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# DATABASE DESIGN DOCUMENT

for

## HostelDesk

Version 1.0

Prepared by

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# 1 Purpose

This Database Design Document for the Hostel and Mess allocation system establishes a target database management system identified from the analysis of the requirements of the software system, maintaining data consistency and integrity. The Entity-Relational model, thus created by analysing the use case diagram, is converted to a relational schema of the target Database Management System (DBMS).

## 1.1 Document Objectives

The Database Design Document has the following objectives:

1. To outline the software design and specification of the Hostel and Mess Allocation system database and the system architecture and components that users or system developers can access via a Database Management System.
2. To provide a fundamental approach for implementing the database and related software units, thus aiding in extracting details necessary for the application's software development.

## 1.2 Intended Audience and Document Overview

This document is written for the perusal of:

- Technical reviewers for assuring and evaluating the quality of the document.
- Architects whose overall architecture design must meet the requirements specified in this document.
- Designers whose design must meet the requirements specified in this document.
- Developers for implementing as per the software requirements specified in this document.
- Quality Assurance personnel for testing and validating the requirements given in this document.

The next section of the document, Assumptions and Constraints, explains certain preconceived notions and conditions that are assumed to be true. Constraints elucidate limitations such as user restrictions, proof of actions, etcetera.

The third section - Database wide design, focuses on describing the system's behaviour, explaining the significant roles/actions along with the details of the DBMS platform, security requirements, performance and availability decisions.

The fourth section, Database Administrative Functions, displays the Entity-Relationship Model created, the relational schema formed from the ER diagram with the normalization and data formats details.

### 1.3 Definitions, Acronyms and Abbreviations

S.No	ABBREVIATION/TERM	DEFINITIONS
1	SRS	Software Requirements Specifications
2	NITC	National Institute of Technology, Calicut
3	HostelDesk	Hostel and Mess Allocation System
4	User	A student of NITC, Hostel Administrators, Hostel Managers, Mess Managers
5	Administrators	Super Admin of the system
6	DBMS	Database Management System
7	1NF	First Normal Form
8	2NF	Second Normal Form
9	3NF	Third Normal Form

## **2 Assumptions**

### **2.1 Assumptions**

1. The hostel and mess authority consists of three independent bodies: Administrator, Hostel Manager and Mess Manager.
2. The Administrator has the right to appoint the Hostel Manager and assign him as the hostel incharge.
3. The Administrator has the right to appoint the Mess Manager and assign him the mess incharge.
4. A Hostel Manager manages only one hostel.
5. A Mess Manager manages only one mess.
6. Students can apply for rooms by giving preferences; rooms will be allocated sequentially based on their requirements.
7. Students can apply for the mess by giving preferences, and the allotment will be based on the availability of the mess.
8. A student can apply for the room and mess only once.

## 3 Database-Wide Design Decisions

### 3.1 Behaviour

#### 3.1.1 Login and Sign Up

Users can log in or sign up for the website from the homepage.

Students who don't have an account can sign up with their institute roll number and password under the signup tab. Mess and hostel managers, on the other hand, are not allowed to register on their own. They must be added to the system by the administrator.

A student logs in to the website using the institute roll number and password, whereas hostel managers, mess managers and the administrator use their employee ID and password. The users must select their roles as well. If the credentials and the role match with any user in the system, they get logged in successfully.

After logging in (or signing up), the users will be directed to their respective pages per their role.

The application provides the following roles with corresponding functionalities. These roles are as follows:

#### 3.1.2 Administrator

- a. Manages the hostel and mess manager and is responsible for their appointment and removal
- b. Has view access over student details
- c. Can permanently expel students from the hostel
- d. Can change their password

#### 3.1.3 Hostel Manager

- a. Has view access to details of the students enrolled in the hostel by Roll number and Room number.
- b. Can vacate the rooms according to the requests made by the students.
- c. Can change their password

#### 3.1.4 Mess Manager

- a. Has view access over the details of students enrolled in their corresponding mess
- b. Can download the CSV file containing the details of all enrolled students
- c. Can change their password

#### 3.1.5 Student

- a. Apply for hostel allocation
- b. Choose their mess at the end of each month
- c. View their profile and edit details.
- d. Can change their password

## **3.2 DBMS Platform**

HostelDesk is a web application that provides users with a clear and interactive experience. The design is simple, and all the interfaces follow a standard template. The web application is expected to work on web browsers. The application allows users to log into the system with corresponding credentials and is directed to different pages according to their roles. The functionalities extended to various users differ by their roles.

## **3.3 Security Requirements**

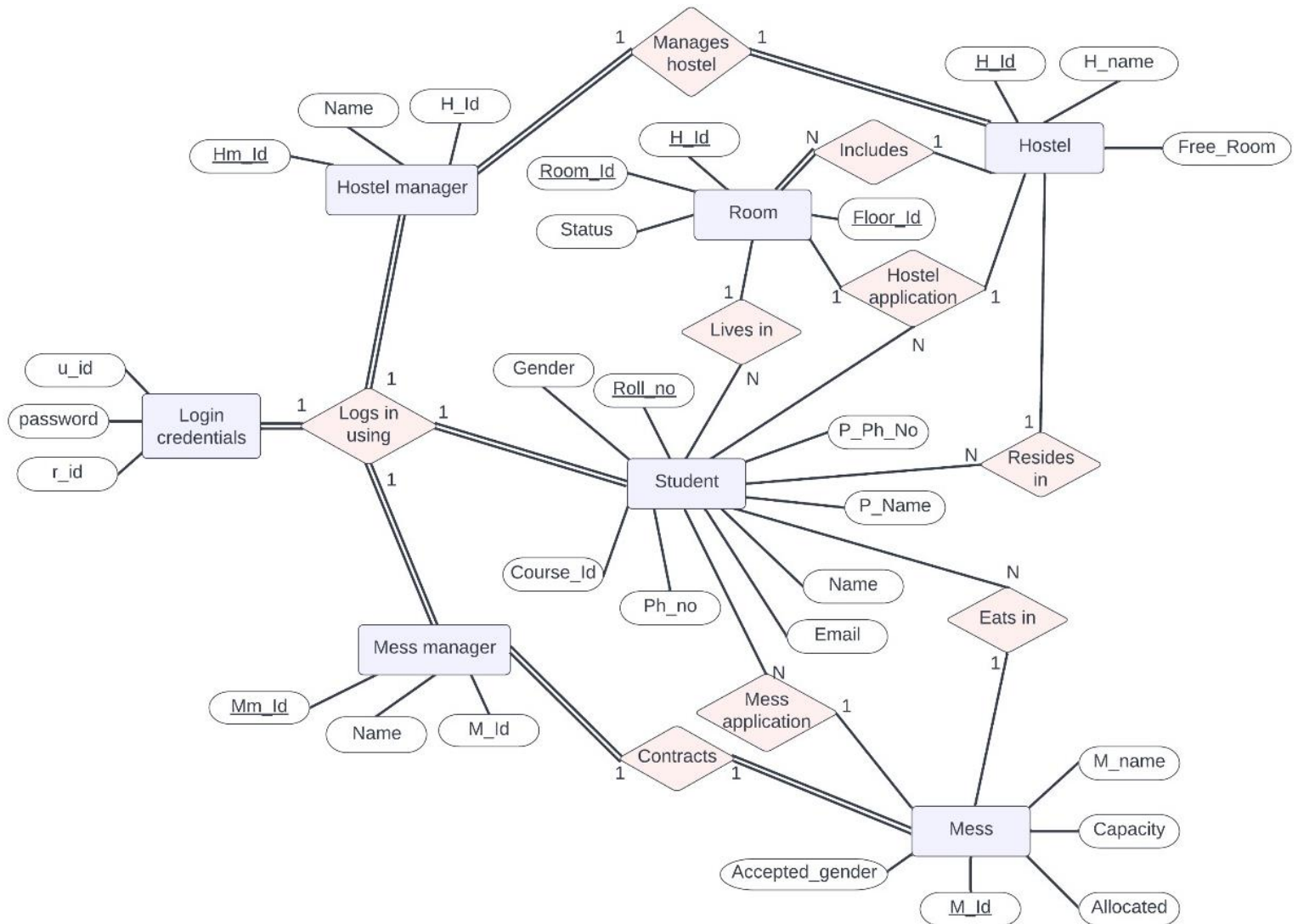
The system will store all the data in a secure database. The interacting users will be able to view information but will not have the privilege to modify/edit it. This privilege will be given to the chief warden (admin), and only they have the right to update the database. These are the two different types of accessors and have varying access constraints. In terms of the safety aspect, the system does not pose a threat to its users. To combat attacks by malware, backing up the database is advised.

## **3.4 Performance and Availability Decisions**

The search retrievals depend upon the updates made to the system. This system is designed to interact with students and staff. The system will respond to the user within less than a second of submitting a request. Overall, the performance will be fast and accurate. The system will be capable of handling a large amount of data and hence accommodate a high number of complaints, user credentials, etc.

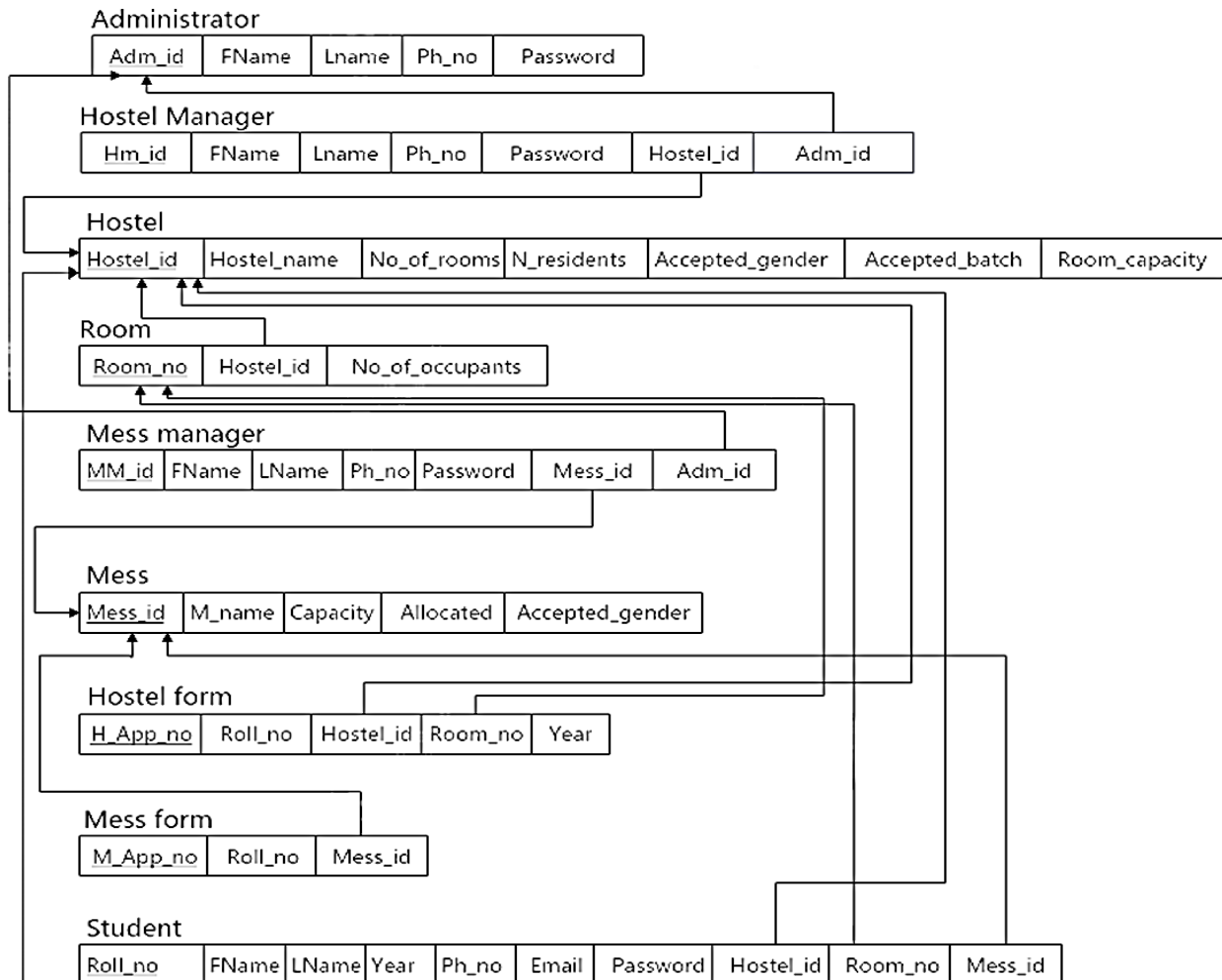
## 4 DATABASE ADMINISTRATIVE FUNCTIONS

### 4.1 Entity-Relation Model





## 4.2 Relational Schema



## 4.3 Normalization

- 1NF - The tables are in 1NF, as there are no multivalued or composite attributes. Each table cell contains atomic values, and each record is unique. Hence the database is 1NF normalized.
- 2NF - The tables are already in 1NF as proved above. There are no partial Dependencies: No non-prime keys are solely dependent on only one part of a primary key in any of the tables. Hence the database is 2NF normalized.
- 3NF - The tables are already in 2NF as proved above. There are no transitive functional dependencies in the schema. There are no non-prime keys that are dependent on another non-prime key in any specific table. Hence the database is 3NF normalized.

## 4.4 Schema Description and Data Formats

