Assignment 1 of DBMS

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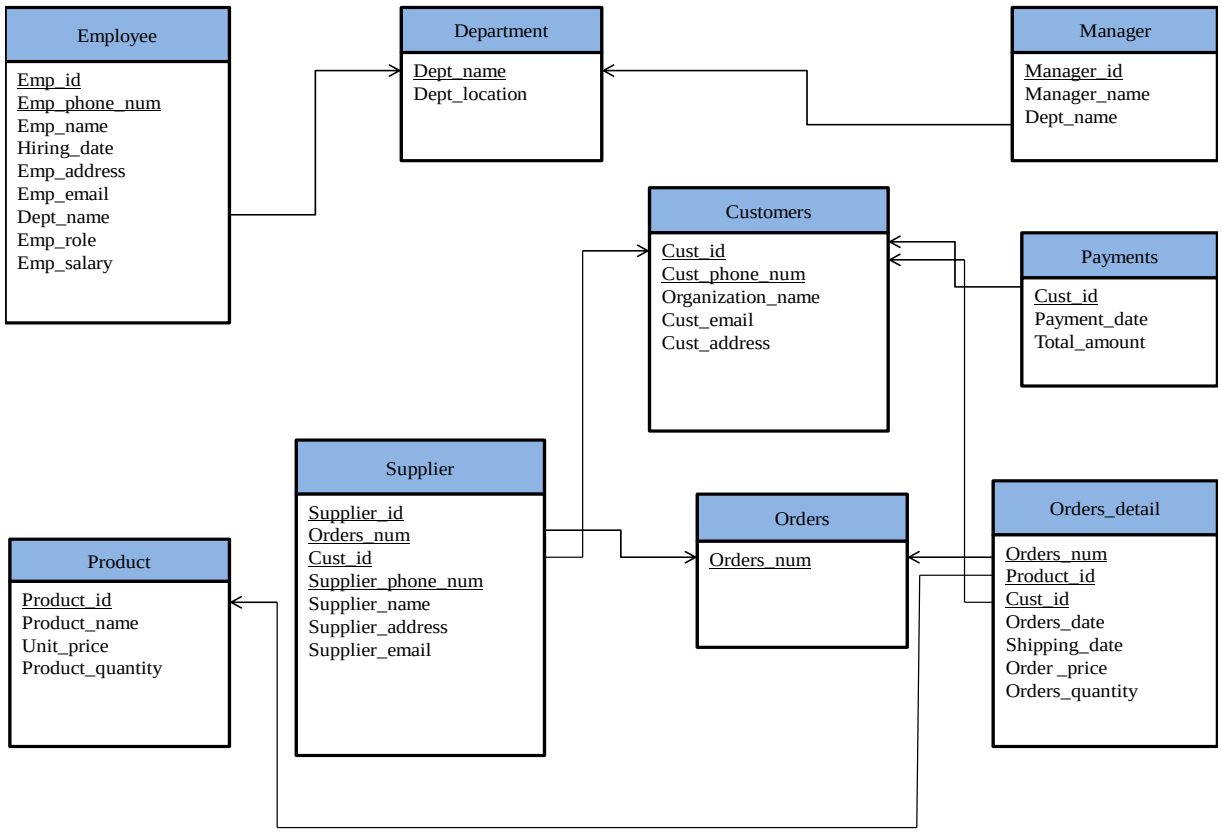
a) The database schema drawn using lucid chart is:



b) Justification of the Query Constrants:

1. **Employee relation**: Emp_id and Emp_phone_num is the primary key since they are unique for each individual employee and cannot be null, where Dept_name is the foreign key which references to the Dept_name in department relation.

2. **Department relation**: Dept_name is the primary key because Dept_name is unique in each and every table and cannot be null for any employee, where Dept_name is the referenced relation.

3. **Manager relation**: Manager_id is the primary as id should uniquely identify each individual and cannot be null. Dept_name is the foreign key which references to the Dept_name from department relation.

4. **Customer relation**: Cust_id and Cust_phone_num is the primary key as id are unique and phone number is different for different customer and they cannot be null. Here, Cust_id is the referenced relation.

5. **Payment relation**: Cust_id is the primary as it is unique for the all the customers and is also the foreign key which references to the Cust_id from customer relation.

6. **Orders relation**: The only attribute Orders_num should be unique for every order so it is the primary key and also the referenced relation.

7. **Product relation**: Product_id is the primary key which is unique for every product and is not null and is also referenced relation.

8. **Supplier relation**: Supplier_id, Orders_num, Cust_id, and Supplier_phone_num are the primary key for this relation because they are unique and non-null. Here Cust_id and Orders_num is the foreign key which references to the Cust_id and Orders_num from the Customers and Orders relation respectively.

9. **Orders_detail**: Orders_num, Cust_id, and Product_id are the primary key in this relation as they uniquely identify the orders detail and are non-null where Orders_num and Product_id is the foreign key which references to the orders and product relation respectively.

c) SQL statements to create a schema and its dummy tuples:

mysql> create table **department**

-> (dept_name varchar(30),

-> dept_location varchar(50),

-> primary key(dept_name));

mysql> insert into department values('Accounting', 'Kingston, Canada');

mysql> insert into department values('purchase', 'Toronto, Canada');

mysql> insert into department values('Sales', 'Sudbury, Canada');

mysql> insert into department values('Warehouse', 'Vancouver, Canada');

```
mysql> select* from department;
+------------+-------------------+
| dept_name  | dept_location     |
+------------+-------------------+
| Accounting | Kingston, Canada  |
| purchase   | Toronto, Canada   |
| Sales      | Sudbury, Canada   |
| Warehouse  | Vancouver, Canada |
+------------+-------------------+
4 rows in set (0.00 sec)
```

mysql> create table **manager**

-> (manager_id varchar(30),

-> manager_name varchar(30),

-> dept_name varchar(30),

-> primary key(manager_id),

-> foreign key (dept_name) references department(dept_name));

mysql> insert into manager values('301', 'badam', 'Warehouse');

mysql> insert into manager values('302', 'baam', 'Purchase');

mysql> insert into manager values('303', 'namjoon', 'sales');

mysql> insert into manager values('304', 'tae', 'accounting');

mysql> insert into manager values('305', 'jimmy', 'warehouse');

```
mysql> select* from manager;
+------------+--------------+------------+
| manager_id | manager_name | dept_name  |
+------------+--------------+------------+
| 301        | badam        | Warehouse  |
| 302        | baam         | Purchase   |
| 303        | namjoon      | sales      |
| 304        | tae          | accounting |
| 305        | jimmy        | warehouse  |
+------------+--------------+------------+
```

mysql> create table **employee**

-> (emp_id varchar(30),

-> emp_phone_num varchar(30),

-> emp_name varchar(30),

-> hiring_date DATE,

-> emp_address varchar(50),

-> emp_email varchar(50),

-> dept_name varchar(30),

-> emp_role varchar(30),

-> emp_salary numeric(9,2),

-> primary key (emp_id, emp_phone_num),

-> foreign key (dept_name) references department (dept_name));

mysql> insert into employee values('201', '3763571819', 'adam','2012/2/1', 'ads rd', 'adam@gmail.com', 'Accounting', 'accounting staff','33000.00');

mysql> insert into employee values('202', '3763523872', 'badam','2010/12/1', 'jdas rd', 'badam@gmail.com', 'Warehouse', 'manager','31120.00');

mysql> insert into employee values('203', '2281731872', 'baam','2019/1/11', 'jhfs rd', 'baam@gmail.com', 'Purchase', 'manager','45420.00');

mysql> insert into employee values('204', '2352351218', 'aim','2009/9/9', 'hfs rd', 'aim@gmail.com', 'warehouse', 'warehouse staff','41420.00');

mysql> insert into employee values('205', '6726281918', 'jin','2008/9/9', 'hfsys rd', 'jin@gmail.com', 'sales', 'sales staff', '14420.00');

mysql> insert into employee values('206', '6729120018', 'namjoon','2007/9/4', 'jdh rd', 'namjoon@gmail.com', 'sales', 'manager','26320.00');

mysql> insert into employee values('207', '8783461920', 'hobi','2006/12/15', 'jinak rd', 'hobi@gmail.com', 'purchase', 'purchase staff','36320.00');

```
mysql> select* from employee;
+--------+--------------+----------+------------+------------+------------------+------------+------------------+------------+
| emp_id | emp_phone_num | emp_name | hiring_date | emp_address | emp_email        | dept_name  | emp_role         | emp_salary |
+--------+--------------+----------+------------+------------+------------------+------------+------------------+------------+
| 201    | 3763571819    | adam     | 2012-02-01 | ads rd      | adam@gmail.com   | Accounting | accounting staff |   33000.00 |
| 202    | 3763523872    | badam    | 2010-12-01 | jdas rd     | badam@gmail.com  | Warehouse  | manager          |   31120.00 |
| 203    | 2281731872    | baam     | 2019-01-11 | jhfs rd     | baam@gmail.com   | Purchase   | manager          |   45420.00 |
| 204    | 2352351218    | aim      | 2009-09-09 | hfs rd      | aim@gmail.com    | warehouse  | warehouse staff  |   41420.00 |
| 205    | 6726281918    | jin      | 2008-09-09 | hfsys rd    | jin@gmail.com    | sales      | sales staff      |   14420.00 |
| 206    | 6729120018    | namjoon  | 2007-09-04 | jdh rd      | namjoon@gmail.com | sales      | manager          |   26320.00 |
| 207    | 8783461920    | hobi     | 2006-12-15 | jinak rd    | hobi@gmail.com   | purchase   | purchase staff   |   36320.00 |
+--------+--------------+----------+------------+------------+------------------+------------+------------------+------------+
```

mysql> create table **customers**

-> (cust_id varchar(30),

-> cust_phone_num varchar(30),

-> organization_name varchar(30),

-> cust_email varchar(50),

-> cust_address varchar(50),

-> primary key(cust_id, cust_phone_num));

mysql> insert into customers values('101', '9828928929', 'ABC', 'abc@yahoo.com', 'Shanghai, China');

mysql> insert into customers values('102', '2328642834', 'DEF', 'def@yahoo.com', 'Busan, Korea');

mysql> insert into customers values('103', '9827373532', 'miyano', 'miyano@yahoo.com', 'Tokyo, Japan');

mysql> insert into customers values('104', '9810283724', 'maya', 'maya@yahoo.com', 'Kathmandu, Nepal');

mysql> insert into customers values('105', '4238281939', 'XYZ', 'XYZ@yahoo.com', 'Kingston, Canada');

```
mysql> select* from customers;
+---------+---------------+-------------------+-----------------+-----------------+
| cust_id | cust_phone_num | organization_name | cust_email      | cust_address    |
+---------+---------------+-------------------+-----------------+-----------------+
| 101     | 9828928929    | ABC               | abc@yahoo.com   | Shanghai, China |
| 102     | 2328642834    | DEF               | def@yahoo.com   | Busan, Korea    |
| 103     | 9827373532    | miyano            | miyano@yahoo.com | Tokyo, Japan    |
| 104     | 9810283724    | maya              | maya@yahoo.com  | Kathmandu, Nepal |
| 105     | 4238281939    | XYZ               | XYZ@yahoo.com   | Kingston, Canada |
```

mysql> create table **payments**

-> (cust_id varchar(30),

-> payment_date DATE,

-> total_amount numeric(10,2),

-> primary key(cust_id),

-> foreign key (cust_id) references customers(cust_id));

mysql> insert into payments values('101', '2021/3/2', '1341.12');

mysql> insert into payments values('102', '2020/3/12', '2311.00');

mysql> insert into payments values('103', '2019/10/1', '6311.00');

mysql> insert into payments values('104', '2020/1/11', '4631.00');

mysql> insert into payments values('105', '2021/11/11', '7821.00');

```
mysql> select* from payments;
+---------+--------------+--------------+
| cust_id | payment_date | total_amount |
+---------+--------------+--------------+
| 101     | 2021-03-02   |      1341.12 |
| 102     | 2020-03-12   |      2311.00 |
| 103     | 2019-10-01   |      6311.00 |
| 104     | 2020-01-11   |      4631.00 |
| 105     | 2021-11-11   |      7821.00 |
+---------+--------------+--------------+
```

mysql> create table **product**

-> (product_id varchar(30),

-> product_name varchar(30),

-> unit_price numeric(9,2),

-> product_quantity varchar(30),

-> primary key(product_id));

mysql> insert into product values ('501', 'jeans', '13.50', '120');

mysql> insert into product values ('502', 'jackets', '18.50', '200');

mysql> insert into product values ('503', 'shoes', '15.50', '250');

mysql> insert into product values ('504', 'boots', '25.50', '100');

mysql> insert into product values ('505', 't-shirt', '8.50', '110');

```
mysql> select* from product;
+------------+--------------+------------+------------------+
| product_id | product_name | unit_price | product_quantity |
+------------+--------------+------------+------------------+
| 501        | jeans        |      13.50 | 120              |
| 502        | jackets      |      18.50 | 200              |
| 503        | shoes        |      15.50 | 250              |
| 504        | boots        |      25.50 | 100              |
| 505        | t-shirt      |       8.50 | 110              |
+------------+--------------+------------+------------------+
```

mysql> create table **orders**

-> (orders_num varchar(30),

-> primary key(orders_num));

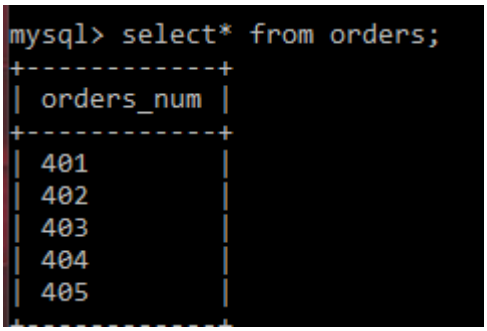
mysql> insert into orders values('401');

mysql> insert into orders values('402');

mysql> insert into orders values('403');

mysql> insert into orders values('404');

mysql> insert into orders values('405');



mysql> create table **supplier**

-> (supplier_id varchar(30),

-> orders_num varchar(30),

-> cust_id varchar(30),

-> supplier_phone_num varchar(30),

-> supplier_name varchar(30),

-> supplier_address varchar(50),

-> supplier_email varchar(50),

-> primary key(supplier_id, orders_num, cust_id, supplier_phone_num),

-> foreign key(cust_id) references customers(cust_id),

-> foreign key(orders_num) references orders(orders_num));

mysql> insert into supplier values('601', '405', '103', '2512653711', 'jiro', 'Tokyo, Japan', 'jiro@mail.com');

mysql> insert into supplier values('602', '404', '104', '2512600011', 'hiro', 'Berlin, Germany', 'hiro@mail.com');

mysql> insert into supplier values('603', '403', '105', '1001613749', 'ucchi', 'Madrid, Spain', 'ucchi@mail.com');

mysql> insert into supplier values('604', '402', '102', '8583593241', 'basa', 'Daegu, Korea', 'basa@mail.com');

mysql> insert into supplier values('605', '401', '101', '8000098765', 'pasa', 'Toronto, Canada', 'pasa@mail.com');

```
mysql> select* from supplier;
+-------------+------------+---------+--------------------+---------------+------------------+----------------+
| supplier_id | orders_num | cust_id | supplier_phone_num | supplier_name | supplier_address | supplier_email |
+-------------+------------+---------+--------------------+---------------+------------------+----------------+
| 601         | 405        | 103     | 2512653711         | jiro          | Tokyo, Japan     | jiro@mail.com  |
| 602         | 404        | 104     | 2512600011         | hiro          | Berlin, Germany  | hiro@mail.com  |
| 603         | 403        | 105     | 1001613749         | ucchi         | Madrid, Spain    | ucchi@mail.com |
| 604         | 402        | 102     | 8583593241         | basa          | Daegu, Korea     | basa@mail.com  |
| 605         | 401        | 101     | 8000098765         | pasa          | Toronto, Canada  | pasa@mail.com  |
+-------------+------------+---------+--------------------+---------------+------------------+----------------+
```

mysql> create table **orders_detail**

-> (orders_num varchar(30),

-> product_id varchar(30),

-> cust_id varchar(30),

-> orders_date DATE,

-> shipping_date DATE,

-> orders_price numeric(9,2),

-> orders_quantity varchar(30),

-> primary key(product_id, orders_num, cust_id),

-> foreign key(cust_id) references customers(cust_id),

-> foreign key(orders_num) references orders(orders_num),

-> foreign key(product_id) references product(product_id));

mysql> insert into orders_detail values('401', '502', '103', '2021/2/3', '2021/2/9', '1234.50', '120');

mysql> insert into orders_detail values('402', '501', '104', '2021/7/1', '2021/7/9', '9234.50', '100');

mysql> insert into orders_detail values('403', '503', '105', '2021/1/11', '2021/1/19', '10234.50', '200');

mysql> insert into orders_detail values('404', '505', '101', '2021/10/21', '2021/11/10', '1034.50', '120');

mysql> insert into orders_detail values('405', '504', '102', '2021/11/27' ,'2021/12/2', '934.50', '90');

```
mysql> select* from orders_detail;
+------------+------------+---------+-------------+---------------+--------------+-----------------+
| orders_num | product_id | cust_id | orders_date | shipping_date | orders_price | orders_quantity |
+------------+------------+---------+-------------+---------------+--------------+-----------------+
| 402        | 501        | 104     | 2021-07-01  | 2021-07-09    |      9234.50 | 100             |
| 401        | 502        | 103     | 2021-02-03  | 2021-02-09    |      1234.50 | 120             |
| 403        | 503        | 105     | 2021-01-11  | 2021-01-19    |     10234.50 | 200             |
| 405        | 504        | 102     | 2021-11-27  | 2021-12-02    |       934.50 | 90              |
| 404        | 505        | 101     | 2021-10-21  | 2021-11-10    |      1034.50 | 120             |
+------------+------------+---------+-------------+---------------+--------------+-----------------+
```

Union example:

Find the orders number whose order number is 401 and orders price is greater than 1000.

```
mysql> select orders_num
    -> from orders_detail
    -> where orders_num='401'
    -> union
    -> (select orders_num
    -> from orders_detail
    -> where orders_price>1000);
+------------+
| orders_num |
+------------+
| 401        |
| 402        |
| 403        |
| 404        |
+------------+
4 rows in set (0.22 sec)
```

Aggregate and group by example:

1. Find the average salary of the employee and group them by their dept_name.

```
mysql> select dept_name, avg(emp_salary) as avg_salary
    -> from employee
    -> group by dept_name;
+------------+--------------+
| dept_name  | avg_salary   |
+------------+--------------+
| Accounting | 33000.000000 |
| Purchase   | 40870.000000 |
| sales      | 20370.000000 |
| Warehouse  | 36270.000000 |
+------------+--------------+
4 rows in set (0.00 sec)
```

2. Find the number of manager in each department.

```
mysql> select emp_role, dept_name, count(*)
    -> from employee
    -> where emp_role = 'manager'
    -> group by dept_name;
+----------+-----------+----------+
| emp_role | dept_name | count(*) |
+----------+-----------+----------+
| manager  | Purchase  |        1 |
| manager  | sales     |        1 |
| manager  | Warehouse |        1 |
+----------+-----------+----------+
3 rows in set (0.05 sec)
```

Nested query example:

1) Find the customer id whose customer id is less than 103 and orders quantity is less than 100.

```
mysql> select distinct cust_id
    -> from orders_detail
    -> where cust_id < 103
    -> and cust_id in (select cust_id
    -> from orders_detail
    -> where orders_quantity<100);
+---------+
| cust_id |
+---------+
| 102     |
+---------+
1 row in set (0.06 sec)
```

2) Find the manager id and manager name whose manager id is between 300 and 310 but is not from accounting department.

```
mysql> select distinct manager_id, manager_name
    -> from manager
    -> where manager_id between 300 and 310 and
    -> manager_id not in (select manager_id
    -> from manager
    -> where dept_name = 'Accounting');
+------------+--------------+
| manager_id | manager_name |
+------------+--------------+
| 301        | badam        |
| 302        | baam         |
| 303        | namjoon      |
| 305        | jimmy        |
+------------+--------------+
4 rows in set (0.00 sec)
```