



**NATIONAL INSTITUTE OF
TECHNOLOGY WARANGAL**

MILITARY DATABASE MANAGEMENT PROJECT

– SRIVATSA SUDHAMSH CHAKRAVARTULA (206152)

Problem Statement :-

In this project, we have designed a database management system to store information about the Indian Military. The database will contain important information about the Army and will be accessible to Army Officials and the Government.

This database will contain the personal details of the soldiers, posting of soldiers, information about the various battalions of the Army, inventory list and medical supplies of military bases, military vehicles, information about soldiers martyred during the war, awards and honors conferred upon the soldiers for their contributions on and off the battlefield, etc.

This database management system will help the Government and the Military Administration to access various types of information quickly and provide resources to the military on time. Assignment of troops to the warfront and formation of special task forces can be done quickly. They can keep track of the weapons and supplies during wartime and assess how many more weapons will be needed. They can efficiently find soldiers who are currently serving in a particular regiment and also the soldiers who have served in previous operations.

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Tables :-

1. SOLDIER

Attribute	Datatype	Constraints and Characteristics
SoldierID	VARCHAR2(20)	Primary key
Sname	VARCHAR2(20)	Not null
DOB	DATE	Not null
DOJ	DATE	Not null
Height	INT	Not null
Weight	INT	Not null
Gender	CHAR	Not null
District	VARCHAR2(20)	Foreign key, Not null
RegimentCode	VARCHAR2(20)	Foreign key, Not null
OperationCode	VARCHAR2(20)	Foreign key, Not null
Srank	VARCHAR2(20)	Foreign key, Not null

2. REGIMENT

Attribute	Datatype	Constraints and Characteristics
RegimentCode	VARCHAR2(20)	Primary key
Rname	VARCHAR2(20)	Not null
HQCity	VARCHAR2(20)	Not null
CurrStrength	INT	Not null

MaxStrength	INT	Not null
CommanderID	VARCHAR2(20)	Not null

3. LOCATION

Attribute	Datatype	Constraints and Characteristics
District	VARCHAR2(20)	Primary key
State	VARCHAR2(20)	Not null
Country	VARCHAR2(20)	Not null

4. FAMILY

Attribute	Datatype	Constraints and Characteristics
FatherName	VARCHAR2(20)	Primary key(1)
SoldierID	VARCHAR2(20)	Primary key(2), Foreign key
Children	INT	-
Marital Status	CHAR	Not null

5. POSTING

Attribute	Datatype	Constraints and Characteristics
FromDate	DATE	Not null
TillDate	DATE	Not null
SoldierID	VARCHAR2(20)	Foreign key, not null
District	VARCHAR2(20)	Foreign key, not null

6. MEDALS

Attribute	Datatype	Constraints and Characteristics
MedalID	VARCHAR2(20)	Primary key
MedalName	VARCHAR2(20)	Not null
Prize	INT	Not null

7. HONORS

Attribute	Datatype	Constraints and Characteristics
MedalID	VARCHAR2(20)	Foreign key, Not null
SoldierID	VARCHAR2(20)	Foreign key, Not null

8. SALARY

Attribute	Datatype	Constraints and Characteristics
sRank	VARCHAR2(20)	Primary key
Salary	INT	Not null

9. WEAPONS_INVENTORY

Attribute	Datatype	Constraints and Characteristics
RegimentCode	VARCHAR2(20)	Primary key(1), Foreign key
WeaponID	VARCHAR2(20)	Primary key(2), Foreign key
Quantity	INT	Not null

10. VEHICLE_INVENTORY

Attribute	Datatype	Constraints and Characteristics
RegimentCode	VARCHAR2(20)	Primary key(1), Foreign key
VehicleID	VARCHAR2(20)	Primary key(2), Foreign key
Quantity	INT	Not null

11. EQUIPMENTS_INVENTORY

Attribute	Datatype	Constraints and Characteristics
RegimentCode	VARCHAR2(20)	Primary key(1), Foreign key
EquipmentID	VARCHAR2(20)	Primary key(2), Foreign key
Quantity	INT	Not null

12. WEAPON

Attribute	Datatype	Constraints and Characteristics
WeaponID	VARCHAR2(20)	Primary key
Wname	VARCHAR2(20)	Not null
Wtype	VARCHAR2(20)	Not null

13. VEHICLE

Attribute	Datatype	Constraints and Characteristics
VehicleID	VARCHAR2(20)	Primary key
Vname	VARCHAR2(20)	Not null
Vtype	VARCHAR2(20)	Not null
FuelType	VARCHAR2(20)	Not null
ManYear	INT	Not null

14. EQUIPMENT

Attribute	Datatype	Constraints and Characteristics
EquipmentID	VARCHAR2(20)	Primary key
Ename	VARCHAR2(20)	Not null
Etype	VARCHAR2(20)	Not null

15. OPERATION

Attribute	Datatype	Constraints and Characteristics
OperationCode	VARCHAR2(20)	Primary key
Oname	VARCHAR2(20)	Not null
StartDate	DATE	Not null
EndDate	DATE	-
Outcome	VARCHAR2(20)	-

ER Model Assumptions-

- A Soldier can participate in at most one operation while an operation can involve multiple numbers of soldiers. Each Operation must involve some soldier hence Total participation.
 - A Soldier is given a salary on the basis of his Rank/Position in the Army.
 - Multiple Soldiers are grouped to form a regiment. Each Soldier must be a part of one or the other regiment hence there is a total participation of Soldiers in this relationship.
 - A Soldier can be honored by multiple medals and a particular medal can be awarded to multiple numbers of Soldiers hence there is a M:N relationship between the two entities.
 - Each Soldier has a family whose details are stored in the form of Father's name, Number of children and his/her marital status.
 - There are three inventories which belong to a particular regiment namely – Weapons inventory, Vehicle Inventory and Equipment Inventory.
 - A Soldier's posting information involves the period of time for which he/she was or will be posted in that particular region. The period of time for which the Soldier is posted will already be predefined by the Army (We already know the deadline date in the future).
 - There is a Location table which will serve two purposes – Storing the detailed address of the Soldier and storing the detailed address of all the places where a Soldier has been posted.
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Functional Dependencies and Primary Key

1) Soldier -

SoldierID \rightarrow {Sname, DOB, DOJ, Weight, Height, Gender, HomeState, RegimentCode, Srank}

Since all the fields depend on SoldierID, (SoldierID)⁺ \rightarrow R.

Hence, SoldierID is the Primary Key.

2) Regiment -

RegimentCode \rightarrow {Rname, HQCity, CurrStrength, MaxStrength, CommanderID} {Rname, HQCity} \rightarrow {CurrStrength, MaxStrength}

Since all the fields depend on RegimentCode,

(RegimentCode)⁺ \rightarrow R. Hence, RegimentCode is Primary Key.

3) Location -

District \rightarrow {State, Country}

Since all the fields depend on District, (District)⁺ \rightarrow R.

Hence, the District is Primary Key.

4) Family-

{FatherName, SoldierID} \rightarrow {Children, MaritalStatus}

Since all the fields depend on {FatherName, SoldierID},

({FatherName, SoldierID})⁺ \rightarrow R.

Hence, {FatherName, SoldierID} is Primary Key.

5) Posting relation

6) Medals

MedalID \rightarrow {MedalName, Prize}

Since all the fields depend on MedalID, (MedalID)⁺ \rightarrow R.

Hence, MedalID is the Primary Key.

7) Salary

Srank \rightarrow salary

Since all the fields depend on Srank, (Srank)⁺ \rightarrow R.

Hence, Srank is Primary Key

8) Weapons_Inventory

{RegimentCode, WeaponID} -> Quantity

Since all the fields depend on {RegimentCode, WeaponID},

$(\{RegimentCode, WeaponID\})^+ \rightarrow R$.

Hence, {RegimentCode, WeaponID} is Primary Key.

9) Vehicle_Inventory

{RegimentCode, VehicleID} -> Quantity

Since all the fields depend on {RegimentCode, VehicleID},

$(\{RegimentCode, VehicleID\})^+ \rightarrow R$.

Hence, {RegimentCode, VehicleID} is Primary Key.

10) Equipment_Inventory

{RegimentCode, VehicleID} -> Quantity

Since all the fields depend on {RegimentCode, VehicleID},

$(\{RegimentCode, VehicleID\})^+ \rightarrow R$.

Hence, {RegimentCode, VehicleID} is Primary Key.

11) Weapon

WeaponID->{Wname, Wtype}

Since all the fields depend on WeaponID, $(WeaponID)^+ \rightarrow R$.

Hence, WeaponID is the Primary Key.

12) Vehicle

VehicleID->{Vname, Vtype, FuelType, ManYear}

{Vname, Vtype} -> {FuelType, ManYear}

Since all the fields depend on VehicleID, $(VehicleID)^+ \rightarrow R$.

Hence, VehicleID is the Primary Key.

13) Equipment

EquipmentID -> {Ename, Etype}

Since all the fields depend on EquipmentID,

$(EquipmentID)^+ \rightarrow R$. Hence, EquipmentID is Primary Key.

14) Operations

OperationCode->{Oname, StartDate, EndDate, Outcome}

Since all the fields depend on OperationCode,
(OperationCode)⁺ → R. Hence, OperationCode is PrimaryKey.

Normalisation

- **Soldier**

Primary key: SoldierID

All attributes depend on the SoldierID, hence the table is 2NF.

All attributes depend directly on SoldierID, hence the table is in 3NF.

All determinants(SoldierID) are candidate keys, hence the table is in BCNF.

- **Regiment**

Primary key: RegimentCode

All attributes depend on the RegimentCode, hence the table is 2NF. All attributes depend directly on RegimentCode, hence the table is in 3NF.

All determinants(RegimentCode) are candidate keys, hence the table is in BCNF.

- **Location**

Primary key: District

All attributes depend on the District, hence the table is 2NF.

All attributes depend directly on the District, hence the table is in 3NF.

All determinants(District) are candidate keys, hence the table is in BCNF.

- **Family**

Primary key: {FatherName, SoldierID}

All attributes depend on the {FatherName, SoldierID}, hence the table is 2NF.

All attributes depend directly on {FatherName, SoldierID}, hence the table is in 3NF.

All determinants({FatherName, SoldierID}) are candidate keys, hence the table is in BCNF.

- **Posting**

Primary key: {SoldierID, District}

All attributes depend on the {SoldierID, District}, hence the table is 2NF.

All attributes depend directly on {SoldierID, District}, hence the table is in 3NF.

All determinants({SoldierID, District}) are candidate keys, hence the table is in BCNF.

- **Medals**

Primary key: MedalID

All attributes depend on the MedalID, hence the table is 2NF. All attributes depend directly on MedalID, hence the table is in 3NF.

All determinants(MedalID) are candidate keys, hence the table is in BCNF.

- **Salary**

Primary key: sRank

All attributes depend on the sRank, hence the table is 2NF.

All attributes depend directly on sRank, hence the table is in 3NF.

All determinants(sRank) are candidate keys, hence the table is in BCNF.

- **Weapons inventory**

Primary key: {RegimentCode, WeaponID}

All attributes depend on the {RegimentCode, WeaponID}, hence the table is 2NF.

All attributes depend directly on {RegimentCode, WeaponID}, hence the table is in 3NF.

All determinants{RegimentCode, WeaponID} are candidate keys, hence the table is in BCNF.

- **Vehicle Inventory**

Primary key: {RegimentCode, VehicleID}

All attributes depend on the {RegimentCode, VehicleID}, hence the table is 2NF.

All attributes depend directly on {RegimentCode, VehicleID}, hence the table is in 3NF.

All determinants{RegimentCode, VehicleID} are candidate keys, hence the table is in BCNF.

- **Equipment inventory**

Primary key: {RegimentCode, EquipmentID}

All attributes depend on the {RegimentCode, EquipmentID}, hence the table is 2NF. All attributes depend directly on {RegimentCode, EquipmentID }, hence the table is in 3NF.

All determinants{RegimentCode, EquipmentID } are candidate keys, hence the table is in BCNF.

- **Weapon**

Primary key: WeaponID

All attributes depend on the WeaponID, hence the table is 2NF. All attributes depend directly on WeaponID, hence the table is in 3NF. All determinants (WeaponID) are candidate keys, hence the table is in BCNF.

- **Vehicle**

Primary key: VehicleID

All attributes depend on the VehicleID, hence the table is 2NF. All attributes depend directly on VehicleID, hence the table is in 3NF. All determinants (VehicleID) are candidate keys, hence the table is in BCNF.

- **Equipment**

Primary key: EquipmentID

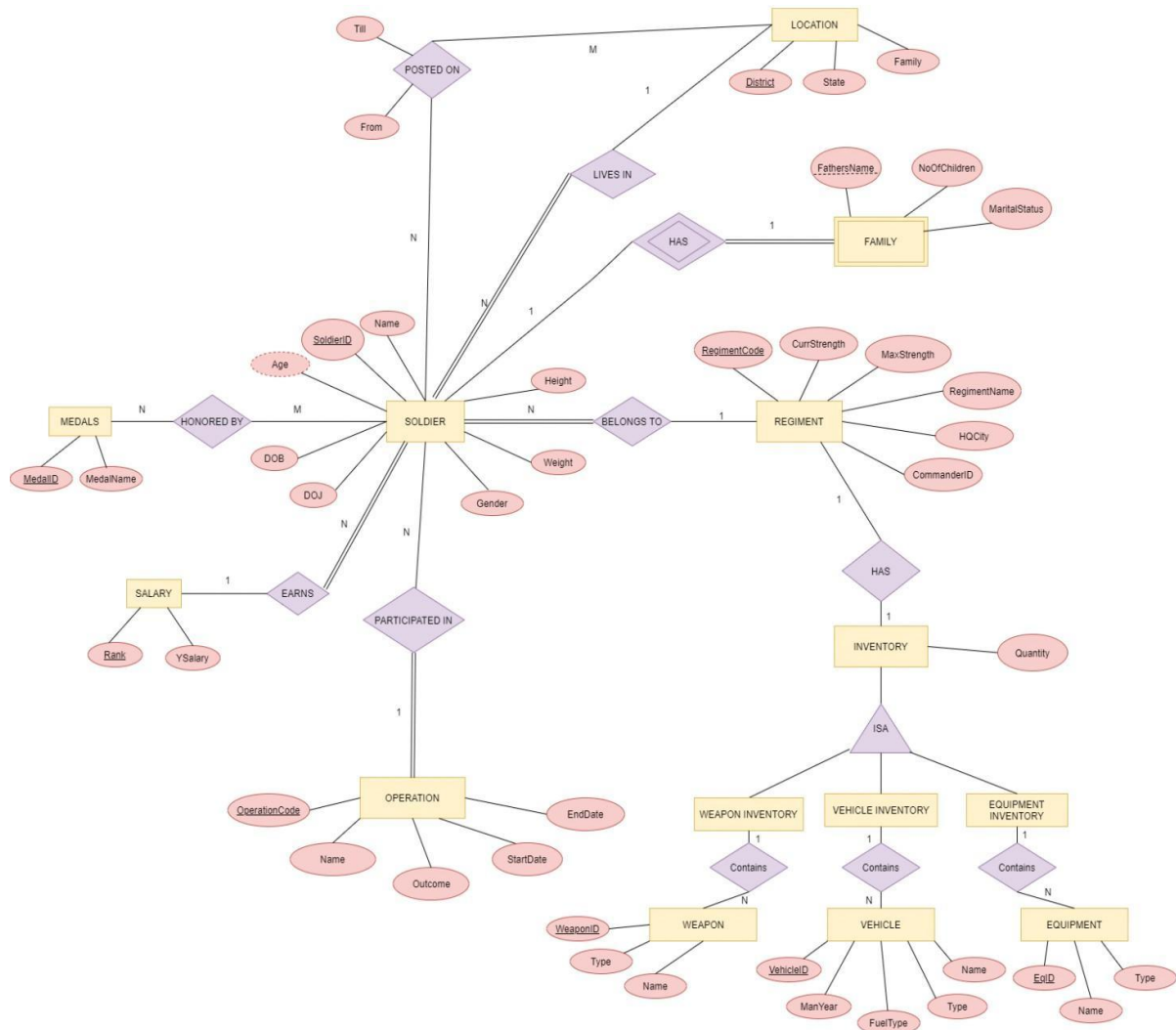
All attributes depend on the EquipmentID, hence the table is 2NF. All attributes depend directly on EquipmentID, hence the table is in 3NF. All determinants (EquipmentID) are candidate keys, hence the table is in BCNF.

- **Operations**

Primary key: OperationCode

All attributes depend on the OperationCode, hence the table is 2NF. All attributes depend directly on OperationCode, hence the table is in 3NF. All determinants (OperationCode) are candidate keys, hence the table is in BCNF

ER Diagram :-



Relational Schema with Normalized Tables :-

