WEAPON SALES MANAGEMENT SYSTEM

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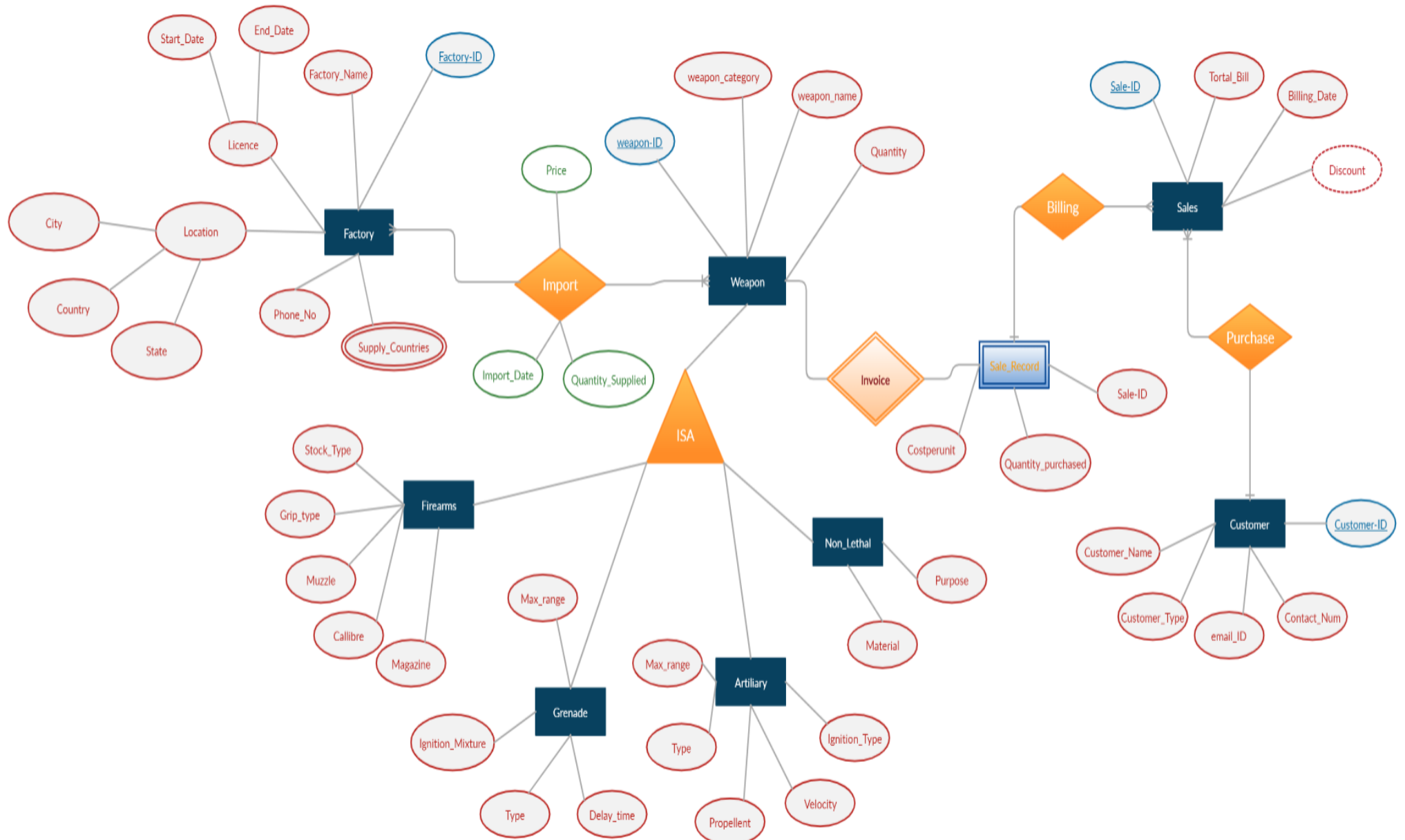
Problem statement

To model a database that tracks and manages inventory and sales activity of <u>defence equipment.</u> This database can be used to store details of stock maintenance and sales reports.

Project description

The retail business is fast paced where the number and details of transactions cannot be recorded conveniently. Inventory is one of the most important departments of retail industry and in order to ensure the business runs smoothly the inventory should be well managed.

Inventory management also involves keeping details of customer transactions which would help manage any issues the customer has in the future with products. An inventory and sales management system help record details of fast-moving products that have been supplied from manufacturers or sold to customers while also maintaining data about the manufacturers and customers.

Entity-Relationship model

Start_Date
End_Date
Factory_Name
Factory-ID
Licence
City
Location
Country
State
Phone_No
Supply_Countries
Factory

Price
weapon_category
weapon_name
weapon-ID
Quantity
Import
Import_Date
Quantity_Supplied
Weapon

Sale-ID
Tortal_Bill
Billing_Date
Discount
Billing
Sales

Invoice
Sale_Record
Costperunit
Quantity_purchased
Sale-ID

Purchase

ISA

Stock_Type
Grip_type
Muzzle
Callibre
Magazine
Firearms

Non_Lethal
Purpose
Material

Customer
Customer-ID
Customer_Name
Customer_Type
email_ID
Contact_Num

Max_range
Grenade
Ignition_Mixture
Type
Delay_time

Max_range
Artillary
Type
Propellent
Velocity
Ignition_Type

Normalization:

Factory:

1.Supply_Countries is a multi-valued attribute. Hence, it violates 1st Normal Form.

    Decomposition:

        Factory_ID -> Supply_Countries

        New relation ➔ Supply_Countries {Factory_ID, Country}

2. Factory_ID -> {City, State}

  {City, State} -> Country

  Factory_ID -> Country

        The above statements show that there exists a transitive property in Factory Table. Hence, it violates 3rd Normal Form.

    Decomposition:

        R1 ➔ Factory {Factory_ID, Factory_Name, City, State, Phone_No, Licence_Start_date, Licence_End_Date}

        R2 ➔ Fact_Country {Factory_ID, Country}

    Verification of Loss-Less Composition:

        R1 ∩ R2 ➔ Factory_ID ->R1 and R2

        Hence, the formed decomposed relations satisfy loss-less decomposition.

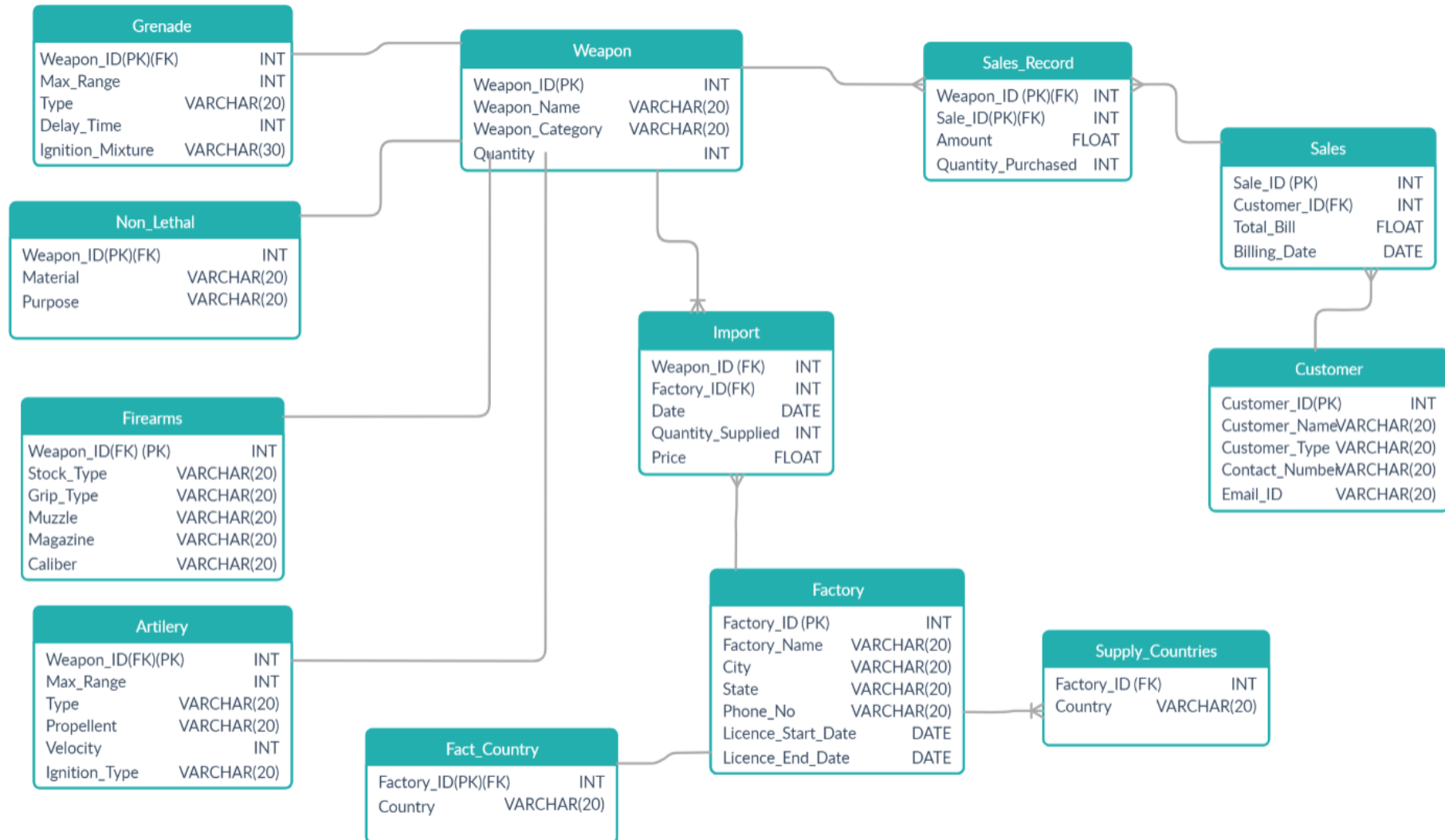Now, Both Factory and Fact_Country are in 3rd Normal Form.

All Other Relations satisfies BCNF.

Hence, the whole Database is normalized and is in BCNF (Boyce Codd Normal Form).

Relational Schema:

1. **weapon** {weapon_id, weapon_name, weapon_category, quantity}
2. **factory** {factory_id, factory_name, city, state, phone_no, licence_start_date, licence_end_date}
3. **fact_country** {factory_id, country}
4. **supply_countries** {factory_id, country}
5. **firearms** {weapon_id, stock_type, grip_type, muzzle, magazine, calibre}
6. **grenade** {weapon_id, type, ignition_mixture, max_range, delay_time}
7. **artillery** {weapon_id, type, ignition_type, propellent, max_range, velocity}
8. **non_lethal** {weapon_id, material, purpose}
9. **import** {factory_id, weapon_id, date, quantity_supplied, price}
10. **customer** {cust_id, cust_name, cust_type, contact_num, email}
11. **sale** {sale_id, cust_id, date, total_bill}
12. **sales_record** {weapon_id, sale_id, quantity_purchased, amount}

Relational Schema:

Grenade
Weapon_ID(PK)(FK)	INT
Max_Range	INT
Type	VARCHAR(20)
Delay_Time	INT
Ignition_Mixture	VARCHAR(30)

Weapon
Weapon_ID(PK)	INT
Weapon_Name	VARCHAR(20)
Weapon_Category	VARCHAR(20)
Quantity	INT

Sales_Record
Weapon_ID (PK)(FK)	INT
Sale_ID(PK)(FK)	INT
Amount	FLOAT
Quantity_Purchased	INT

Sales
Sale_ID (PK)	INT
Customer_ID(FK)	INT
Total_Bill	FLOAT
Billing_Date	DATE

Non_Lethal
Weapon_ID(PK)(FK)	INT
Material	VARCHAR(20)
Purpose	VARCHAR(20)

Import
Weapon_ID (FK)	INT
Factory_ID(FK)	INT
Date	DATE
Quantity_Supplied	INT
Price	FLOAT

Customer
Customer_ID(PK)	INT
Customer_Name	VARCHAR(20)
Customer_Type	VARCHAR(20)
Contact_Number	VARCHAR(20)
Email_ID	VARCHAR(20)

Firearms
Weapon_ID(FK) (PK)	INT
Stock_Type	VARCHAR(20)
Grip_Type	VARCHAR(20)
Muzzle	VARCHAR(20)
Magazine	VARCHAR(20)
Caliber	VARCHAR(20)

Factory
Factory_ID (PK)	INT
Factory_Name	VARCHAR(20)
City	VARCHAR(20)
State	VARCHAR(20)
Phone_No	VARCHAR(20)
Licence_Start_Date	DATE
Licence_End_Date	DATE

Supply_Countries
Factory_ID (FK)	INT
Country	VARCHAR(20)

Artilery
Weapon_ID(FK)(PK)	INT
Max_Range	INT
Type	VARCHAR(20)
Propellent	VARCHAR(20)
Velocity	INT
Ignition_Type	VARCHAR(20)

Fact_Country
Factory_ID(PK)(FK)	INT
Country	VARCHAR(20)

SQL STATEMENTS:

Creation:

```
CREATE TABLE weapon
(
 weapon_id INT ,
 weapon_name VARCHAR(20) ,
 weapon_category VARCHAR(20) ,
 quantity INT,
 PRIMARY KEY (weapon_id)
);

CREATE TABLE factory
(
 factory_id INT ,
 factory_name VARCHAR(20) ,
 city VARCHAR(20) ,
 state VARCHAR(20) ,
 phone_no VARCHAR(20) ,
 licencestart_date DATE ,
 licenceend_date DATE ,
 PRIMARY KEY (factory_id)
);

CREATE TABLE firearms
(
 weapon_id INT ,
 stock_type VARCHAR(20) ,
 grip_type VARCHAR(20) ,
 muzzle VARCHAR(20) ,
 magazine VARCHAR(20) ,
 caliber VARCHAR(20) ,
 PRIMARY KEY (weapon_id),
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id)
);

CREATE TABLE grenade
(
 weapon_id INT ,
 type VARCHAR(20) ,
 ignition_mixture VARCHAR(30) ,
 max_range INT ,
 delay_time INT ,
 PRIMARY KEY (weapon_id),
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id)
);
```

```sql
CREATE TABLE artilery
(
 weapon_id INT ,
 type VARCHAR(20) ,
 ignition_type VARCHAR(20) ,
 propellent VARCHAR(20) ,
 max_range INT ,
 velocity INT ,
 PRIMARY KEY (weapon_id),
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id),
);

CREATE TABLE non_lethal
(
 weapon_id INT ,
 material VARCHAR(20) ,
 purpose VARCHAR(20),
 PRIMARY KEY (weapon_id),
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id)
);

CREATE TABLE customer
(
 cust_id INT ,
 cust_name VARCHAR(20) ,
 cust_type VARCHAR(20) ,
 contact_num VARCHAR(20) ,
 email_id VARCHAR(20) ,
 PRIMARY KEY (cust_id)
);

CREATE TABLE sale
(
 sale_id INT ,
 cust_id INT ,
 date DATE ,
 total_bill FLOAT ,
 PRIMARY KEY (sale_id),
 FOREIGN KEY (cust_id) REFERENCES customer(cust_id)
);

CREATE TABLE sales_record
(
 weapon_id INT ,
 sale_id INT ,
 quantity_purchased INT ,
 amount FLOAT ,
 PRIMARY KEY (weapon_id, sale_id),
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id),
```

```sql
  FOREIGN KEY (sale_id) REFERENCES sale(sale_id)
);

CREATE TABLE supply_countries
(
 factory_id INT ,
 country VARCHAR(20) ,
 FOREIGN KEY (factory_id) REFERENCES factory(factory_id)
);

CREATE TABLE import
(
 factory_id INT ,
 weapon_id INT ,
 date DATE,
 quantity_supplied INT,
 Price FLOAT ,
 FOREIGN KEY (weapon_id) REFERENCES weapon(weapon_id),
 FOREIGN KEY (factory_id) REFERENCES factory(factory_id)
);

CREATE TABLE fact_country
(
 factory_id INT ,
 country VARCHAR(20) ,
 PRIMARY KEY (factory_id),
 FOREIGN KEY (factory_id) REFERENCES factory(factory_id)
);
```

Insertion:

```sql
insert into weapon values(8120001,'AK-107','firearms',103);

insert into weapon values(8120002,'AEK-97','firearms',234);

insert into weapon values(8120003,'BSA28P','firearms',123);

insert into weapon values(8120004,'CETME','firearms',23);

insert into weapon values(8120005,'FBMSBS','firearms',12);

insert into weapon values(8119001,'M26A2','explosive',156);

insert into weapon values(8119002,'M33','explosive',234);

insert into weapon values(8119003,'M57','explosive',123);

insert into weapon values(8119004,'MK2','explosive',56);

insert into weapon values(8119005,'M68','explosive',12);
```

insert into weapon values(8320001,'M968','artillary',12);

insert into weapon values(8320002,'HEI','artillary',345);

insert into weapon values(8320003,'HE-T','artillary',456);

insert into weapon values(8320004,'TP-T','artillary',345);

insert into weapon values(8320005,'AP-T','artillary',45);

insert into weapon values(8418001,'strike-pen','non-lethal',45);

insert into weapon values(8418002,'strike-light','non-lethal',56);

insert into weapon values(8418003,'monkey-fist','non-lethal',456);

insert into weapon values(8418004,'pepper-spray','non-lethal',432);

insert into weapon values(8418005,'coldsteelbaseballbat','non-lethal',345);

insert into firearms values(8120001,'sidefoldingpolymer','ar-15style','900','30','5.45X39');

insert into firearms values(8120002,'rectractedtype','pistoltype','900','40','5.45X39');

insert into firearms values(8120003,'tacticaltype','lighttype','1200','45','6.23X22');

insert into firearms values(8120004,'G3stockbolttype','ar15style','1000','42','4.21X44');

insert into firearms values(8120005,'rectractedtype','thumbgrip','1050','43','5.22X19');

insert into grenade values(82190001,'fragmentation','leadazide_PETN',45,4);

insert into grenade values(82190002,'fragmentation','leadazide_RDX',55,6);

insert into grenade values(82190003,'offensive','leadstyphnate_PETN',50,5);

insert into grenade values(82190004,'incendiary','leadazide_PETN_RDX',52,7);

insert into grenade values(82190005,'incendiary','leadstyphnate_PETN_RDX',62,6);

insert into artilery values(8320001,'manned','electric','M31A1E1_stick',0.5,328);

insert into artilery values(8320002,'unmanned','heat','singleperforated',10,1100);

insert into artilery values(8320003,'unmanned','electric','MIpropellant',6,950);

insert into artilery values(8320004,'manned','electric','MI0.7216',7,780);

```sql
insert into artilery values(8320005,'manned','heat','M31A1stick',11,950);

insert into non_lethal values(8418001,'aluminium','self_defense');

insert into non_lethal values(8418002,'frosted_glass','self_defense');

insert into non_lethal values(8418003,'monkey_fist','self_defense');

insert into non_lethal values(8418004,'pepper_spray','self_defense');

insert into non_lethal values(8418005,'coldsteelbaseballbat','riot_control');

insert into factory
values(448801,'lockhead_martin','betesda','maryland','8219000223','01-jan-1949','04-mar-2095');

insert into factory
values(469902,'baesystems','farnborough','moscow','8214000223','01-feb-1989','04-may-2099');

insert into factory values(499103,'airbus','blangnac','leiden','8268110223','01-mar-1849','04-mar-2021');

insert into factory
values(518204,'thalesgroup','marseille','ladefence','9139000223','10-dec-1978','24-nov-2056');

insert into factory
values(629105,'almaz_antery','novosibirsk','moscow','5671200223','11-feb-1989','14-may-2095');

insert into factory
values(712906,'rheimmetall','dussseldorf','northrhine_west','8219000223','21-jan-1989','24-dec-2035');

insert into fact_country values(448801,'US');

insert into fact_country values(469902,'germany');

insert into fact_country values(499103,'UK');

insert into fact_country values(518204,'netherlands');

insert into fact_country values(629105,'france');

insert into fact_country values(712906,'Russia');

insert into supply_countries values(448801,'germany');

insert into supply_countries values(448801,'US');
```

```sql
insert into supply_countries values(448801,'france');

insert into supply_countries values(448801,'india');

insert into supply_countries values(469902,'germany');

insert into supply_countries values(469902,'US');

insert into supply_countries values(499103,'france');

insert into supply_countries values(499103,'Russia');

insert into supply_countries values(518204,'US');

insert into supply_countries values(518204,'germany');

insert into supply_countries values(629105,'france');

insert into supply_countries values(629105,'Russia');

insert into supply_countries values(712906,'germany');

insert into supply_countries values(712906,'US');

insert into import values(448801,8120001,'01-jan-1949',40,57);

insert into import values(469902,8120002,'03-jan-1919',240,20);

insert into import values(469902,8120001,'01-feb-1969',103,50);

insert into import values(499103,8120003,'01-jan-1999',150,57);

insert into import values(518204,8120003,'01-mar-1979',3,47);

insert into import values(448801,8120004,'01-jan-1949',43,5);

insert into import values(629105,8120005,'09-feb-1990',22,8);

insert into import values(712906,8120005,'01-jan-1949',10,97);

insert into import values(448801,82190001,'23-may-1969',256,97);

insert into import values(499103,82190002,'01-oct-1949',344,57);

insert into import values(518204,82190002,'01-jan-1979',9,51);

insert into import values(712906,82190003,'11-mar-1989',197,90);

insert into import values(448801,82190004,'21-nov-1949',22,57);

insert into import values(629105,82190004,'16-jan-1949',12,12);

insert into import values(518204,82190005,'15-oct-1999',99,7);
```

```sql
insert into import values(499103,8320001,'23-mar-2009',45,57);

insert into import values(448801,8320001,'01-jan-1949',4,57);

insert into import values(448801,8320002,'14-may-1979',450,77);

insert into import values(448801,8320003,'01-jan-1949',40,7);

insert into import values(712906,8320003,'17-apr-1989',490,71);

insert into import values(518204,8320004,'27-feb-2011',450,57);

insert into import values(448801,8320005,'01-may-1989',400,32);

insert into import values(629105,8320005,'01-dec-1949',4,23);

insert into import values(518204,8418001,'29-jun-2010',59,18);

insert into import values(518204,8418002,'27-jul-2009',59,18);

insert into import values(469902,8418002,'29-dec-2008',19,18);

insert into import values(518204,8418003,'29-nov-2007',590,1);

insert into import values(629105,8418004,'17-jul-2000',59,18);

insert into import values(518204,8418005,'29-jun-2010',119,28);

insert into customer
values(12001,'krishnasai','navy','9192392345','ksgay31@gmail.com');

insert into customer
values(12002,'raghunagam','airforce','9197398345','nrloda@gmail.com');

insert into customer
values(12003,'abhi','industrialsecurity','678123478','abhi@gmail.com');

insert into customer
values(12004,'hrishiT','navy','678123478','spardhak12@gmail.com');

insert into customer
values(12005,'diwakar','airforce','9081237567','dondiwa12@gmail.com');

insert into customer
values(12006,'kshithija','army','3451238902','tirumija@gmail.com');

insert into customer
values(12007,'joshna','banksecurity','9081234567','bonu12@gmail.com');

insert into sale values(1001,12001,'01-mar-1979',1234);
```

```sql
insert into sale values(1002,12002,'11-may-1979',1734);

insert into sale values(1003,12003,'21-feb-1989',1937);

insert into sale values(1004,12003,'01-mar-1979',1230);

insert into sale values(1005,12004,'17-may-1999',2345);

insert into sale values(1006,12005,'01-dec-2001',1890);

insert into sale values(1007,12006,'17-nov-2002',1789);

insert into sale values(1008,12006,'19-oct-1983',1789);

insert into sale values(1009,12007,'30-aug-2009',1871);

insert into sales_record values(82190005,1001,5,234);

insert into sales_record values(82190004,1004,6,6782);

insert into sales_record values(8120005,1009,4,3456);

insert into sales_record values(82190002,1003,7,7865);

insert into sales_record values(8320005,1007,1,3456);

insert into sales_record values(8120003,1002,3,7685);

insert into sales_record values(82190001,1006,4,8765);

insert into sales_record values(8418005,1001,5,1234);

insert into sales_record values(8418004,1003,1,3421);

insert into sales_record values(8418002,1005,3,2345);

insert into sales_record values(82190005,1007,5,2897);

insert into sales_record values(82190005,1008,7,9866);

insert into sales_record values(8120004,1003,9,3457);

insert into sales_record values(8120001,1009,2,2387);

insert into sales_record values(8120004,1005,6,4562);

insert into sales_record values(8418005,1008,7,9872);
```