" ...Adopt our system to prevent this from happening with your barrack"

The Barrack Brigade:

Barracks Management DB

Project Phase 1

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Introduction

In every nation, the safety and security of its citizens are paramount. Central to this safeguarding are the dedicated soldiers who commit themselves to protect and serve their country. These courageous individuals live in barracks, the nucleus of their day-to-day lives. It's within these barracks that their needs, their well-being, and their readiness are of utmost importance.

To make their lives more straightforward and to enable administrators to efficiently manage and cater to their needs, we present our "Barracks Management Database" which is based on the mini-world of barracks lives and the people that live in there. This project aims at enhancing their quality of life by ensuring efficient and timely management of their needs and requirements. Our Database will contain data that could be used to offer a structured approach to barracks administration. Administrators can more efficiently allocate resources, track equipment and plan daily routines.

Purpose

1. **_Removes Data redundancy and Inconsistency:_** It would help us to efficiently manage and store data without storing the same data again and again and the constraints would help keep that data consistent.

   Eg: If some official updates the information about some soldier then the constraints would ensure that the same data gets updated in all the respective places (maintaining integrity) and also if two different officers try to store the same data it will ensure that it is not stored twice thus reducing data repetition.

2. **_Reduce difficulty in accessing data:_** This database would aid in easier access to any data related to the soldiers living in the barracks. For example, Assume that certain soldiers need to be moved from one barrack to a another based on certain qualifications and requirements, so the administrator can find out about all those soldiers who satisfy the requirement with a simple query instead of searching through the list of all the soldiers living there or to hassle and write a program to do it for them. This would be very efficient.

3. **_Enhance Security:_** Not every piece of information should be accessible to everyone. For example the cleaning staff department only needs the access to the data where the soldiers have requested their rooms to get cleaned and they do not require any access to the list of ammunations and the places where they are kept.

Users of the Database

1. ***Military Institutions:*** Military institutions, such as training academies or military bases, could use it to look for ideas on how to enhance barracks management.
2. ***Administrators:*** Barracks administrators that look after barracks management and functioning can use this database to derive insights about what is going on in the barracks and what all changes/adjustments need to be done to improve it's functioning. They can view all the complaints filed against some official and can see into the matter to take appropriate action.
3. ***Military Personnel:*** All the active on-duty soldiers living in the barracks can use this database to retrieve information about their schedules, their assigned bunk beds and usage timings of various equipment and training facilities like playgrounds and shooting ranges.

Database Requirements

Note: Asterisk (*) denotes that this attribute is a primary key of the respective entity type.

All attributes other than derived attributes are stored attributes.

All attributes are NOT NULLABLE unless specified separately.

List of the different entities:

1. **Strong Entities:**
   - (a) Credentials
   - (b) Soldiers
   - (c) Units
   - (d) Sector
   - (e) Barracks Building
   - (f) Mess
   - (g) Training Ground
   - (h) Security Personnel
   - (i) Military Equipment
   - (j) Duties
   - (k) Shifts
2. **Weak Entities:**
   - (a) Dependants
   - (b) Bunk Bed
   - (c) Room
   - (d) Complaint

1. Strong Entities

- ## Credentials:

  Stored email id, username, passwords and role of all the users that would access the data. Used for authentication. Root/Admin users have access to update and read all the data, other users have different privileges based on the access they are granted.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Govt email Id*	Simple	Varchar	Primary Key Format: <soldier_name>@<barrack_id>.gov.in
2.	Username	Simple	Varchar(30)	-
3.	Password	Simple	Varchar	Hashed password
4.	User Type	Simple	Enum	Value set = {Admin, User}
5.	Soldier Id	Simple	Int	Foreign Key

- ## Soldiers:

  Refers to all the soldiers living in the barracks.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Soldier Id*	Simple	Integer	Primary Key
2.	Name	Composite (First Name, Middle Name, Last Name)	Varchar(30)	-
3.	Phone Number	Multivalued	Integer	Positive Integer of 10 digits (separated by comma if more than 1 present)
4.	DOB	Composite (Day, Month, Year)	Date	DDMMYY format
5.	Age	Derived	Integer	Minimum = 18

6.	Rank	Simple	Enum	Value Set = {Field Marshal, General, Lieutenant General, Major General, Brigadier, Colonel, Lieutenant Colonel, Major, Captain, Lieutenant}
7.	Corresponden ce Address	Composite (House No, Street, Area, City, State, Postal Code)	Varchar	String (space separated)
8.	Aadhaar Number	Simple	Integer	12 digits positive integer
9.	Sex	Simple	Enum	Value set = {M, F}
10.	Govt email id	Simple	Varchar	Format: <soldier_name>@<barrack_id>.gov.in
11.	Salary	Simple	Integer	Currency: Rupees
12.	Unit Id	Simple	Integer	Foreign Key
13.	Mess Id	Simple	Integer	Foreign Key
14.	Duty S. No.	Simple	Integer	Foreign Key, NULLABLE

- Units:

    Stores information about different units. Ex: Engineering unit, medical unit, artillery unit, infantry unit etc (A group having a prescribed size and a specific combat or support role within a larger military organization).

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Unit Id*	Simple	Integer	Primary Key
2.	Unit Name	Simple	Varchar(30)	-
3.	Role	Simple	Enum	Value set = {Infantry, Armored, Artillery, Cavalry, Engineer, Signals, Mechanized Infantry, Air Defense, Special Forces, Military Police, Medical, Supply and Transport}

- Sector:

  Stores information about sectors and their locations.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Sector Id*	Simple	Integer	Primary Key
2.	Name	Simple	Varchar(30)	-
3.	Location	Composite (Street No., Area, City, State, Postal Code)	Varchar	String (space separated)
4.	Sector Head Id	Simple	Integer	-

- Barracks Building:

  Stores information about various barrack buildings in the sectors.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Barrack Id*	Simple	Integer	Primary Key
2.	Capacity	Derived	Integer	Positive Integer
3.	Commander Id	Simple	Integer	Foreign Key (Soldier Id of the soldier which is the commander of his/her respective barrack)
4.	Last Date of Maintenance	Simple	Date	-
5.	Landline number	Simple	Integer	Positive Integer with 10 digits (4 area code + 6 digits)
6.	Type	Simple	Enum	Value set = {M, F}

7.	Number of soldiers	Simple	Integer	Positive Integer
8.	Sector Id	Simple	Integer	Foreign Key

- Mess :

    Stores information about various messes in the sectors.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Mess Id*	Simple	Integer	Primary Key
2.	Name	Simple	Varchar	Length MinMax(1, 20)
3.	Menu	Complex Menu(Days of the week({B},{L},{D}))	Varchar	Each menu item for a particular meal (Breakfast/Lunch/Dinner) for a particular day of the week is separated by commas.
4.	Chef Id	Simple	Integer	-
5.	Seating Capacity	Simple	Integer	Positive Integer
6.	Sector Id	Simple	Integer	Foreign Key

- Training Grounds:

    Stores information about all the sports and training and shooting ground/arena available.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Training Ground Id*	Simple	Integer	Primary Key
2.	Name	Simple	Varchar	Length MinMax(1, 20)

3.	Start Time	Simple	Time	HHMMSS format
4.	Closing Time	Simple	Time	HHMMSS format
5.	Type	Simple	Enum	Value set = {indoor, outdoor}
6.	Sector Id	Simple	Integer	Foreign Key

- Security Personnel:

  Stores information about the security guard posted at each barrack.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Security Personnel Id*	Simple	Integer	Primary Key
2.	Name	Composite (First Name, Middle Name, Last Name)	Varchar(30)	-
3.	Date Posted	Simple	Date	DDMMYY format
4.	Contact Number	Simple	Integer	Positive integer with 10 digits
5.	Barrack Id	Simple	Integer	Foreign Key

- Military Equipment:

  Stores information about issued and stored military equipment, eg: guns, shells, armours etc.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Equipment Id*	Simple	Integer	Primary Key

2.	Type	Simple	Enum	Value set = {weapon, gear, uniform}
3.	Stored at	Simple	Integer	Foreign Key (Sector Id of the sector where the equipment is kept)
4.	Status	Simple	Enum	Value set = {issued, not issued}
5.	Late Return Fine	Simple	Integer	Currency: Rupees Value in per day

- Duties:

Stores information of various duties at messes. Eg: cooking duty.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Duty S. No.*	Simple	Integer	Artificial Key/Surrogate Key/Primary Key
2.	Duty Type	Simple	Enum	Value Set = {Cleaning Duty, Serving Duty}

- Shifts:

Stores information of various shifts at messes. Eg: lunch shift.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Shift S. No.*	Simple	Integer	Artificial Key/Surrogate Key/Primary Key
2.	Shift Type	Simple	Enum	Value Set = {Breakfast Shift, Lunch Shift, Snacks Shift, Dinner Shift}

2. Weak Entities
- Dependents:

Stores information about dependents (Relatives) of soldiers.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Name	Composite (First Name, Middle Name, Last Name)	Varchar(30)	Partial Key
2.	Phone Number	Simple	Enum	Positive Integer with 10 digits
3.	Correspondence Address	Composite (House no., Street no, area, city, state, zip code)	Varchar	-
4.	Relationship with soldier	Simple	Enum	Value Set = {Mother, Father, Son, Daughter, Sister, Brother, Uncle, Aunt, Guardian}
5.	Sex	Simple	Enum	Value set = {M, F}
6.	Soldier Id	Simple	Integer	Foreign Key

- Bunk Bed:

Stores information about which bunk bed is where.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Bunk Bed S.no.	Simple	Integer	Partial Key
2.	Bed Status	Simple	Enum	Value Set = {empty, occupied}
3.	Room	Simple	Integer	Partial Key

S. No.	Attribute	Attribute Type	Data Type	Constraints
	Number			
4.	Floor Number	Simple	Integer	Partial Key
5.	Barrack Id	Simple	Integer	Foreign Key

● Rooms:

Stores information about the rooms in a barrack.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Room Number	Simple	Integer	Partial Key
2.	Floor Number	Simple	Integer	Partial Key
3.	Cleaning Schedule	Simple	Enum	Value set = {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}
4.	Capacity	Derived	Integer	Positive Integer
5.	Barrack Id	Simple	Integer	Foreign Key

● Complaints:

Soldiers can file complaints about services and infrastructure.

S. No.	Attribute	Attribute Type	Data Type	Constraints
1.	Complaint Number	Simple	Integer	Partial Key
2.	Complaint Type	Simple	Enum	Value Set = {Mess, Infrastructure, Officials}
3.	Filing Date	Simple	Date	DDMMYY format

4.	Status	Simple	Enum	Value set = {solved, pending}
5.	Soldier Id	Simple	Integer	Foreign Key

Relationships

1. Binary Relationships:

(a) BELONGS TO
- <u>Bunker bed</u> **BELONGS TO** <u>Soldier</u>
- Participating Entities: Bunker Bed, Soldier
- Cardinality: (1:1)
- Participation Constraints: Bunker Bed (0,1) ; Soldier (1,1)

(b) BELONGS TO
- <u>Barracksl</u> **BELONGS TO** <u>Sector</u>
  - Relationship Attribute : Number of barracks in the sector
- Participating Entities:Barracks, Sector
- Cardinality: (N:1)
- Participation Constraints: Barracks (1,N) ; Sector (1,1)

(c) WORKS UNDER
- <u>Soldier</u> **WORKS UNDER** <u>Unit</u>
  - Relationship Attribute : Number of soldiers in a unit (Derived) - Integer
- Participating Entities: Soldier, Unit
- Cardinality: (1:1)
- Participation Constraints: Soldier (1,N) ; Unit (1,1)

(d) REGISTERED
- <u>Soldier</u> has a **REGISTERED** in <u>Mess</u>
  - Relationship Attribute : Number of soldiers registered (Derived) - Integer
- Participating Entities:Soldier, Mess
- Cardinality: (N:1)
- Participation Constraints: Soldier(0 ,1) ; Mess (1,1)

(e) FILES
- <u>Soldier</u> **FILES** <u>Complaint</u>

- Participating Entities:Soldier, Complaint
- Cardinality: (1:N)
- Participation Constraints: Soldier (0,1) ; Complaint (0,N)

(f) BELONGS TO
- <u>Mess</u> **BELONGS TO** <u>Sector</u>
  - Relationship Attribute : Number of mess in a sector (Derived) - Integer
- Participating Entities: Mess, Sector
- Cardinality: (N:1)
- Participation Constraints: Mess (1,N) ; Sector (0,N)

(g) BELONGS TO
- <u>Training Ground</u> **BELONGS TO** <u>Sector</u>
  - Relationship Attribute : Number of training grounds in the sector (Derived) - Integer
- Participating Entities: Training Ground, Sector
- Cardinality: (N:1)
- Participation Constraints: Training Ground (1,N) ; Sector (0,N)

(h) ISSUES
- <u>Soldiers</u> **ISSUES** <u>Equipment</u>
  - Relationship Attribute : Date of Issue - Date
  - Relationship Attribute : Date of Return - Date
- Participating Entities:Soldiers, Equipment
- Cardinality: (1:N)
- Participation Constraints: Soldier(0,N) ; Equipment(0,1)

(i) GUARDS
- <u>Security Personnel</u> **GUARDS** <u>Barrack</u>
- Participating Entities: Security Personnel, Barrack
- Cardinality: (1:1)
- Participation Constraints: Security Personnel(0, 1) ; Barrack (1 ,1)

(j) HAVE
- <u>Soldiers</u> **HAVE** <u>Dependents</u>
- Participating Entities:Soldiers, Dependants
- Cardinality: (1:1)
- Participation Constraints: Soldiers(1 ,1) ; Dependants (1 ,1)

(k) LIVES IN
- <u>Soldiers</u> **LIVES IN** <u>Barrack</u>
  - Relationship Attribute : Arrival Date of soldier - Date
- Participating Entities:Soldiers, Barrack
- Cardinality: (N:1)
- Participation Constraints: Soldiers(1,1) ; Barrack (0 ,N)

2. Tertiary Relationships:

(a) HAVE

- Barracks **HAVE** Rooms having Bunker Beds (1:N:M)
    - Relationship Attribute : Number of bunk beds in a room - Int
    - Relationship Attribute : Number of rooms in the barrack - Int
- Participating Entities: Barracks, Rooms, Bunker Beds
- Cardinality: (1:N:M)
- Participation Constraints: Barracks (1,N); Rooms(1,N) ; Bunker Beds(1,N)

3. N > 3 Relationship:

(a) ASSIGNED

- Soldier is **ASSIGNED** a duty in the shift at a mess
- Participating Entities: Soldier, Duty, Shift, Mess
- Cardinality: (N:1:1:1)
- Participation Constraints: Soldier (0,1); Duty(0,N);Shift (1,N); Mess(1,1)

4. Recursive Relationships:

(a) WORKS UNDER

- Soldiers **WORKS UNDER** Soldiers
- Participating Entities:Soldiers, Soldiers
- Cardinality: (N:1)
- Participation Constraints: Soldiers(0,1) ; Soldiers (0,N)
- There is a hierarchy among different types of soldiers so soldiers having lower rank in hierarchy works under the higher rank ones
- Hierarchy : Lieutenant => Captain => Major => Lieutenant Colonel => Colonel => Brigadier => Major General => Lieutenant General => General => Field Marshal (=> Means works under)

Assumptions

- A sector is a group of barracks together just like a township in some part of India.
- Assuming only male and female genders.
- Males and Females live in different barracks.

- Each soldier works for only one unit.
- Assuming every soldier has a phone number and a correspondence address.
- Phone numbers are not stored with the country codes.
- All the soldiers are from India and have correspondence addresses and phone numbers of india.
- Assuming all ranks in the Indian army can live in barracks.
- Commander of a barrack is also a soldier who lives in the same barrack.
- Landline numbers are stored with the area code.
- Each soldier lives in only one barrack.
- Each barrack has the same number of bunk beds in it as its capacity.
- Chefs are identified by their chef ids and we can find information about the chefs in some other database (of the company which provides chefs) but we are not storing the chefs info in our database as our mini world is mostly concerned with soldiers, barracks and their management.
- Assuming each lower rank official works under a higher rank official among soldiers.
- Soldiers can issue equipment available at their sector only.
- It is mandatory for each soldier to have registration in some mess.
- A soldier can register in only one mess at a time for a particular meal.
- Each barrack has only one security personnel.
- Only one dependent per soldier will be stored.
- Capacity of a room is equal to the number of bunk beds in the room.
- Rooms on each floor are numbered 1,2,3... (with the number of rooms on each floor varying from barrack to barrack).

Functional Requirements

I. Retrievals
1. **SELECTION:**

   (Selection queried data can be used to send custom emails to specific subset of the soldiers).

   a. Select all soldiers working in a unit.
   b. Select all soldiers registered in a mess.
   c. Select all the soldiers having a particular rank (ex. Lieutenant, Commander etc.)
   d. Select all the soldiers above some particular age.

2. **PROJECTION:**

   a. List all the equipments issued on a particular date.

b. List the number of soldiers in each sector.

3. **AGGREGATE:**

a. Average salary of all the soldiers in a barrack.

b. The total number of military equipment in all the sectors.

4. **SEARCH:**

a. Search for initial 'Sh' in the soldiers table.

b. Search for the sector name with the initial 'ja' in the sector table.

c. Search for all the messes which serve some particular food item. Ex. search for all the messes which serve "sabudana khichdi".

II. Analysis

(a) The Frequency and the nature of the complaints by the soldiers can be used as a means of analyzing quality of services in the bunker.

(b) Display the names of the sectors in decreasing order of strength of soldiers in a particular unit. Ex. Display the names of all sectors in decreasing order based on the number of soldiers in the engineering unit.

(c) Display the names of messes in a particular sector based on decreasing popularity (measured by how many people go to that mess in a day).

(d) Display the names of all the soldiers which have been living in the same barrack for more than some particular years.

(e) Display the name of the mess having the highest number of complaints. (Can be used to take some action to improve the mess).

(f) Issues with User Authentication can be analyzed.

(g) Display all the barracks which are full and which still have vacancies.

III. Modifications

1. **INSERT:**

a. Insert the details of a new soldier. (Username, email, Barrack assigned, Bunk bed assigned etc.)

b. Insert the details if some new barrack is constructed.

c. Filing a new complaint.

d. New equipment/bunk bed is brought.

e. New mess is added

2. **DELETE:**

a. Delete the details of the soldier once they leave the barrack.

    b.   Delete the details of equipment/bunk bed when it is retired.

    c.   A particular mess is deleted.

3. **UPDATE:**

    a.   Update passwords.

    b.   Update a soldier's personal information, such as their phone number, rank, correspondence address and salary.

    c.   Update information related to barracks, such as last date of maintenance, landline number, barrack type, and the number of soldiers residing in the barrack.

    d.   Update mess menu.

    e.   Update the status and late return fines of military equipment. Change the location where the equipment is stored and mark whether the equipment has been issued or not.

    f.   Update dependent information.

    g.   Update room's cleaning schedule.

    h.   Update rank/salaries of soldiers.

    i.   Update the status of complaints.