

REDALERT - Schema and Normalization

1. FireStation Table

- **Elements:**

- **Station_ID (Primary Key):** A unique identifier for each fire station.
- **Name:** The name of the fire station (e.g., "Central Fire Station").
- **Location:** The physical address of the fire station.
- **Contact_Number:** The contact number for the fire station.
- **Total_Staff:** The total number of staff members at the station.
- **Total_Vehicles:** The total number of vehicles at the station.

- **Normalization:**

- **1NF:** The table is in 1NF because each column contains atomic values. For example, **Name** only stores the name of the station, and **Contact_Number** only stores a single phone number.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Station_ID**), and all non-key attributes (like **Name**, **Location**, etc.) are fully dependent on the primary key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. All attributes depend directly on the primary key (**Station_ID**), and not on any other non-key attribute.
- **BCNF:** The table is in BCNF because the primary key (**Station_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

2. Vehicle Table

- **Elements:**

- **Vehicle_ID (Primary Key):** A unique identifier for each vehicle.
- **Type:** The type of vehicle (e.g., fire truck, ambulance).
- **Model_No:** The model number of the vehicle.
- **Status:** The current status of the vehicle (e.g., active, under maintenance).
- **Water_Capacity:** The water-carrying capacity of the vehicle (if applicable).
- **Station_ID (Foreign Key):** Links the vehicle to a specific fire station.
- **Last_Maintenance_Date:** The date when the vehicle was last serviced.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Type** only stores the type of vehicle, and **Model_No** only stores the model number.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Vehicle_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Status** depends directly on **Vehicle_ID**, not on any other attribute like **Station_ID**.
- **BCNF:** The table is in BCNF because the primary key (**Vehicle_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

3. Supplier Table

- **Elements:**

- **Supplier_ID (Primary Key):** A unique identifier for each supplier.
- **Name:** The name of the supplier (e.g., "Fire Safety Supplies Inc.").
- **Contact:** The contact information of the supplier.

- **Email:** The email address of the supplier.
- **Address:** The physical address of the supplier.
- **Item_Provided:** The type of item provided by the supplier (e.g., fire extinguishers, hoses).

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Email** only stores a single email address.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Supplier_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Address** depends directly on **Supplier_ID**, not on any other attribute like **Name**.
- **BCNF:** The table is in BCNF because the primary key (**Supplier_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

4. Inventory Table

- **Elements:**

- **Inventory_ID (Primary Key):** A unique identifier for each inventory item.
- **Item_Name:** The name of the item (e.g., fire extinguisher, hose).
- **Quantity:** The quantity of the item in stock.
- **Station_ID (Foreign Key):** Links the inventory item to a specific fire station.
- **Supplier_ID (Foreign Key):** Links the item to the supplier who provided it.
- **Last_Updated:** The timestamp of the last update to the inventory.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Item_Name** only stores the name of the item.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Inventory_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Quantity** depends directly on **Inventory_ID**, not on any other attribute like **Station_ID**.
- **BCNF:** The table is in BCNF because the primary key (**Inventory_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

5. Staff Table

- **Elements:**

- **Staff_ID (Primary Key):** A unique identifier for each staff member.
- **Name:** The name of the staff member.
- **Designation:** The role or designation of the staff member (e.g., firefighter, paramedic).
- **Contact:** The contact information of the staff member.
- **Email:** The email address of the staff member.
- **Station_ID (Foreign Key):** Links the staff member to a specific fire station.
- **Shift:** The shift timing of the staff member (e.g., morning, night).

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Designation** only stores the role of the staff member.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Staff_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Shift** depends directly on **Staff_ID**, not on any other attribute like **Station_ID**.
- **BCNF:** The table is in BCNF because the primary key (**Staff_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

6. User Table

- **Elements:**

- **User_ID (Primary Key):** A unique identifier for each user.
- **Name:** The name of the user.
- **Username:** A unique username for login purposes.
- **Password:** The password for login.
- **Contact:** The contact information of the user.
- **Email:** The email address of the user.
- **Address:** The physical address of the user.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Username** only stores a single username.
- **2NF:** The table is in 2NF because it has a single-column primary key (**User_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Address** depends directly on **User_ID**, not on any other attribute like **Username**.
- **BCNF:** The table is in BCNF because the primary key (**User_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

7. Admin Table

- **Elements:**

- **Admin_ID (Primary Key):** A unique identifier for each admin.
- **Name:** The name of the admin.
- **Username:** A unique username for login purposes.
- **Password:** The password for login.
- **Contact:** The contact information of the admin.
- **Role:** The role of the admin (e.g., super admin, station admin).

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Username** only stores a single username.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Admin_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Role** depends directly on **Admin_ID**, not on any other attribute like **Username**.
- **BCNF:** The table is in BCNF because the primary key (**Admin_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

8. Report Table

- **Elements:**

- **Report_ID (Primary Key):** A unique identifier for each report.
- **Street_Address:** The street address of the incident.
- **City:** The city where the incident occurred.
- **State:** The state where the incident occurred.
- **Pincode:** The postal code of the incident location.
- **Description:** A detailed description of the incident.

- **Report_Date_Time:** The timestamp of when the report was filed.
- **Severity_Level:** The severity level of the incident (e.g., low, medium, high).
- **User_ID (Foreign Key):** Links the report to the user who filed it.
- **Action_Taken:** A description of the action taken in response to the report.
- **Action_Date_Time:** The timestamp of when the action was taken.
- **Admin_ID (Foreign Key):** Links the report to the admin who handled it.
- **Assigned_Vehicle (Foreign Key):** Links the report to the vehicle assigned to the incident.
- **Assigned_Staff (Foreign Key):** Links the report to the staff assigned to the incident.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Description** only stores a single description.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Report_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Severity_Level** depends directly on **Report_ID**, not on any other attribute like **User_ID**.
- **BCNF:** The table is in BCNF because the primary key (**Report_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

9. EquipmentUsage Table

- **Elements:**

- **Usage_ID (Primary Key):** A unique identifier for each usage record.
- **Inventory_ID (Foreign Key):** Links the usage record to the inventory item used.
- **Used_Quantity:** The quantity of the item used.
- **Date_Used:** The timestamp of when the item was used.
- **Purpose:** The purpose of using the item (e.g., training, emergency).
- **Staff_ID (Foreign Key):** Links the usage record to the staff member who used the item.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, **Purpose** only stores a single purpose.
- **2NF:** The table is in 2NF because it has a single-column primary key (**Usage_ID**), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, **Used_Quantity** depends directly on **Usage_ID**, not on any other attribute like **Inventory_ID**.
- **BCNF:** The table is in BCNF because the primary key (**Usage_ID**) is the only determinant, and it uniquely identifies every other attribute in the table.

10. Maintenance Table

- **Elements:**

- **Maintenance_ID (Primary Key):** A unique identifier for each maintenance record.
- **Vehicle_ID (Foreign Key):** Links the maintenance record to the vehicle being maintained.
- **Maintenance_Type:** The type of maintenance performed (e.g., oil change, engine repair).
- **Date_Performed:** The timestamp of when the maintenance was performed.
- **Cost:** The cost of the maintenance.
- **Performed_By:** The name of the person or entity who performed the maintenance.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, `Maintenance_Type` only stores the type of maintenance.
- **2NF:** The table is in 2NF because it has a single-column primary key (`Maintenance_ID`), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, `Cost` depends directly on `Maintenance_ID`, not on any other attribute like `Vehicle_ID`.
- **BCNF:** The table is in BCNF because the primary key (`Maintenance_ID`) is the only determinant, and it uniquely identifies every other attribute in the table.

11. FuelLog Table

- **Elements:**

- **Fuel_ID (Primary Key):** A unique identifier for each fuel log.
- **Vehicle_ID (Foreign Key):** Links the fuel log to the vehicle being fueled.
- **Date:** The timestamp of when the fueling occurred.
- **Fuel_Amount:** The amount of fuel added.
- **Cost:** The cost of the fuel.

- **Normalization:**

- **1NF:** The table is in 1NF because all columns contain atomic values. For example, `Fuel_Amount` only stores a single value.
- **2NF:** The table is in 2NF because it has a single-column primary key (`Fuel_ID`), and all non-key attributes depend entirely on this key. There are no partial dependencies.
- **3NF:** The table is in 3NF because there are no transitive dependencies. For example, `Cost` depends directly on `Fuel_ID`, not on any other attribute like `Vehicle_ID`.
- **BCNF:** The table is in BCNF because the primary key (`Fuel_ID`) is the only determinant, and it uniquely identifies every other attribute in the table.