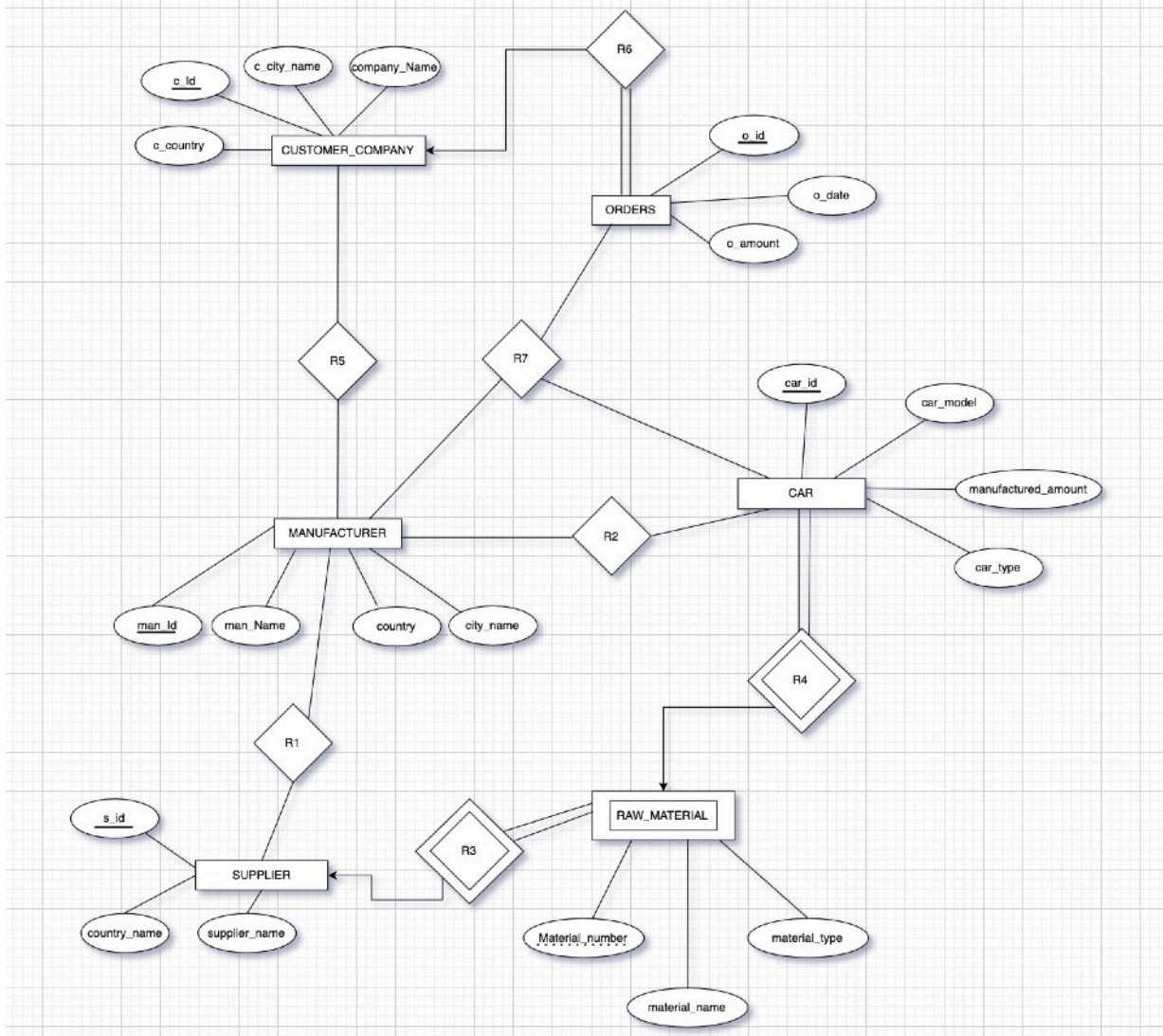## PART A)

The project topic we chose for the database application is manufacturing. We designed a database where manufacturers , customers and related assets are stored.
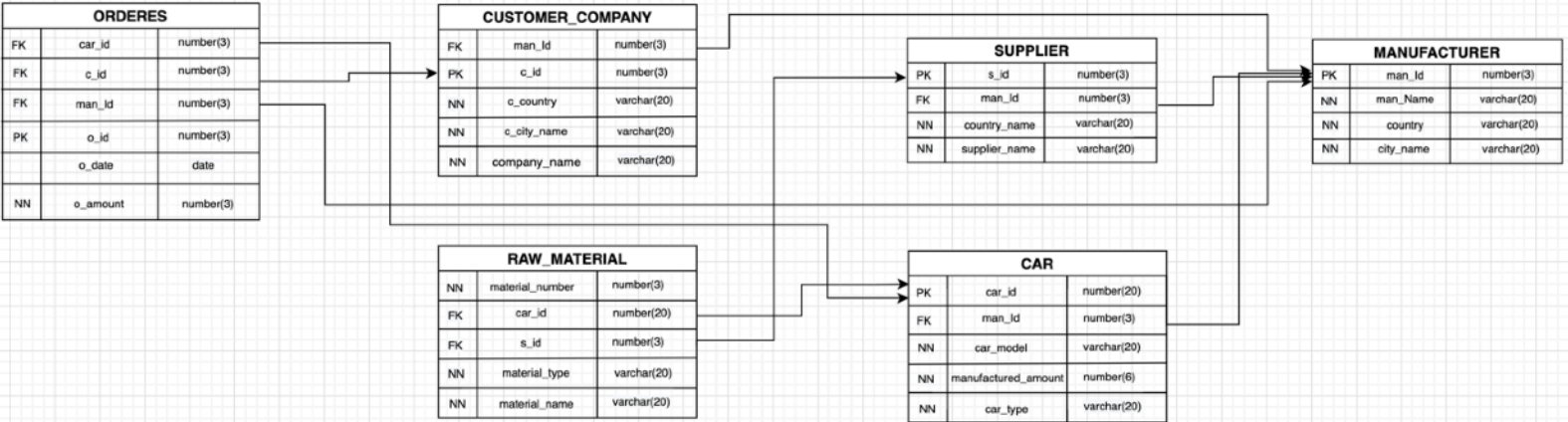
Barış Gündem 2002936 : I wrote insert into statements and wrote 8 different SQL queries for the database he created. (Parts e and f)

Meltem Meydan 1904629 :   I explained our topics and member-role responsibilities, designed an E-R diagram with at least 5 strong assets based on our project location. (Parts a and b)

Rıdvan Burak Ünal 2001405: Boyce-Codd drew a database schema diagram to meet its normal form and illustrated its relationships. Also I wrote the create table statements for all relations in the schema. (Parts c and d)

PART B)
PART C)

ORDERES

FK	car_id	number(3)
FK	c_id	number(3)
FK	man_Id	number(3)
PK	o_id	number(3)
	o_date	date
NN	o_amount	number(3)

CUSTOMER_COMPANY

FK	man_Id	number(3)
PK	c_id	number(3)
NN	c_country	varchar(20)
NN	c_city_name	varchar(20)
NN	company_name	varchar(20)

SUPPLIER

PK	s_id	number(3)
FK	man_Id	number(3)
NN	country_name	varchar(20)
NN	supplier_name	varchar(20)

MANUFACTURER

PK	man_Id	number(3)
NN	man_Name	varchar(20)
NN	country	varchar(20)
NN	city_name	varchar(20)

RAW_MATERIAL

NN	material_number	number(3)
FK	car_id	number(20)
FK	s_id	number(3)
NN	material_type	varchar(20)
NN	material_name	varchar(20)

CAR

PK	car_id	number(20)
FK	man_Id	number(3)
NN	car_model	varchar(20)
NN	manufactured_amount	number(6)
NN	car_type	varchar(20)

MANUFACTURER

MANID	MANNAME	COUNTRY	CITYNAME
416	Toyota Motor Corp	JAPAN	TOYOTA CITY
417	Volkswagen AG	GERMANY	WOLFSBURG
418	Ford Motor Co.	USA	MICHIGAN

RAW MATERIAL

MATERIALNUMBER	CARID	SID	MATERIALTYPE	MATERIALNAME
998	62895	255	PC ABS	Bumper
442	768994	256	Caoutchouc	Tire
106	4578	257	Aluminum	Rim

SUPPLIER

SID	MANID	COUNTRYNAME	SUPPLIERNAME
255	416	GERMANY	BOSCH
256	417	GERMANY	CONTINENTAL
257	418	GERMANY	ZF Friedrichshafen

CUSTOMER COMPANY

MANID	CID	CCOUNTRY	CCITYNAME	COMPANYNAME
417	628	TURKEY	ISTANBUL	MEZ AUTOMOTIVE
416	578	TURKEY	ISTANBUL	Toyota Plaza ALJ
418	441	TURKEY	ESKISEHIR	OTOKOC

CAR

CARID	MANID	CARMODEL	MANUFACTUREDAMOUNT	CARTYPE
62895	417	Tiguan	6500	SUV
768994	416	Corolla	88000	Sedan
768995	416	Camry	45000	Sedan
4578	418	Mustang	3850	Sedan

ORDERS

CID	MANID	OID	ODATE	OAMOUNT
628	417	12	01-SEP-2021	120
578	416	22	15-OCT-2021	250
441	418	6	05-FEB-2021	20

PART D)

```sql
CREATE TABLE MANUFACTURER(
man_Id NUMBER(3) PRIMARY KEY,
man_Name VARCHAR(20) NOT NULL,
country VARCHAR(20) NOT NULL,
city_name VARCHAR(20) NOT NULL);


CREATE TABLE SUPPLIER(
s_id NUMBER(3) PRIMARY KEY,
man_Id NUMBER(3) REFERENCES MANUFACTURER(man_Id),
country_name VARCHAR(20) NOT NULL,
supplier_name VARCHAR(20) NOT NULL);


CREATE TABLE CAR(
car_id NUMBER(20) PRIMARY KEY,
man_Id NUMBER(3) REFERENCES MANUFACTURER(man_Id),
car_model VARCHAR(20) NOT NULL,
manufactured_amount NUMBER(6) NOT NULL,
car_type VARCHAR(20) NOT NULL);


CREATE TABLE RAW_MATERIAL(

material_number NUMBER(3) NOT NULL,
car_id NUMBER(20) REFERENCES CAR(car_id),
s_id NUMBER(3) REFERENCES SUPPLIER(s_id),
material_type VARCHAR(20) NOT NULL,
material_name VARCHAR(20) NOT NULL);


CREATE TABLE CUSTOMER_COMPANY(
man_Id NUMBER(3) REFERENCES MANUFACTURER(man_Id),
c_id NUMBER(3) PRIMARY KEY,
c_country VARCHAR(20) NOT NULL,
c_city_name VARCHAR(20) NOT NULL,
company_name VARCHAR(20) NOT NULL);

CREATE TABLE ORDERS(
car_id NUMBER(20) REFERENCES CAR(car_id),
c_id NUMBER(3) REFERENCES CUSTOMER_COMPANY(c_id),
man_Id NUMBER(3) REFERENCES MANUFACTURER(man_Id),
o_id NUMBER(3) PRIMARY KEY,
o_date DATE,
o_amount NUMBER(3) NOT NULL);
```

PART E)

```sql
INSERT INTO MANUFACTURER VALUES(416 , 'Toyota Motor Corp.' , 'JAPAN' , 'TOYOTA CITY');
INSERT INTO MANUFACTURER VALUES(417 , 'Volkswagen AG' , 'GERMANY' , 'WOLFSBURG');
INSERT INTO MANUFACTURER VALUES(418 , 'Ford Motor Co.' , 'USA' , 'MICHIGAN');

INSERT INTO SUPPLIER VALUES(255 , 416 , 'GERMANY' , 'BOSCH');
INSERT INTO SUPPLIER VALUES(256 , 417 , 'GERMANY' , 'CONTINENTAL');
INSERT INTO SUPPLIER VALUES(257 , 418 , 'GERMANY' , 'ZF Friedrichshafen');

INSERT INTO CAR VALUES(62895 , 417 , 'Tiguan' , 6500 , 'SUV');
INSERT INTO CAR VALUES(768994 , 416 , 'Corolla' , 88000 , 'Sedan');
INSERT INTO CAR VALUES(768995 , 416 , 'Camry' , 45000 , 'Sedan');
INSERT INTO CAR VALUES(4578 , 418 , 'Mustang' , 3850 , 'Sedan');

INSERT INTO RAW_MATERIAL VALUES(998 , 62895 , 255 , 'PC ABS' , 'Bumper');
INSERT INTO RAW_MATERIAL VALUES(422 , 768994 , 256 , 'Caoutchouc' , 'Tire');
INSERT INTO RAW_MATERIAL VALUES(106 , 4578 , 257 , 'Aluminum' , 'Rim');

INSERT INTO CUSTOMER_COMPANY VALUES(417 , 628 , 'TURKEY' , 'ISTANBUL' , 'MEZ AUTOMOTIVE');
INSERT INTO CUSTOMER_COMPANY VALUES(416 , 578 , 'TURKEY' , 'ISTANBUL' , 'Toyota Plaza ALJ');
INSERT INTO CUSTOMER_COMPANY VALUES(418 , 441 , 'TURKEY' , 'ESKISEHIR' , 'OTOKOC');

INSERT INTO ORDERS VALUES(62895 , 628 , 417 , 12 , '01-SEP-2020' , 120); --vw suv
INSERT INTO ORDERS VALUES(768994 , 578 , 416 , 22 , '15-OCT-2021' , 250); --toyota sedan
INSERT INTO ORDERS VALUES(4578 ,441 , 418 , 6 , '05-FEB-2018' , 20); --ford sedan
```

PART F)

- Joins Operations

```
--DISPLAYS THE ORDER ID'S OF EACH CUSTOMER COMPANY
SELECT CUSTOMER_COMPANY.company_name , ORDERS.o_id
FROM CUSTOMER_COMPANY
FULL OUTER JOIN ORDERS ON CUSTOMER_COMPANY.c_id = ORDERS.c_id
ORDER BY CUSTOMER_COMPANY.company_name;
```

	COMPANY_NAME	O_ID
1	MEZ AUTOMOTIVE	12
2	OTOKOC	6
3	Toyota Plaza ALJ	22

```
--DISPLAYS THE MANUFACTURER AND RELATED ORDER ID OF THE CUSTOMER COMPANY
SELECT ORDERS.o_id, CUSTOMER_COMPANY.company_name, MANUFACTURER.man_Name
FROM ((ORDERS
INNER JOIN CUSTOMER_COMPANY ON ORDERS.c_id = CUSTOMER_COMPANY.c_id)
INNER JOIN MANUFACTURER ON ORDERS.man_Id = MANUFACTURER.man_Id);
```

	O_ID	COMPANY_NAME	MAN_NAME
1	6	OTOKOC	Ford Motor Co.
2	22	Toyota Plaza ALJ	Toyota Motor Corp.
3	12	MEZ AUTOMOTIVE	Volkswagen AG

- Nested Queries

```
--DISPLAYS THE CAR MODELS WHICH ORDER AMOUNT IS GREATER THAN 50.
SELECT *
FROM CAR
WHERE car_id = ANY
(SELECT car_id
FROM ORDERS
WHERE o_amount > 50);
```

	CAR_ID	MAN_ID	CAR_MODEL	MANUFACTURED_AMOUNT	CAR_TYPE
1	62895	417	Tiguan	6500	SUV
2	768994	416	Corolla	88000	Sedan

```
--DISPLAYS THE MANUFACTURERS WHICH HAS CUSTOMERS LOCATED IN ISTANBUL.
SELECT man_Name, man_Id, country
FROM MANUFACTURER
WHERE man_Id IN
(SELECT man_Id
FROM CUSTOMER_COMPANY
WHERE c_city_name='ISTANBUL');
```

	MAN_NAME	MAN_ID	COUNTRY
1	Toyota Motor Corp.	416	JAPAN
2	Volkswagen AG	417	GERMANY

- Set Operations

```
--DISPLAYS THE CITIES WHERE ALL MANUFACTURERS AND CUSTOMERS ARE LOCATED.
SELECT city_name , man_Name FROM MANUFACTURER
UNION ALL
SELECT c_city_name , company_name FROM CUSTOMER_COMPANY;
```

	CITY_NAME	MAN_NAME
1	TOYOTA CITY	Toyota Motor Corp.
2	WOLFSBURG	Volkswagen AG
3	MICHIGAN	Ford Motor Co.
4	ISTANBUL	MEZ AUTOMOTIVE
5	ISTANBUL	Toyota Plaza ALJ
6	ESKISEHIR	OTOKOC

```
--DISPLAYS MANUFACTURERS LOCATED IN GERMANY AND CUSTOMERS LOCATED IN ISTANBUL.
SELECT man_Name, city_name, country FROM MANUFACTURER
WHERE country='GERMANY'
UNION ALL
SELECT company_name , c_city_name , c_country FROM CUSTOMER_COMPANY
WHERE c_city_name='ISTANBUL'
ORDER BY city_name;
```

	MAN_NAME	CITY_NAME	COUNTRY
1	MEZ AUTOMOTIVE	ISTANBUL	TURKEY
2	Toyota Plaza ALJ	ISTANBUL	TURKEY
3	Volkswagen AG	WOLFSBURG	GERMANY

-                 Aggregate Operations

```sql
--DISPLAYS THE NUMBER OF CAR TYPES MANUFACTURED BY MANUFACTURERS.
SELECT MANUFACTURER.country , MANUFACTURER.man_Name , COUNT(CAR.car_type) as CAR_TYPES
FROM MANUFACTURER
JOIN CAR
  ON MANUFACTURER.man_Id = CAR.man_Id
GROUP BY MANUFACTURER.country, MANUFACTURER.man_Name ;
```

	COUNTRY	MAN_NAME	CAR_TYPES
1	GERMANY	Volkswagen AG	1
2	JAPAN	Toyota Motor Corp.	2
3	USA	Ford Motor Co.	1

```sql
--DISPLAYS THE TOTAL NUMBER OF ORDERS OF EACH CAR TYPE.
SELECT CAR.car_type, SUM(CAR.manufactured_amount) AS TOTAL_AMOUNT, SUM(ORDERS.o_amount) AS ORDERS
FROM CAR
JOIN ORDERS
ON CAR.car_id = ORDERS.car_id
GROUP BY CAR.car_type;
```

	CAR_TYPE	TOTAL_AMOUNT	ORDERS
1	Sedan	91850	270
2	SUV	6500	120