

HOME ASSIGNMENT-3

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Q) A company maintains a sales database with the following unnormalized relation: sales(sale_id, customer_name, product_id, product_name, category, unit_price, quantity, sales_date, region_manager, manager_contact). You are asked to analyze and normalize this schema based on the following business rules: Each product_id uniquely identifies a product_name and category.

- Identify all functional dependencies present in above relation.
- Identify the candidate keys.
- Decompose the relation step by step into 3NF, clearly stating the reasons for each decomposition.
- Check whether your final 3NF tables are in BCNF, if not, further decompose them into BCNF with satisfaction.
- Draw a diagram or tabular representation of the final normalized schema.

A) a) functional dependencies:-

$\text{sale_id} \rightarrow \{\text{customer_name}, \text{customer_phone},$

$\text{product_id}, \text{quantity}, \text{sales_date},$

$\text{region_manager}, \text{manager_contact}\}$

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Product_name, category

- 2) product_id → {product_name, Category, unit_price}
 - 3) region_manager → {manager_contact}
 - 4) Customer_name → customer_phone (multivalued)
- b) Candidate Keys :-
- {sale_id} is the only guaranteed candidate key.
- c) Step by Step to 3NF:-
- i) Extract products :- products (product_id, "PK", product_name, category, unit_price)
 - ii) Extract Manager :- managers (Manager_id, manager_name, manager_contact),
 - iii) Extract customer_phones :- customer (customer_id, customer_name),
customerphones (customer_id, FK, customer_phone)

iv) Final Sales :-

Sales (sale_id, customer_id, product_id, manager_id, quantity, sale_date, sale_price)

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d) BCNF checks:-

All the are in 3NF satisfied and also checked.

f) Final Schema:-

<u>Table</u>	<u>Attributes</u>
Customers	- customer_id, customer_name.
CustomerPhone	- customer_id, customer_phone, (customer_id), customer_name.
Products	- product_id, product_name, category, unit_cost.
Managers	- manager_id, manager_name, manager_contact.
Sales	- sale_id, customer_id, product_id, manager_id, quantity, sales_date.

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