

CS351 - Software Engineering

Hostel Management System

A report submitted for the Software Engineering Course

Project

by

Kancharla N V L Durga Mahitha, 211113

Katepalli Sri Sai Snigdha, 211114

Kavuluru Lakshmi Srinidhi, 211117

Course Faculty

Dr. Anoop Jacob Thomas



**COMPUTER SCIENCE AND ENGINEERING
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
TIRUCHIRAPPALLI
TIRUCHIRAPPALLI – 620012.**

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I Project Description

1 Project Overview

The Hostel Management System is a user-friendly web platform that centralizes all aspects of hostel administration, including room allocation, facility management and complaint resolution. By digitizing these processes, it enhances efficiency, reduces manual errors, and provides real-time data accessibility to hostel administrators, students, and staff, ultimately improving the overall management experience.

2 The Purpose of the Project

Content

The hostel management system addresses challenges in manual room allocation, manual room vacation, paperwork for permission to go out of campus, and record-keeping for complaint resolution. It offers a digital solution to streamline these processes efficiently.

Motivation

The motivation behind the system lies in the need to automate hostel administration, reduce errors, and improve operational efficiency.

Considerations

Inefficient hostel management processes pose significant problems, leading to errors and delays. Solving these issues is crucial to enhance campus management, and student satisfaction in institute.

3 The Scope of the Work

The scope of the hostel management project encompasses the development of a comprehensive system to streamline various administrative tasks and facilitate smooth operations within a hostel or student accommodation environment.

3a Goals of the Project

The project aims to achieve:

- ☐ Enhanced Efficiency: The main goal of this project is to streamline hostel management processes to reduce administrative burdens and optimize the process.
- ☐ Enhanced User Experiences: By providing a user-friendly interface, the system aims to bridge communication gaps between warden, students, and faculty-in-charge to interact and share information effortlessly.

- Real-time Monitoring: Enable real-time monitoring of hostel occupancy, complaint resolution, and maintenance requests for better decision-making.
- Comprehensive Complaint Resolution: Implement a platform for students to submit complaints related to hostel facilities or other issues. Administrators should be able to view and respond to complaints, tracking the progress of resolution until the complaint is resolved satisfactorily.

3b Work Partitioning

It is necessary to gather requirements for discrete sections of the work. This requires us to partition the work, and listing events is the most convenient, consistent, and natural way to break the work into manageable units.

The event list includes the following elements:

- Event name
- Input from adjacent systems (identical with name on context diagram)
- Output to adjacent systems (identical with name on context diagram)
- Brief summary of the use case

EVENT LIST:

| Event name | Input | Output | Summary |
|--------------------------------|----------------|-----------------|---|
| Room Management System: | | | |
| Create Room | Admin | Database update | Admin adds a new room to the hostel with details such as room number, capacity, and facilities. |
| Delete Room | Admin | Database update | Admin removes a room from the hostel, updating the database accordingly. |
| Allocate Room | Admin, Student | Database update | Admin assigns a room to a student, updating the database and notifying the student about their room assignment. |
| Update Room Details | Admin | Database update | Admin modifies room details such as capacity, facilities, or availability, reflecting changes in the database. |

| | | | |
|--|----------------------|--|--|
| Permission Management System: | | | |
| Submit Permission Request | Student | Database update | Student submits a request for permission to leave the campus, providing necessary details. |
| Review Permission Request | Admin | Database update | Admin reviews permission requests submitted by students, updating the database and notifying students about the status of their request. |
| Complaint Resolution System: | | | |
| Submit Complaint | Student | Database update | Student submits a complaint regarding hostel facilities or other issues, which is recorded in the database. |
| Resolve Complaint | Admin | Database update, Notification to student | Admin resolves a complaint, updating the database and notifying the student who submitted the complaint about the resolution. |
| User Profiles: | | | |
| View Profile | User (Student/Admin) | Profile details | User views their profile page, displaying personal details, room assignments, permission request history, and complaint status. |
| Authentication and Authorization: | | | |
| User Authentication | User credentials | Authentication status | User logs in to the system using their username and password, with the system verifying their credentials for authentication. |
| Role-based Access Control | User role | Access permissions | Based on the user's role (student, admin), the system grants appropriate access permissions to functionalities within the application. |

4 Stakeholders

4a The Client

The Hostel Management body in the college administration is the client for the project.

The Hostel Management Committee oversees the operations and management of the hostel facilities. They are the primary investors in the hostel management system and have the final say on its acceptance. Their satisfaction with the delivered product is crucial for project success.s

4b The Customer

The customers are the students residing in the hostel and the hostel administration staff.

4c User Participation

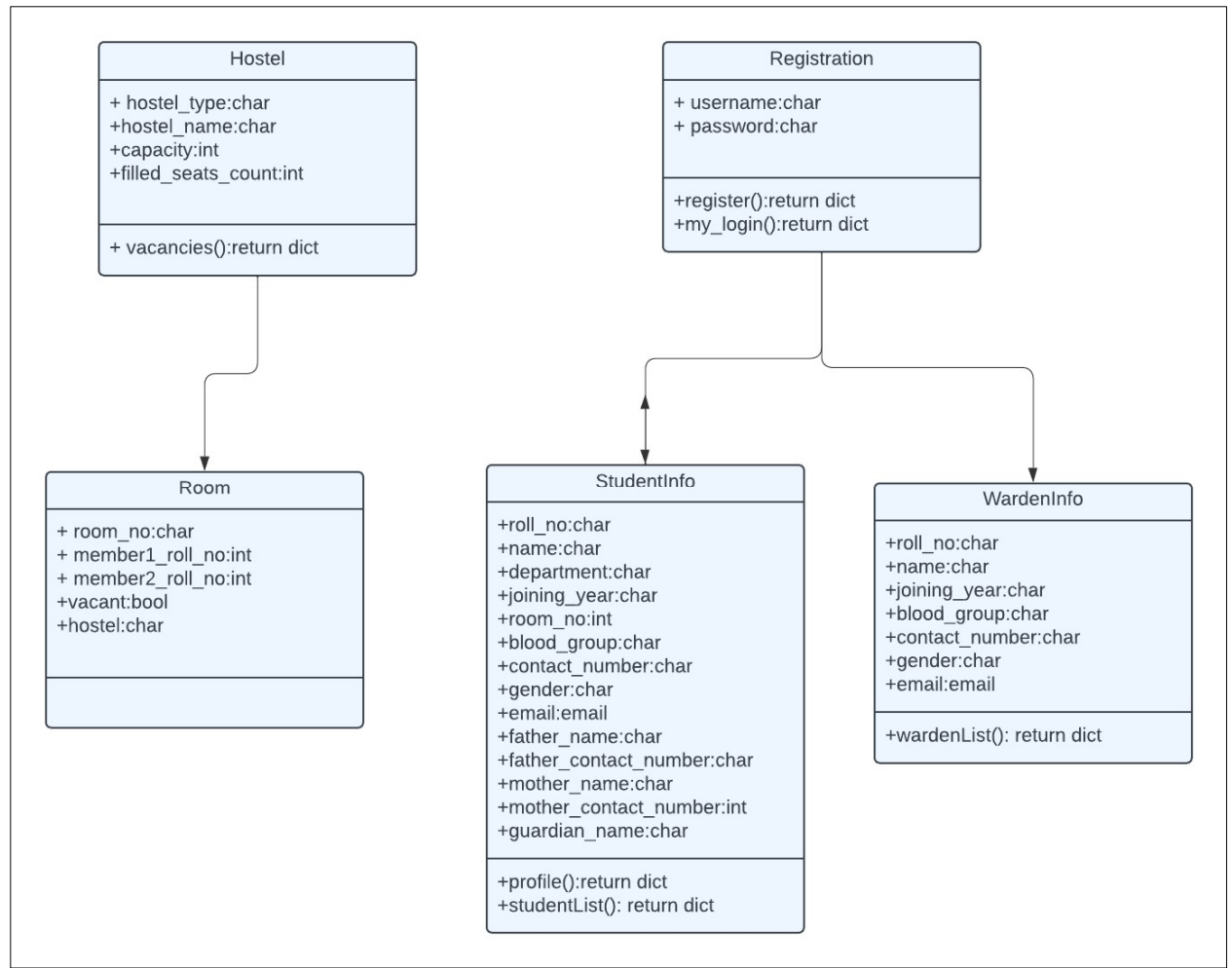
- Students: Active participation required for providing feedback on usability, submitting complaints, and testing functionalities during user acceptance testing. Minimum time commitment: 2 hours per week.
- Hostel Administration Staff: Active participation required for defining requirements, testing functionalities, and providing feedback on system improvements. Minimum time commitment: 4 hours per week.

4d Maintenance Users and Service Technicians

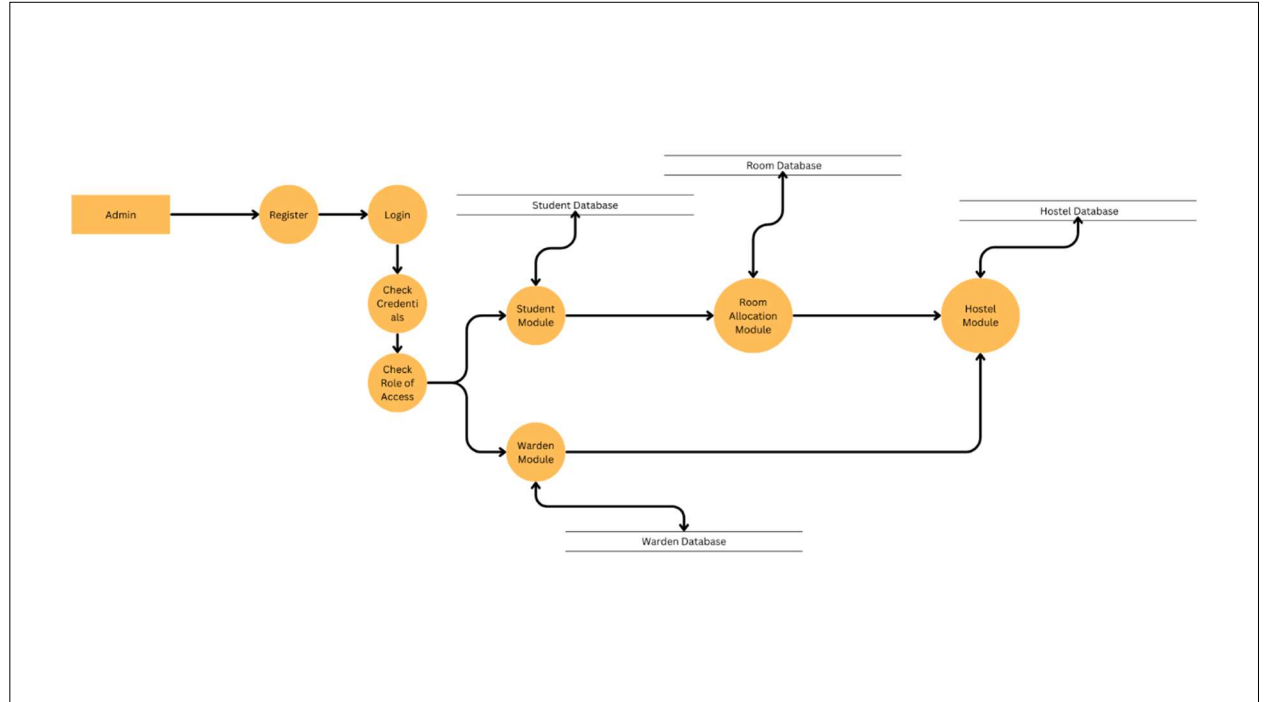
Maintenance Users are the Hostel maintenance staff, since they are responsible for maintaining and repairing hostel facilities.

5 UML & DFD

5a UML Diagram



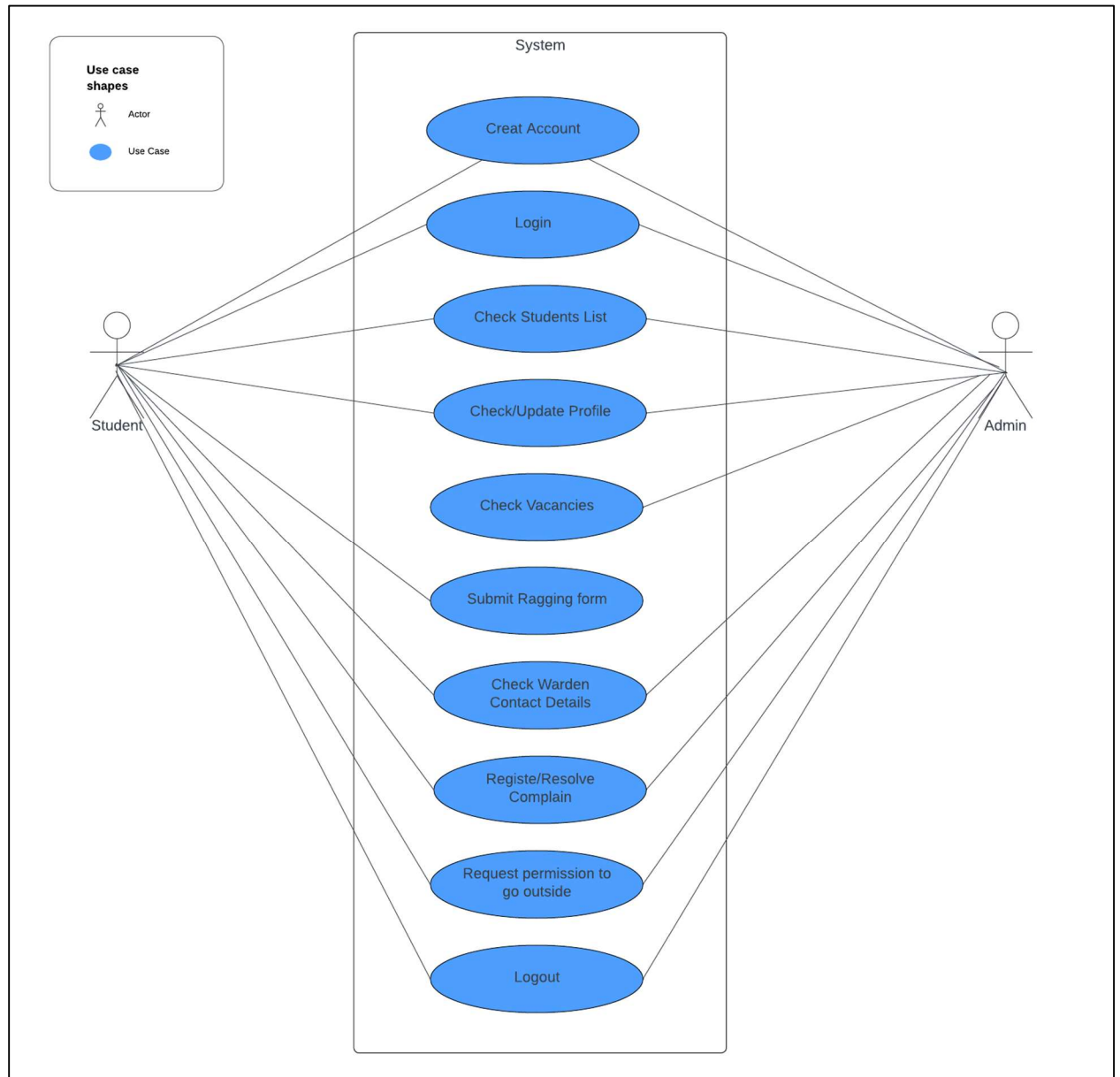
5b Dataflow Diagram



II Requirements

6 Product Use Cases

6a Use Case Diagram



7 Functional Requirements

➤ **Requirement FR-01:** Room Management

Description: The system shall allow administrators to manage hostel rooms, including creating, updating, and deleting room records.

Fit Criterion: An administrator should be able to add a new room, update existing room details, and delete rooms. The changes should reflect in the system's database.

➤ **Requirement FR-02:** Room Allocation

Description: The system shall allow administrators to allocate rooms to students.

Fit Criterion: An administrator should be able to assign a vacant room to a student. The student's room assignment should be updated in the database, and the room status should change from vacant to occupied.

➤ **Requirement FR-03:** Permission Management

Description: The system shall allow students to submit permission requests to leave the campus and administrators to review and respond to these requests.

Fit Criterion: Students should be able to submit permission requests through the system, and administrators should be able to view pending requests, approve or reject them, and provide comments if necessary. The status of permission requests should be updated accordingly, and notifications should be sent to students upon approval or rejection.

➤ **Requirement FR-04:** Complaint Submission

Description: The system shall allow students to submit complaints regarding hostel facilities or other issues.

Fit Criterion: Students should be able to submit complaints through the system, providing detailed descriptions of the issues. Complaints should be recorded in the system's database for further resolution.

➤ **Requirement FR-05:** Complaint Resolution

Description: The system shall allow administrators to review and resolve complaints submitted by students.

Fit Criterion: Administrators should be able to view pending complaints, investigate the issues, and provide resolutions. The status of complaints should be updated accordingly, and notifications should be sent to students upon resolution.

➤ **Requirement FR-06:** Profile Management

Description: The system shall allow users (students and administrators) to view and manage their profiles, including personal details, room assignments, permission request history, and complaint status.

Fit Criterion: Users should be able to access their profile pages, view personal details, room assignments, permission request history, and complaint status. They should also be able to update their personal information if necessary.

➤ **Requirement FR-07:** Authentication and Authorization

Description: The system shall provide secure authentication mechanisms for users to log in and access the system. Role-based access control shall be implemented to restrict functionalities based on user roles.

Fit Criterion: Users should be able to log in using their credentials, with the system verifying their authentication. Different functionalities should be accessible based on the user's role (student or administrator).

➤ **Requirement FR-08:** Database Management

Description: The system shall maintain a relational database using SQLite to store data related to hostel rooms, students, permissions, complaints, etc.

Fit Criterion: Data related to hostel rooms, students, permissions, complaints, etc., should be stored and retrieved accurately from the SQLite database. The database should support efficient data querying and manipulation operations.

➤ **Requirement FR-09:** User Interface

Description: The system shall provide a user-friendly interface using HTML, CSS, and JavaScript to facilitate ease of use for both administrators and students.

Fit Criterion: The user interface should be responsive and intuitive, compatible with various devices and browsers. It should allow users to navigate seamlessly through different functionalities of the system.

➤ **Requirement FR-10:** Documentation

Description: The system shall provide comprehensive documentation including requirements specification, design documentation, user manuals, and guides.

Fit Criterion: Documentation should be clear, organized, and up-to-date, assisting users in understanding the system functionalities and usage effectively.

8 Non-functional Requirements

➤ **Requirement NFR-01:** Performance

Description: The system shall be able to handle a minimum of 100 simultaneous users without a decrease in performance.

➤ **Requirement NFR-02:** Reliability

Description: The system shall have a system uptime of at least 99.9% per month, excluding scheduled maintenance.

➤ **Requirement NFR-03:** Security

Description: The system shall implement encryption mechanisms to secure sensitive user data, such as passwords and personal information.

➤ **Requirement NFR-04:** Usability

Description: The user interface shall be intuitive and easy to navigate.

➤ **Requirement NFR-05:** Compatibility

Description: The system shall be compatible with the latest versions of popular web browsers, including Google Chrome, Mozilla Firefox, and Safari.

➤ **Requirement NFR-06:** Scalability

Description: The system architecture shall be designed to scale horizontally to accommodate an increase in users or data volume without significant performance degradation.

➤ **Requirement NFR-07:** Maintainability

Description: The system shall be modularly structured and well-documented to facilitate ease of maintenance and future enhancements.

➤ **Requirement NFR-09:** Data Backup and Recovery

Description: The system shall implement regular automated backups of the database, with a recovery plan in place to restore data in the event of a system failure or data loss

9 User Requirements

STUDENT:

- Students should be able to view their assigned rooms and any room changes made by administrators.

- Students should be able to view and update their profile details, including personal information and contact details
- Students should be able to submit requests for permission to leave the campus, providing necessary details such as reason, date, and time.
- Students should be able to submit complaints regarding hostel facilities or other issues, providing detailed descriptions of the issues.

ADMINISTRATOR:

- Administrators should be able to manage hostel rooms, including creating, updating, and deleting room records.
- Administrators should be able to view and update their profile details, including contact information and administrative roles.
- Administrators should be able to review and respond to permission requests and complaints submitted by students.

10 System Requirements

10a Hardware Requirements:

1. Server:

- Minimum: Dual-core processor
- Minimum: 4GB RAM
- Minimum: 100GB HDD/SSD storage

2. Client Devices:

- Desktop/Laptops/Mobile:
- Any modern device with a compatible browser.

10b Software Requirements:

1. Server:

- Operating System: Linux (Ubuntu, CentOS) or Windows Server
- Web Server: Apache or Nginx
- Database: SQLite
- Python 3.x

- Django web framework

2. Client Devices:

- Any modern web browser (Google Chrome, Mozilla Firefox, Safari, Microsoft Edge)

10c Network Requirements:

1. Internet Connection:

- Required for accessing the system from remote locations.
- Minimum bandwidth: 2 Mbps for optimal performance.

11d Backup and Recovery Requirements:

1. Database Backup:

- Regular automated backups of the database to prevent data loss.
- Backup storage location separate from the primary server.

2. Disaster Recovery Plan:

- Procedures for restoring data from backups in the event of a system failure or data loss.
- Regular testing of disaster recovery procedures to ensure effectiveness.