialog shall be shown in the system.

Outputs

- Confirmation dialog shall be shown in the system and it shall show:
  - Action description and consequences are clear.
  - "Cancel" button (prominent)
  - "Confirm" button (red color)
- The action of the system shall take place only after explicit confirmation.

3.2 Performance Requirements

3.2.1 Static Numerical Requirements

3.2.1.1 Capacity Requirements

- Concurrent users: Minimum 500 without performance degradation
- Active sessions: Minimum 300 across all user roles
- Complaint records: 10,000 initial capacity
- File attachments: 50,000 images maximum
- User records: 1000 users (students, faculty, staff, administrators)
- Notification history: 10,000 records maximum

3.2.1.2 File Storage

- Individual attachment: 2 MB maximum
- Attachments per complaint: 5 files maximum
- Total storage capacity: 10 GB minimum, 100 GB maximum

3.2.1.3 Field Size Limits

- Complaint description: 2000 characters
- Complaint subject: 200 characters
- Comment text: 1000 characters
- Feedback text: 500 characters
- Room number: 50 characters

3.2.2 Dynamic Numerical Requirements

3.2.2.1 Normal Workload (per hour)

- Complaint submissions: 10 minimum
- Status queries: 20 minimum
- Push notifications: 10 minimum
- Feedback submissions: 20 minimum

3.2.2.2 Peak Workload (per hour)

- Complaint submissions: 50 minimum
- Status queries: 100 minimum

- Push notifications: 100 minimum
- Feedback submissions: 100 minimum

3.2.2.3 Response Time

- Login: 95% under 2 seconds
- Complaint submission: 95% under 5 seconds
- List retrieval: 95% under 3 seconds
- Search queries: 98% under 2 seconds
- Filter operations: 95% under 1 second
- Push notifications: Within 30 seconds of trigger event
- Image upload/compression: Under 10 seconds per image

3.3 Design Constraints

3.3.1 Hardware Limitations

3.3.1.1 Mobile Device Requirements:

- iOS: iOS 12.0+
- Android: Version 8.0
- RAM: 2 GB minimum
- Storage: 100MB for installation
- Screen: 4.7 inches minimum, 750x1334 pixels minimum
- Camera: 5MP rear-facing minimum
- Network: Wi-Fi or cellular

3.3.1.2 Mobile Memory Constraints:

- Application size: 150 MB maximum
- Runtime memory: 200 MB maximum
- Local cache: 50 MB maximum
- Temporary files: 20 MB maximum

3.3.1.3 Required Permissions:

- Photo gallery read/write access
- Camera access
- Network state access
- Push notifications

3.3.1.4 Server Hardware:

- Database server: 4 CPU cores, 8 GB RAM, 100 GB SSD
- Application server: 2 CPU cores, 4 GB RAM, 50 GB storage
- Network: 10 Mbps minimum bandwidth
- Compatibility: University firewall and proxy configurations

3.4 System Attributes

3.4.1 Security

3.4.1.1 Authentication

- Password: 8 characters minimum with uppercase, lowercase, and numbers
- Account lockout: After 5 failed login attempts
- Session timeout: 30 minutes of inactivity

3.4.1.2 Audit Logging

- All login attempts with timestamp, user ID, and device
- Complaint submissions with user ID, timestamp, and IP address
- Status changes with administrator ID, timestamp, and values
- Administrator data access with complaint IDs and timestamps
- Log retention: Minimum 2 years

3.4.1.3 Access Control

- Role-based complaint data access
- Students: Own complaints only
- Operators: Department-assigned complaints only
- Administrators: All complaints with logging

3.5 External Interface Requirements

3.5.1 User Interfaces

- Mobile application with separate dashboards for students, staff, and administrators
- Touch-optimized interface for smartphone interactions
- Screens: Login, registration, complaint submission, tracking, notifications, profile management

3.5.2 Hardware Interfaces

- Android smartphone camera for capturing complaint images
- Device storage for photo gallery access
- Network hardware (Wi-Fi or cellular) for connectivity

3.5.3 Software Interfaces

- Backend server for data processing and business logic
- Database management system for storing users, complaints, departments, and logs
- Push notification services for alert delivery
- University authentication system (LDAP/Active Directory) for user verification
- University personnel directory for user information retrieval

3.5.4 Communications Interfaces

- Active internet connection required (Wi-Fi or mobile data)
- Secure protocols for data transmission
- Push notification delivery through mobile notification services

3.6 Other Requirements

3.6.1 Database Requirements

3.6.1.1 Core Data Elements:

- **Users:** ID, registration number, name, email, department, role, timestamps, device tokens, account status
- **Complaints:** ID, subject (200 char), description (2000 char), department ID, tracker ID, priority, status, room number (50 char), resolution time, timestamps, user IDs, feedback flag
- **Attachments:** ID, complaint ID, filename, type (JPG/PNG), size, path, timestamp, user ID
- **Comments:** ID, complaint ID, text (1000 char), author ID, timestamp, attachment IDs
- **Feedback:** ID, complaint ID, ratings (1-5 stars: overall, response time, communication, resolution), text (500 char), timestamps
- **Notifications:** ID, user ID, complaint ID, type, title, timestamps

- **Departments:** ID, name, description,
- **Trackers:** ID, department ID, name, description

3.6.1.2 Access Frequency

- Very high: Complaints, notifications (hundreds per hour)
- High: Users, attachments (dozens per hour)
- Medium: Comments (tens per hour)
- Low: Feedback (tens per day), departments, trackers (occasional)

3.6.1.3 Data Retention

- Active: Current year + 2 years for complaints, 90 days for notifications
- Archived: 5 years minimum for complaints older than 2 years
- Deletion: User data within 30 days of request; temporary files after 24 hours; session data on expiration; notifications after 90 days

3.6.1.4 Backup

- Full backup: Weekly (Sunday 2 AM)
- Incremental: Daily (2 AM)
- Transaction logs: Hourly
- Retention: 30 days minimum

3.6.2 Operations

3.6.2.1 User Operations

- 24/7: Login/logout, complaint tracking, comments, feedback, profile management
- Complaint submission: Accessible 24/7, monitored during business hours

3.6.2.2 Administrator Operations

- Business hours (8 AM - 5 PM, Mon-Fri): Complaint review/assignment, reports, user management
- 24/7: Urgent complaint status updates

3.6.2.3 Data Processing

- Real-time: Input validation, image compression, timezone conversion
- Event-triggered: Status change notifications, feedback analytics updates

3.6.2.4 System Monitoring

- Continuous: Server health (CPU, memory, disk), database performance, network connectivity, user sessions, application errors
- Monthly: Index usage analysis, storage capacity planning

Chapter 4

Appendixes

All diagrams and visual models (Context Diagram and Use Case Diagram) have been integrated into Chapter 2: General Description to maintain better flow and readability. No additional appendix material is required at this stage of the project.