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Task A

Relations:

- Attendee

First_name
Last_name
Email
<u>ID</u>
Ticket_type
Mailing_list
Date_checked_in

  - ID → First_name, Last_name, Email, Ticket_type, Mailing_list, Date_checked_in
    - 1NF: All attributes depend on the key
    - 2NF: All attributes depend on the whole key
    - 3NF: All attributes depend on nothing but the whole key
    - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.
- Staff

Primary_team
Rank
<u>ID</u>
First_name
Last_name
Password

  - ID → Primary_team, Rank, Name, First_name, Last_name, Password
    - 1NF: All attributes depend on the key
    - 2NF: All attributes depend on the whole key
    - 3NF: All attributes depend on nothing but the whole key
    - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.
- Event

Max_attendees

Length_minutes
Event_runner_id
<u>Event_id</u>
Name
Description
Room
Time

    - Event_id → Max_attendees, Length_minutes, Event_runner_id, Name, Description, Room, Time
        - 1NF: All attributes depend on the key
        - 2NF: All attributes depend on the whole key
        - 3NF: All attributes depend on nothing but the whole key
        - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.
- Event_Attendee

<u>ID</u>
<u>Event_id</u>

    - No functional dependency therefore relation is in BCNF
- Stock
    - Original Relation
        - Stock

Item_name
Cost
Size
Quantity
<u>SKU</u>
Category

            - SKU → Item_name, Cost, Size, Quantity
            - Item_name → Category
                - 1NF: All attributes depend on the key
                - 2NF: All attributes depend on the whole key
                - Not 3NF: Item_name functionally depends on SKU, but Category functionally depends on Item_name, indicating transitive dependency

            - Not BCNF: Not in 3NF, therefore cannot be BCNF
    - Decomposed Relations
        - Stock

Item_name
Cost
Size
Quantity
<u>SKU</u>

            - SKU → Item_name, Cost, Size, Quantity
                - 1NF: All attributes depend on the key
                - 2NF: All attributes depend on the whole key
                - 3NF: All attributes depend on nothing but the whole key
                - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.
        - Item_category

<u>Item_name</u>
Category

            - Item_name → Category
                - 1NF: All attributes depend on the key
                - 2NF: All attributes depend on the whole key
                - 3NF: All attributes depend on nothing but the whole key
                - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.
- Sale
    - Original Relation
        - Sale

Customer_id
<u>Sale_id</u>
Total
Date_purchased
Sale_quantity
SKU

Size
Cost
Item_Name

- Sale_id → Customer_id, SKU, Date_purchased, Total, Sale_quantity
- SKU → Size, Cost, Item_name
    - 1NF: All attributes depend on the key
    - 2NF: All attributes depend on the whole key
    - Not 3NF: Transitive dependency present, Sale_id determines SKU, but SKU also determines Size, Cost, and Item_Name
    - Not BCNF: Not in 3NF, therefore cannot be in BCNF

- Revised Relation
    - Sale

Customer_id
<u>Sale_id</u>
Total
Date_purchased
Sale_quantity
SKU

- Sale_id → Customer_id, SKU, Date_purchased, Total, Sale_quantity
    - 1NF: All attributes depend on the key
    - 2NF: All attributes depend on the whole key
    - 3NF: All attributes depend on nothing but the whole key
    - BCNF: All functional dependencies work such that a prime attribute functionally determines a non-prime attribute and *not* vice versa.

Summary of Changes:

- The Name attribute in the Attendee and Staff relations was a composite value and as such, was broken down into First_name and Last_name in the relations.
- In the Sale relation, there existed a transitive dependency where Sale_id (PK) determined the SKU attribute which then determined the attributes Size, Cost, Item_name, and Quantity. For this reason, they were removed and since SKU is a foreign key to the Stock table where the transitively determined attributes exist, they did not need to be replaced in Sale.

        - Original Dependencies for Sale relation
            - Sale_id → Customer_id, SKU, Date_purchased, Total, Sale_quantity
            - SKU → Size, Cost, Item_name
- A new table Item_category was created to remove a transitive dependency in the Stock relation where SKU determines Item_name which then determines Category.
    - Original Dependencies for Stock relation
        - SKU → Item_name, Cost, Size, Quantity
        - Item_name → Category