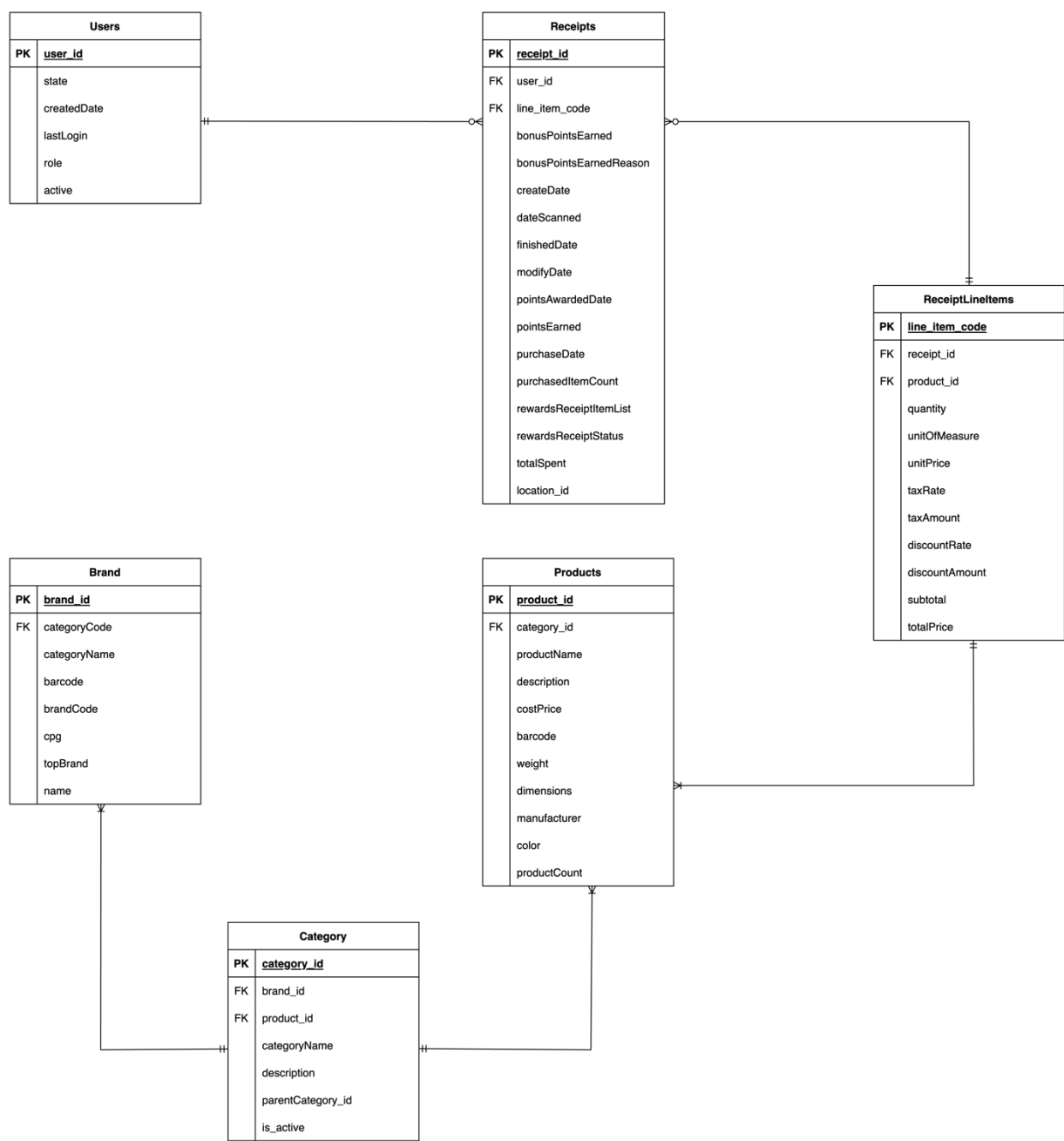


Structured ER Diagram:



Explanation:

This ER diagram represents a normalized database structure for managing users, receipts, products, brands, categories, and receipt line items. Below is a detailed explanation of the entities, their relationships, and key connections.

Entities:

1. Users
2. Receipts
3. Products (New entity to account for normalization)
4. Brand
5. ReceiptLineItems (Associative entity to resolve many to many relationship between Receipts and Products)
6. Categories (Associative entity to resolve many to many relationship between Brand and Products)

Relationships:

1. A single user can have 0 or multiple receipts, but each receipt belongs to exactly one user.
2. A single receipt can have multiple products in the form of line items, and each product can be present on 0 or multiple receipts.
3. A single category can be associated with multiple products and brands, but one brand/product can be referenced to only one category.

Key Connections:

1. Users
 - Primary Key: user_id
2. Receipts
 - Primary Key: receipt_id
 - Foreign Key(s): user_id, line_item_code
3. Products
 - Primary Key: product_id
 - Foreign Key(s): category_id
4. Brand
 - Primary Key: brand_id
 - Foreign Key(s): categoryCode
5. ReceiptLineItems (Associative entity)
 - Primary Key: line_item_code
 - Foreign Key(s): receipt_id, product_id
6. Categories (Associative entity)
 - Primary Key: category_id
 - Foreign Key(s): brand_id, product_id