# ASSIGNMENT 2 OF COMP- 3413

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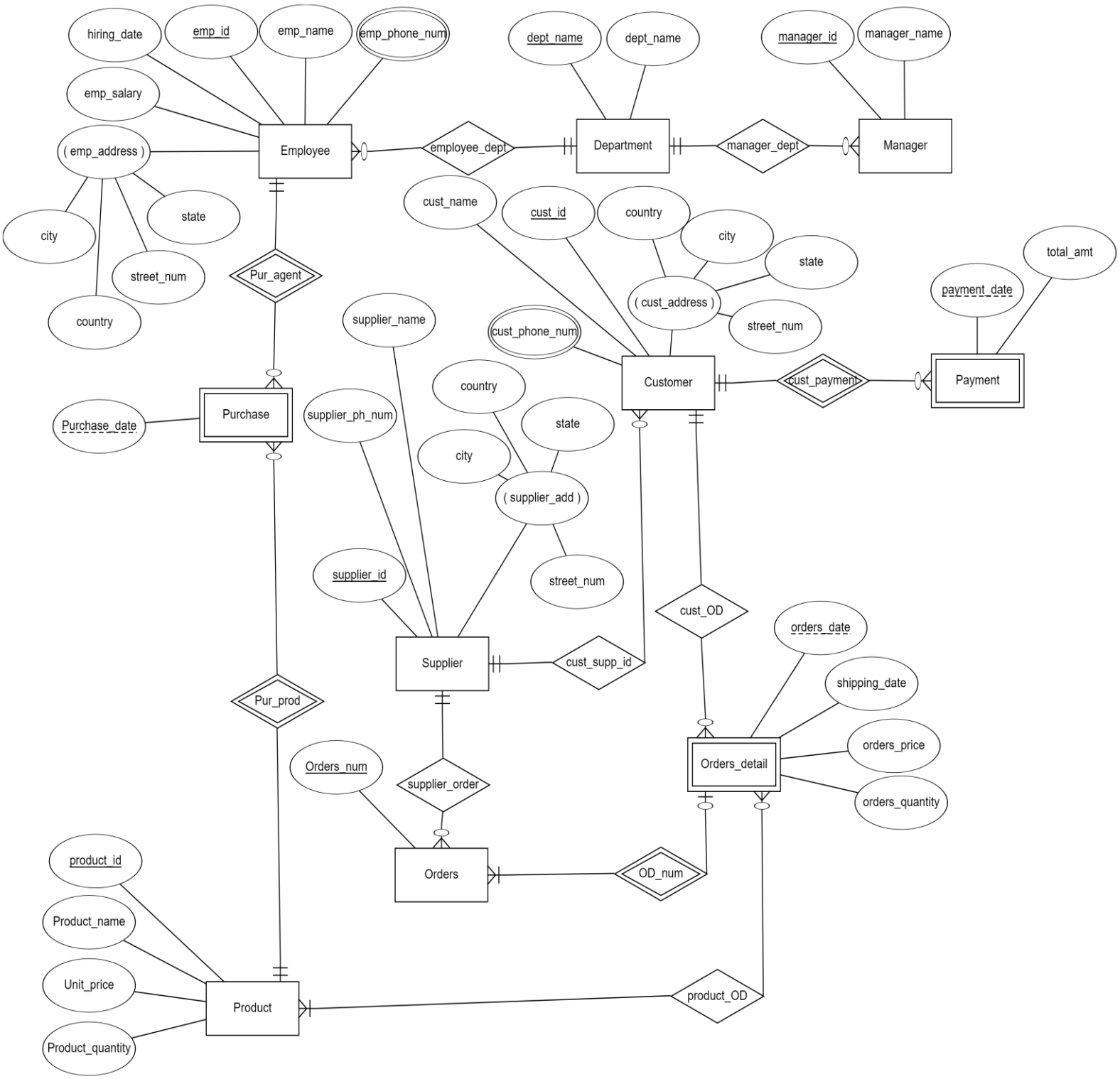
# QN 1: ER MODEL DIAGRAM:



# QN. 2 Initial set relation schema:

Relation schema for entity sets:

- Employee (emp_id, emp_name, emp_phone_num, hiring_date, emp_salary, emp_address, dept_name)
- Department (dept_name, dept_name)
- Manager (manager_id, manager_name, dept_name)
- Purchase (emp_id, product_id, purchase_date)
- Product (product_id, product_name, unit_price, product_quantity)
- Payment (cust_id, payment_date, total_amt)
- Customer (cust_id, cust_name, cust_address, cust_phone_num)
- Supplier (supplier_id, supplier_ph_num, supplier_name, supplier_add)
- Orders (orders_num)
- Orders_detail (orders_num, orders_date, shipping_date, orders_price, orders_quantity)

Relation schema for relationship sets:

- Employee_dept (emp_id, dept_name)
- Manager_dept (manager_id, dept_name)
- Pur_agent(emp_id, product_id, purchase_date)
- Pur_prod (product_id, emp_id, purchase_date)
- Cust_payment (cust_id, payment_date)
- Cust_supp_id (cust_id, supplier_id)
- Supplier_order (orders_num, supplier_id)
- OD_num (orders_num, orders_date)
- Cust_OD(orders_num, orders_date, cust_id)
- Product_OD (product_id, orders_num, orders_date )

# QN. (3) Reduced set of relation schema with explanation:

Employee - (emp_id, emp_name, emp_phone_num, hiring_date, emp_salary, emp_address)

- Dept_name is redundant and should be removed because dept_name attribute replicates the information present in the relationship.

Department - (dept_name, dept_name)

- There is no redundant and will remain the same.

Manager (manager_id, manager_name)

- Dept_name is redundant and should be removed because dept_name attribute replicates the information present in the relationship.

Purchase - (emp_id, product_id, purchase_date)

- Purchase is a weak entity set, so it is dependent on its parent entity (employee and product) where Purchase_date is a discriminator so the new schema will be the set of primary key of strong entity set and discriminator.

Product - (product_id, product_name, unit_price, product_quantity)

- Orders_num is redundant and should be removed because Orders_num attribute replicates the information present in the relationship.

Payment - (cust_id, payment_date, total_amt)

- Payment is a weak entity set, so it is dependent on its parent entity (customer) where Payment_date is a discriminator. The new schema will be the set of primary key of strong set and discriminator and the remaining attribute of the weak entity set.

Customer - (cust_id, cust_name, cust_address, cust_phone_num)

- Customer entity will remain as it is because it does not have any redundant.

Supplier - (supplier_id, supplier_ph_num, supplier_name, supplier_add)

- Orders_num, cust_id are redundant and should be removed because Orders_num and cust_id attributes replicate the information present in the relationship.

Orders - (orders_num)

- There is no redundant in this entity.

Orders_detail - (orders_num, orders_date, shipping_date, orders_price, orders_quantity)

- Orders_detail is a weak entity set, so it is dependent on its parent entity (Orders) where orders_date is a discriminator so the new schema will be the set of primary key of parent entity set and discriminator. Here cust_id, product_id are redundant and should be removed as they replicate the information present in the relationship.

# QN. 4 and 5

Functional dependencies for each schema in the reduced set:

Emp_id -> emp_name, emp_phone_num, hiring_date, emp_salary, emp_address

- It does not satisfy the 3NF because emp_address is a composite attribute while emp_phone_num is a multivalued attribute. All the attributes should only hold atomic values in order to satisfy 1NF.

Dept_name -> dept_name

- It satisfies 3NF because dept_name attribute is fully functionally dependent on dept_name which is the only primary and super key of the relation and also atomic.

Manager_id -> manager_name

- It satisfies 3NF as manager_id is the super key of the relation and all the attributes are also atomic. We don't have any transitive and partial functional dependencies.

Emp_id, product_id -> purchase_date

- It satisfies 3NF as {emp_id, product_id} are the super key of the relation and all the attributes are also atomic. We don't have any transitive and partial functional dependencies.

Cust_id -> payment_date, total_amt

- It satisfies 3NF as cust_id is the super key and we don't have any transitive and partial functional dependencies. All the attributes are also atomic.

Cust_id -> cust_name, cust_address, cust_phone_num

- It is not in 3NF because supplier_add is a composite attribute which violate the 1NF.

Supplier_id -> supplier_ph_num, supplier_name, supplier_add

- It is not in 3NF because supplier_add is a composite attribute which violate the 1NF.

Product_id -> product_name, unit_price, product_quantity

- It satisfies 3NF as product_id is the super key and we don't have any transitive and partial functional dependencies. All the attributes are also atomic.

Orders_num -> orders_date, shipping_date, orders_price, orders_quantity

- It satisfies 3NF as orders_num is the super key and we don't have any transitive and partial functional dependencies. All the attributes are also atomic.

[No such dependencies for "orders" schema.]