# Database Design Document

**for**

# HOSTEL ROOM ALLOCATION AND MAINTENANCE SYSTEM

**Prepared by**

**Group Number: 19**


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# 1. Introduction

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 logical or conceptual data constructs to physical storage constructs(e.g., tables, files) of the target Database Management System (DBMS).

## 1.1 Overview of Project

Hostel Management System is a web application which mainly aims for automating the hostel room allocation and also provides other features such as informing hostel authorities about any complaints. Currently our students are filling up forms and submitting in the respective hostel offices which involves a lot of paperwork and is less efficient.

## 1.2 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.

## 1.3 Project Objectives

1.Simplification of the process of allocation and management of different hostels under an institute.
2.Creation of a database that allows monitoring and managing hostel requirements and functions in an efficient manner.

## 1.4 Scope of the Project

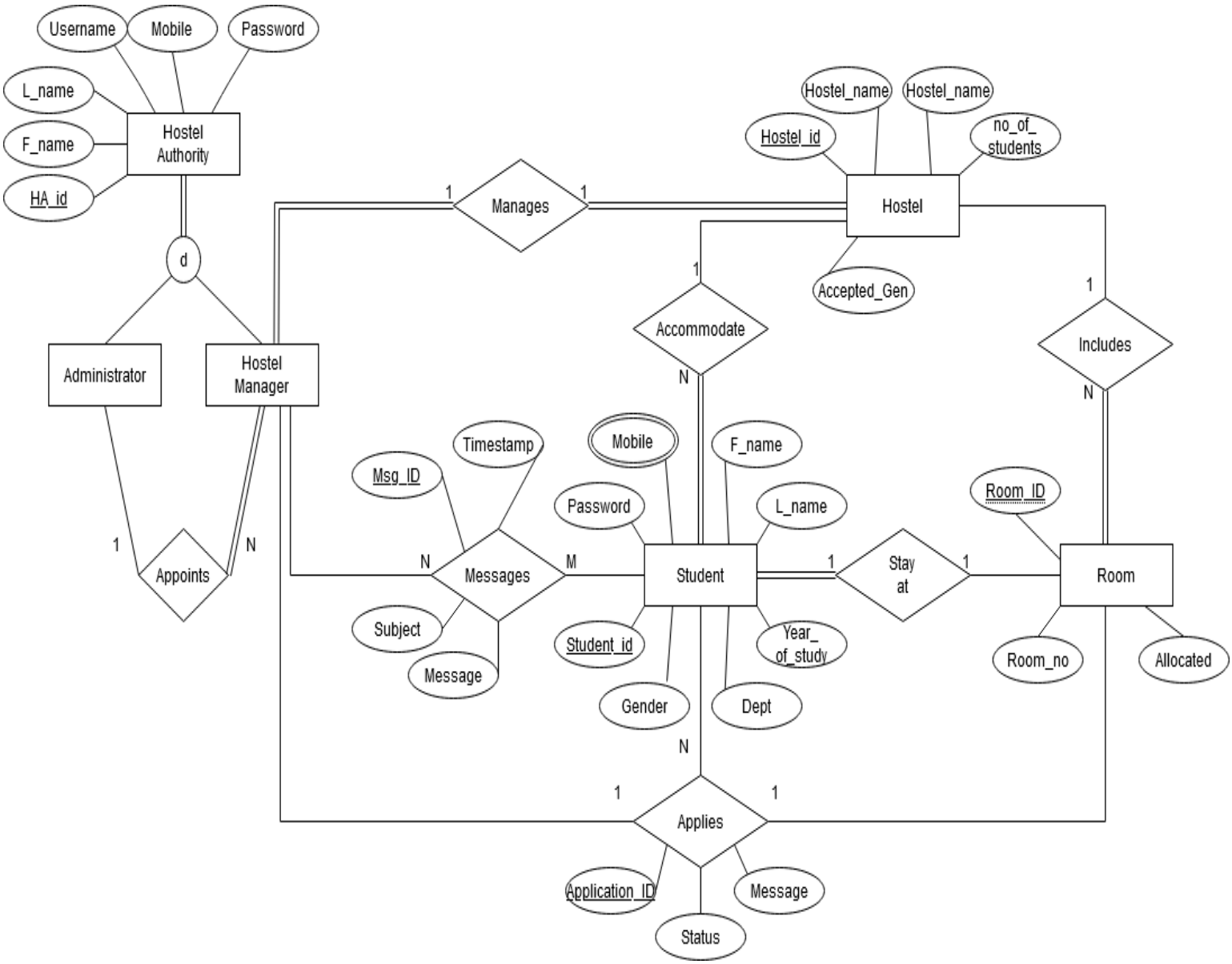
1.Hostel Management System(HMS) is designed for hostels that are under the governance of a school or institute.
2.The End-User is a student that requires the hostel services.
3.The are predefined criterias for the allocation of a student

## 1.5 Assumptions

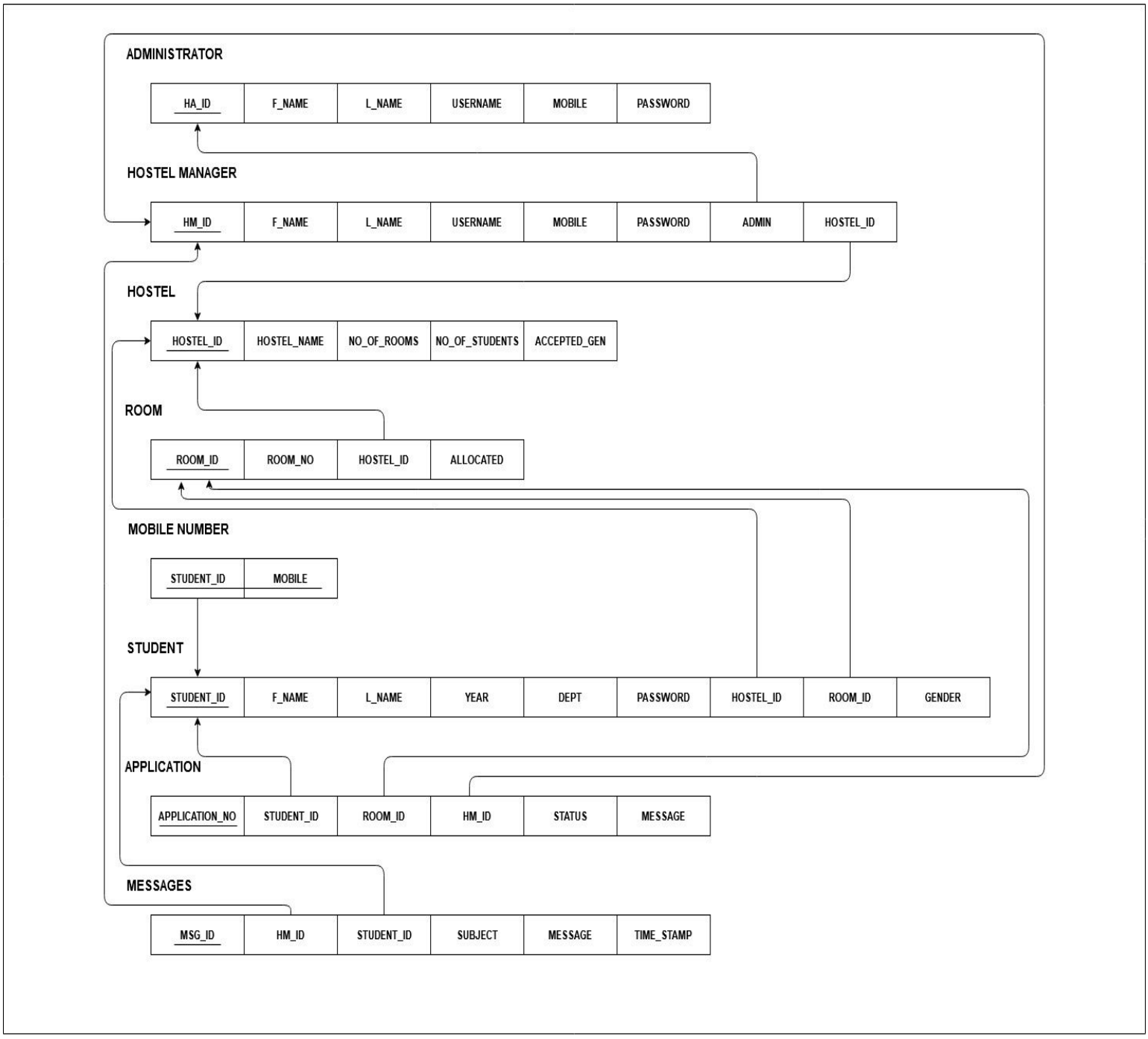
1. Hostel authority consist of two independent bodies namely Administrator and Hostel Manager
2. Administrator has the right to appoint the Hostel Manager and assign him his hostel incharge
3. One Hostel Manager manages One Hostel
4. Students can apply for any rooms and the Hostel Manager has the right to confirm or reject it. Moreover students can make multiple applications and only one will be accepted.

# 2.Database Design

## 2.1 Entity relationship diagram



# 2.2 Normalized Conceptual Schema



# 3.Normalization

## 3.1. 1st Normal Form

All the relations present in the relational database schema are in first normal form since the domain of each attribute contains only atomic (indivisible) values, and the value of each attribute contains only a single value from that domain.

## 3.2. 2nd Normal Form

All the relations satisfies second normal form since it fulfills the following requirements:

It is already in first normal form.It does not have any non-prime attribute that is functionally dependent on any proper subset of any candidate key of the relation.For most of the relations the candidate keys are single valued. So that there is no scope for a proper subset.

## 3.3. 3rd Normal Form

Since all the relations are in the second normal form it satisfies the first prerequisite.
Furthermore,
Since all the attributes of each relation of the relational database schema solely depend on the primary key(i.e no two non-prime attributes have a dependency between them) the database is in the third normal form.

### 3.4 Boyce-Codd Normal Form(BCNF)

Since all the relations satisfy all previous normal forms. Moreover all the attributes of each relation of the relational database scheme satisfies the condition, every functional dependency $X \rightarrow Y$ implies X is the super key of the table.

# 4. Entities,Relations and Attributes

This section of the document explains the entities and relations used in the project, their attributes and how they will work together.

**Entities Type**

1. Hostel
2. Hostel Authority
3. Administrator
4. Hostel Manager
5. Room
6. Student

**Multi-Valued Attribute**

7. Mobile_number

**Relationship Type**

8. Messages
9. Application

## 4.1 Hostel

An Institution has many hostels and each hostel is represented using

this ‘Hostel’ entity.The entity takes part in the following relationships:

1.Hostel Manager **manages** Hostel.
2.Hostel **accommodates** Students.
3.Hostel **includes** Rooms.

**Attributes**

| Name | Data type | Type |
|---|---|---|
| HOSTEL_ID | integer | Primary key attribute |
| HOSTEL_NAME | string | Non_key attribute |
| NO_OF_ROOMS | integer | Non_key attribute |
| NO_OF_STUDENTS | integer | Non_key attribute |
| ACCEPTED_GEN | integer | Non_key attribute |

## 4.2 Hostel Authority

The entity Hostel Authority has two disjoint subclasses Administrator and Hostel Manager

## 4.3 Administrator

Administrator is in charge of assigning Hostel Managers and also the handling of the database in general.

**Attributes**

| Name | Data type | Type |
|---|---|---|
| HA_ID | integer | Primary Key attribute |

| | | |
|---|---|---|
| F_NAME | string | Non_key attribute |
| L_NAME | string | Non_key attribute |
| USERNAME | string | Key attribute |
| MOBILE | string | Key attribute |
| PASSWORD | string | Non_key attribute |

## 4.4 Hostel Manager

Hostel managers are responsible for the handling of their respective Hostels.This entity takes part in the following relationships:
1.Hostel Manager manages Hostel.

**Attributes**

| **Name** | **Data type** | **Type** |
|---|---|---|
| HM_ID | integer | Primary Key attribute |
| F_NAME | string | Non_key attribute |
| L_NAME | string | Non_key attribute |
| USERNAME | string | Key attribute |
| MOBILE | string | Key attribute |
| PASSWORD | string | Non_key attribute |
| ADMIN | integer | Foriegn Key attribute |
| HOSTEL_ID | integer | Foriegn Key attribute |

## 4.5 Room

Every Hostel has rooms and they are represented using ‘room’ entity. Room entities participate in the following relationships.

1.Hostel **includes** Rooms.

2.Students **stays at** room

**Attributes**

| Name | Data type | Type |
|---|---|---|
| ROOM_ID | integer | Primary Key attribute |
| ROOM_NO | integer | Non_key attribute |
| HOSTEL_ID | integer | Foriegn Key attribute |
| ALLOCATED | boolean | Non_key attribute |

## 4.6 Student

Every hostel has students and they are represented by the ‘student’ entity.Student entity participates in the following relationships.

1.Hostel **accommodates** Students.

2.Students **stay in their** rooms.

**Attributes**

| Name | Data type | Type |
|---|---|---|
| STUDENT_ID | integer | Primary Key attribute |
| F_NAME | string | Non_key attribute |

| | | |
|---|---|---|
| L_NAME | string | Non_key attribute |
| YEAR | string | Non_key attribute |
| DEPT | string | Non_key attribute |
| PASSWORD | string | Non_key attribute |
| HOSTEL_ID | integer | Foriegn Key attribute |
| ROOM_ID | integer | Foreign Key attribute |
| GENDER | integer | Non_key attribute |

## 4.7 Mobile number

Mobile number of each student is given as a multi-valued attribute hence it is given as a separate table.

**Attributes**

| **Name** | **Data type** | **Type** |
|---|---|---|
| STUDENT_ID | integer | Foriegn Key attribute |
| MOBILE | string | Partial Key attribute |

## 4.8 Messages

Students can complain to the Hostel Manager about the hostel related issues. This is a relationship between following entities types:

1. Student
2. Hostel Manager

**Attributes**

| Name | Data type | Type |
|---|---|---|
| MSG_ID | integer | Primary Key attribute |
| HM_ID | integer | Foriegn Key attribute |
| STUDENT_ID | integer | Foriegn Key attribute |
| SUBJECT | string | Non_key attribute |
| MESSAGE | string | Non_key attribute |
| TIME_STAMP | date and time | Non_key attribute |

## 4.9 Application

Students can apply for any rooms and the Hostel Manager has the right to confirm or reject it. This is a relationship between following entities types:

1. Student
2. Hostel Manager
3. Room

**Attributes**

| Name | Data type | Type |
|---|---|---|
| APPLICATION_NO | integer | Primary Key attribute |
| STUDENT_ID | integer | Foriegn Key attribute |
| ROOM_ID | integer | Foriegn Key attribute |
| HM_ID | integer | Foriegn Key attribute |

| | | |
|---|---|---|
| STATUS | boolean | Non_key attribute |
| MESSAGE | string | Non_key attribute |