Database Design Document

for

Hostel Management System

Prepared by

Group 28

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Course: **Database Management Systems**

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1 Purpose

The Database Design Document maps the logical data model to the target database management system with consideration to the system's performance requirements. The Database Design converts the entity relational model to a relational schema of the target Database Management System (DBMS). Further, the document would briefly describe the integration aspects of the Database with the Web Application.

1.1 Document Objectives

The Database Design Document has the following objectives:

1. To describe the design of a database, that is, a collection of related data stored in one or more computerized files that can be accessed by users or computer developers via a DBMS.

2. To serve as a basis for implementing the database and related software units. It provides the acquirer visibility into the design and provides information necessary for software development.

1.2 Intended Audience and Document Overview

This document is intended for the following audiences:

1. Technical reviewers, who must evaluate the quality of this document.

2. Developers including:
    - 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, whose software must implement the requirements specified in this document.
    - Quality Assurance personnel, whose test cases must validate the requirements specified in this document.

1.3 Definitions, Acronyms, and Abbreviations

DBMS - Database Management System
1NF - First Normal Form
2NF - Second Normal Form
3NF - Third Normal Form
BCNF - Boyce–Codd normal form
Student - A person that is a user of the system with minimal access level.
Admin - A person that is a user of the system with complete access.

2 Assumptions and Constraints

2.1 Assumptions

The following are the assumptions made while developing this product :

- User must be a student of NITC.
- Students can be allocated only one room in a hostel.
- Students can view the complaint status.

2.2 Constraints

The following design and implementation constraints are employed in the system:

- Administrative access is password protected.
- Admin only can be permissible to view complaints.
- Admin only can approve to issue a room.
- Each user has an individual ID and password.
- The software is designed, delivered and maintained to the client by this team.

3 Database- Wide Design Decisions

3.1 Behavior

Login
Users are first prompted to select whether they are accessing the system as an admin or student. The user then logs into the system by entering their credentials. Accordingly, they are then directed to different pages respective to their roles and varying access permission levels.

Admin
Admin, once signed in, are presented with five options -

- View compliant Forms.
- View Room Request Form and allocate room option.
- Access Room number using student Id.
- Access residents of Room using Roomid.
- Access residents of Hostel using HostelId/name.

Student
The students are given the following options :

- Register Complaint form.
- Request Room form
- Check the status of the complaint/room allocation.

3.2 DBMS Platform

Users will interact with the system via a web app that provides a simple and intuitive interface. It is expected to work on all web browsers. The web app allows users entry to their respective landing pages after providing login credentials. Depending on the user role, the functionality differs.

3.3 Security Requirements

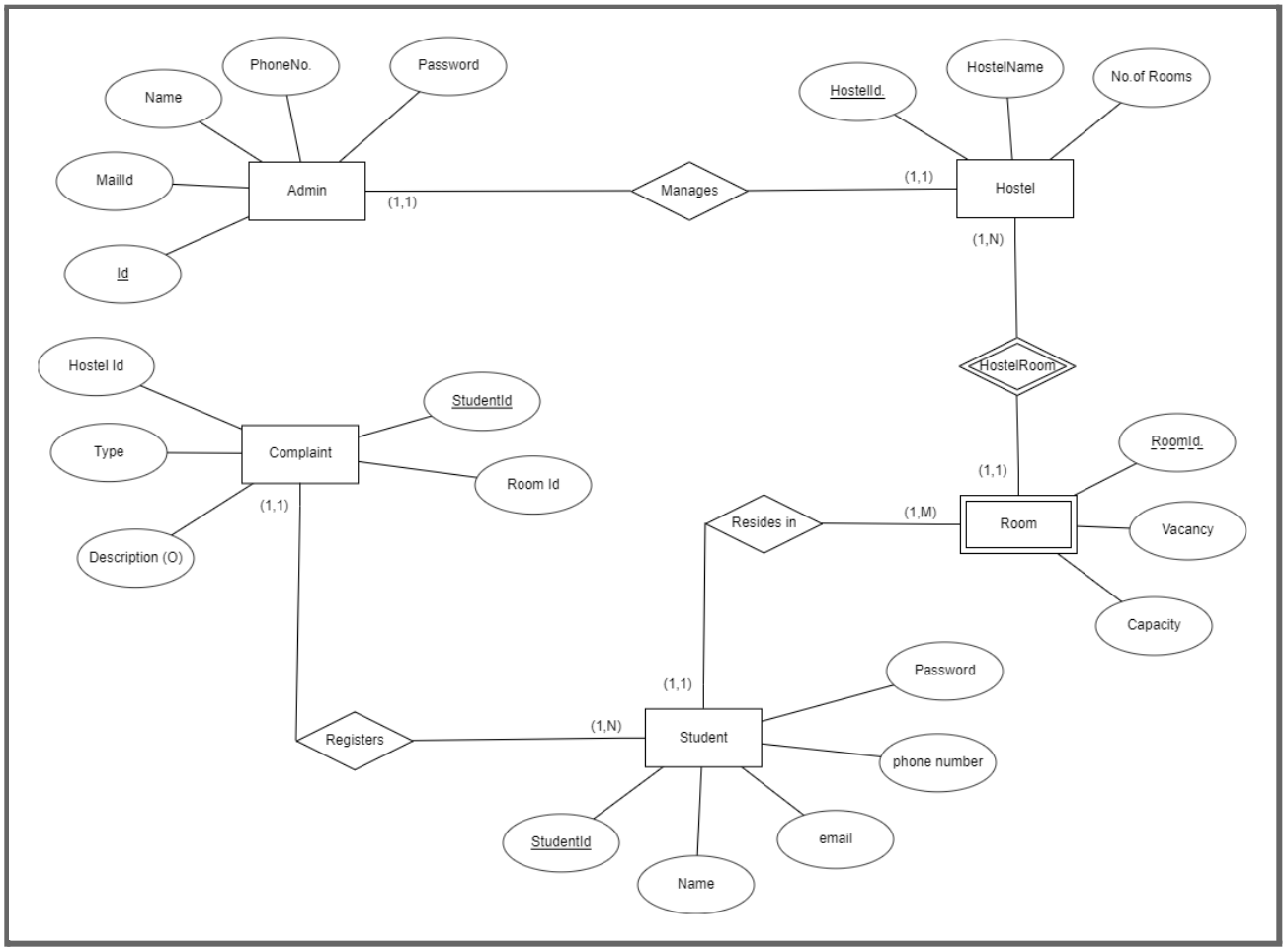
We will use encrypted passwords to store in the database rather than direct passwords for better security. There will be proper arrangements to ensure secure access to the system and management of proper user permissions, to avoid malicious use and/or corruption of data by outside access. Students will only be allowed access to view their own complaints, not any other student's complaints, and may not edit or review it in any way. Admin has permission to view only the compliments of students but not the name or id of students who filed that complaint, in order to uphold Integrity. All such methods of ensuring secure access and manipulation of data will be firmly implemented. Admin can allocate a room to students using an only automated process to avoid partiality toward students.

3.4 Performance and Availability Decisions

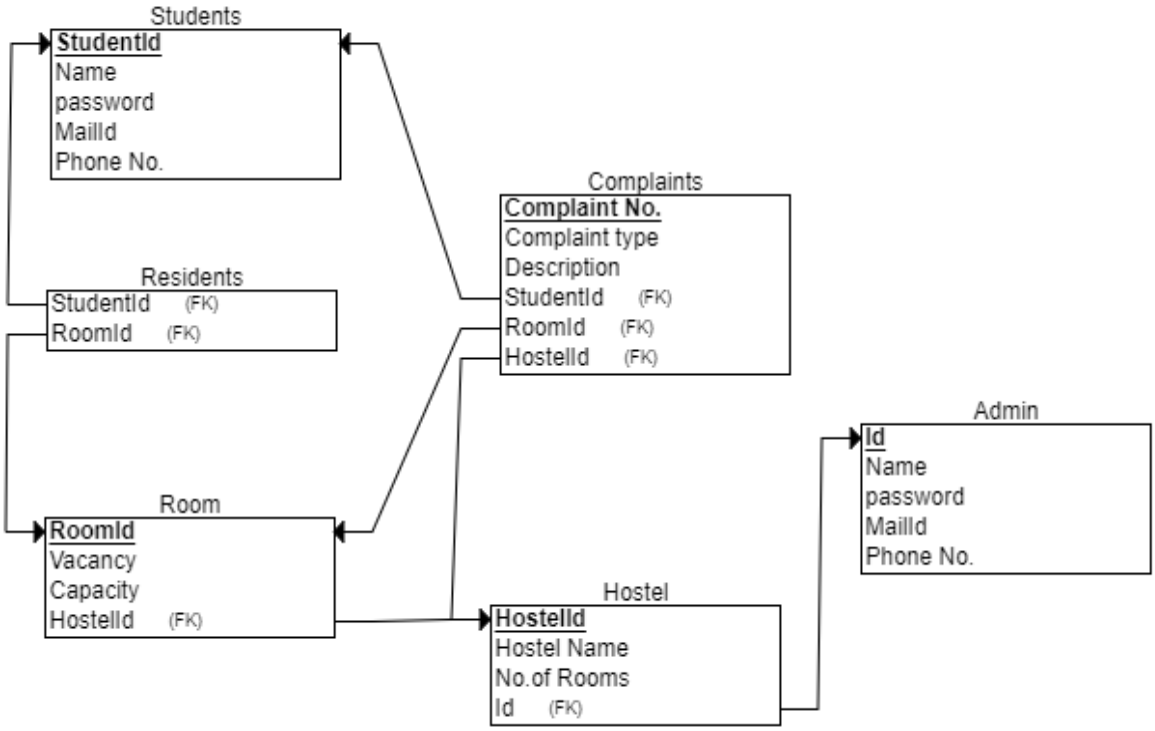
The response times of the various interfaces and capacity of the system are entirely dependent on the available memory space as well as the system capability of performance. During times of the new academic year, there may be a slight delay in the response time on the website because multiple users are trying to log in at the same time.

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, that is, there are no non-prime keys solely dependent on only one part of a candidate key in any of the tables. Hence the database is 2NF normalized. Moreover, in every relationship, we are having a single attribute as a candidate key.

- 3NF - The tables are already in 2NF as proved above. There are no transitive functional dependencies in the schema. There are non-prime keys that are dependent on another non-prime key in any specific relation. Hence the database is 3NF normalized.

- BCNF - The tables are already in 3NF as proved above. And a prime attribute in any relationship is a candidate key.

4.4 Schema Description & Data Formats

Table	Attribute	Data Type	Type
Student	Student.Id	string	Primary Key attribute
	Student name	string	non Primary Key attribute
	Password	string	non Primary Key attribute
	EmailID	string	non Primary Key attribute
	PhoneNo.	Integer	non Primary Key attribute
Admin	Admin.Id	string	Primary Key attribute
	Admin Name	string	non Primary Key attribute
	Password	String	Non Primary Key attribute

	Phone no.	long int	Non Primary Key attribute
	Mail id	string	Non Primary key attribute
Complaint	ComplaintId	String	Primary Key attribute
	Complaint Type	String	non Primary Key attribute
	Description	String	non Primary Key attribute
	StudentId	String	Foreign Key attribute
	RoomId	String	Foreign Key attribute
	HostelId	String	Foreign Key attribute
Residents	student id	string	Foreign Key attribute
	roomid	string	Foreign Key attribute
	Hostelid	string	Primary Key attribute

Hostels	Hostel name	string	non Primary key attribute
	No. of rooms	Integer	non Primary key attribute
	admin id	string	foriegn key
Room	Hostel ID	string	Foriegn key attribute
	RoomId	String	Primary key
	Vacancy	Integer	Non Primary Key attribute
	Capacity	Integer	non Primary Key attribute

REFERENCES

[1] http://www.sdlcforms.com/PopupForm-DatabaseDesignDocument.html

[2] https://app.diagrams.net/