

## BCNF

BCNF requires that for every functional dependency  $A \rightarrow B$ ,  $A$  must be a superkey, meaning no partial dependencies or transitive dependencies can exist.

### 1. Farmer

**Farmer(farmer\_id, first\_name, last\_name, email, zip\_code, contact\_number, current\_address, city, state)**

- Functional Dependencies:  $\text{farmer\_id} \rightarrow (\text{first\_name}, \text{last\_name}, \text{email}, \text{zip\_code}, \text{contact\_number}, \text{current\_address}, \text{city}, \text{state})$
- The primary key is  $\text{farmer\_id}$ , which is a superkey. This table is in BCNF.

### 2. Expense\_Category

**Expense\_Category(expense\_category\_id, category\_name, description)**

- Functional Dependencies:  $\text{expense\_category\_id} \rightarrow (\text{category\_name}, \text{description})$
- The primary key is  $\text{expense\_category\_id}$ , which is a superkey. This table is in BCNF.

### 3. Expense

**Expense(expense\_id, expense\_category\_id, amount, date)**

- Functional Dependencies:  $\text{expense\_id} \rightarrow (\text{expense\_category\_id}, \text{amount}, \text{date})$
- The primary key is  $\text{expense\_id}$ , which is a superkey. This table is in BCNF.

### 4. Farmer\_Expense

**Farmer\_Expense(farmer\_id, expense\_id)**

- Functional Dependencies:  $(\text{farmer\_id}, \text{expense\_id}) \rightarrow ()$  (This is a junction table, linking farmers to expenses.)
- The combination of  $\text{farmer\_id}$  and  $\text{expense\_id}$  is a composite key and thus a superkey. This table is in BCNF.

### 5. Product

**Product(product\_id, product\_name, description)**

- Functional Dependencies:  $\text{product\_id} \rightarrow (\text{product\_name}, \text{description})$
- The primary key is  $\text{product\_id}$ , which is a superkey. This table is in BCNF.

## 6. Base\_Market\_Incentive

**Base\_Market\_Incentive(product\_id, date, price)**

- Functional Dependencies:  $(\text{product\_id}, \text{date}) \rightarrow (\text{price})$
- The composite key  $(\text{product\_id}, \text{date})$  is a superkey. This table is in BCNF.

## 7. Inventory

**Inventory(farmer\_id, product\_id, date, quantity\_in\_bundles, selling\_price\_per\_bundle, reserved\_quantity, updated\_at)**

- Functional Dependencies:  $(\text{farmer\_id}, \text{product\_id}, \text{date}) \rightarrow (\text{quantity\_in\_bundles}, \text{selling\_price\_per\_bundle}, \text{reserved\_quantity}, \text{updated\_at})$
- The composite key  $(\text{farmer\_id}, \text{product\_id}, \text{date})$  is a superkey. This table is in BCNF.

## 8. Customer

**Customer(customer\_id, first\_name, last\_name, email, zip\_code, contact\_number, current\_address, city, state, updated\_at)**

- Functional Dependencies:  $\text{customer\_id} \rightarrow (\text{first\_name}, \text{last\_name}, \text{email}, \text{zip\_code}, \text{contact\_number}, \text{current\_address}, \text{city}, \text{state}, \text{updated\_at})$
- The primary key is  $\text{customer\_id}$ , which is a superkey. This table is in BCNF.

## 9. Orders

**Orders(order\_id, customer\_id, order\_status, order\_total, quantity\_in\_bundles, price\_at\_purchase, shipping\_address, created\_at, updated\_at)**

- Functional Dependencies:  $\text{order\_id} \rightarrow (\text{customer\_id}, \text{order\_status}, \text{order\_total}, \text{quantity\_in\_bundles}, \text{price\_at\_purchase}, \text{shipping\_address}, \text{created\_at}, \text{updated\_at})$
- The primary key is  $\text{order\_id}$ , which is a superkey. This table is in BCNF.

## 10. Inventory\_Orders

**Inventory\_Orders(farmer\_id, product\_id, order\_id, date)**

- Functional Dependencies:  $(\text{farmer\_id}, \text{product\_id}, \text{order\_id}) \rightarrow (\text{date})$
- The combination of  $\text{farmer\_id}$ ,  $\text{product\_id}$ , and  $\text{order\_id}$  is a superkey. This table is in BCNF.

## 11. Payment

**Payment(payment\_id, *order\_id*, payment\_method, amount\_paid, payment\_date)**

- Functional Dependencies:  $\text{payment\_id} \rightarrow (\text{order\_id}, \text{payment\_method}, \text{amount\_paid}, \text{payment\_date})$
- The primary key is  $\text{payment\_id}$ , which is a superkey. This table is in BCNF.