

REPORT B

B.1 Overview of the Case Study

Buyzone is a simple e-commerce website that allows users to post products they want to sell and buy products listed by others. Users are not divided into buyers and sellers; any user can sell and buy. Unregistered visitors can view products, but must register to make purchases or other interactions. Product payments use a QR code system and require verification. Users can also comment on products, give ratings, and purchase multiple products in a single transaction.

B.2. Revised Business Rules and Assumptions

Entities and Business Rules

User

- BR1: Every user must register to the system before performing any activity.
- BR2: Each user must provide name, username, email, and password.
- BR3: Each user has a unique user ID.
- **PK:** User_ID

Product

- BR4: Every product is created and owned by one user.
- BR5: A product must have a name, description, image, price, and stock quantity.
- BR6: Each product has a unique product ID.
- **PK:** Product_ID
- **FK:** User_ID (owner)

Transaction

- BR7: A transaction is made when a user buys one or more products.
- BR8: Each transaction is associated with one buyer.
- BR9: Each transaction has a date and a status (e.g., pending, completed).
- BR10: Payment is made through QR and must be verified.
- **PK:** Transaction_ID
- **FK:** User_ID (buyer)

Transaction_Detail

- BR11: A transaction can contain multiple products.

- BR12: A product can be part of many transactions.
- BR13: For each product in a transaction, quantity and subtotal are recorded.
- **PK:** Composite: Transaction_ID, Product_ID
- **FKs:** Transaction_ID, Product_ID

Comment

- BR14: Users can comment on any product.
- BR15: A product can have many comments from different users.
- **PK:** Comment_ID
- **FKs:** User_ID, Product_ID

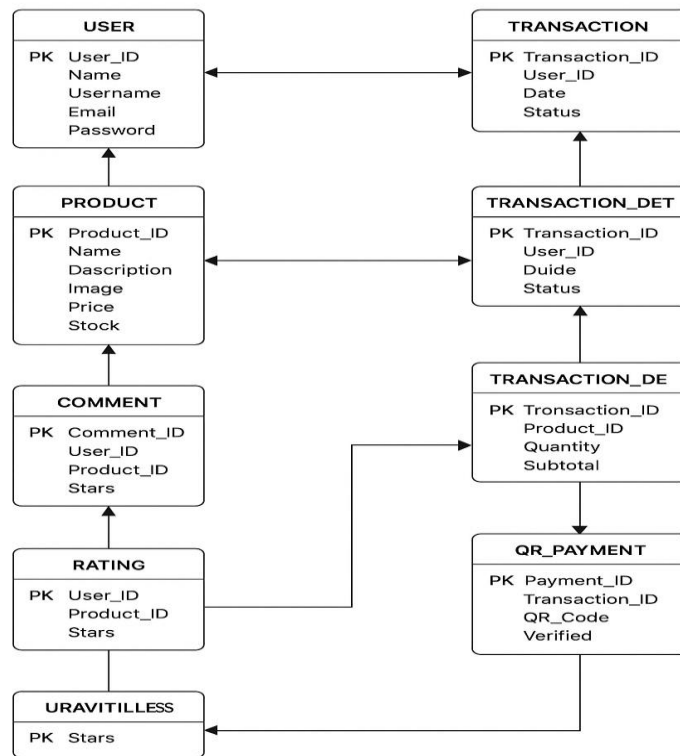
Rating

- BR16: Users can give ratings (1–5 stars) to products they've purchased.
- BR17: A user can rate a product only once.
- **PK:** Composite: User_ID, Product_ID
- **FKs:** User_ID, Product_ID

QR_Payment

- BR18: Each transaction has a corresponding QR code for payment.
- BR19: The payment must be verified to complete the transaction.
- **PK:** Payment_ID
- **FK:** Transaction_ID

B3.ERD(Conceptual Data Modelling)



B.4. Justification of ERD based on Business Rules and Assumptions

- **User** is a central entity since all actions (posting, buying, commenting, rating) are tied to it.
- **Product** is related to one user (as seller) in a 1-to-many relationship: one user can post many products.
- **Transaction** is made by one user (as buyer), again a 1-to-many from user to transaction
- **Transaction_Detail** breaks the many-to-many between product and transaction: one transaction can contain many products, and each product can be sold in many transactions.
- **Comment** is a many-to-many (user ↔ product), captured as a separate entity so users can comment on multiple products and vice versa.
- **Rating** is also a many-to-many (user ↔ product) with a constraint: only one rating per user per product, hence a composite PK.
- **QR_Payment** ensures that every transaction must have a corresponding QR code and verification status, making it a 1-to-1 with transaction

Business Rules related to entity USER

- **BR1:** Every user must register to the system.
- **BR2:** Every user must provide name, username, email, and password.
PK of USER is: User_ID

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Business Rules related to entity PRODUCT

- **BR3:** Each product must be posted by a user.
- **BR4:** A user can post multiple products.
- **BR5:** Each product must have a unique ID, name, description, image, price, stock.
PK of PRODUCT is: Product_ID
FK in PRODUCT is: User_ID (from USER)

Business Rules related to relationship between USER and PRODUCT

- **BR6:** One user can post many products (1 to many).
- **BR7:** Each product belongs to one user (1 to 1).
→ Relationship: **USER (1) — (M) PRODUCT**

Business Rules related to entity TRANSACTION

- **BR8:** Each transaction must be made by one user.
- **BR9:** Each transaction includes a transaction date and status.
PK of TRANSACTION is: Transaction_ID
FK in TRANSACTION is: User_ID (from USER)

Business Rules related to TRANSACTION and PRODUCT (via TRANSACTION_DETAIL)

- **BR10:** A transaction can include many products.
- **BR11:** A product can appear in many transactions.
- **BR12:** Transaction and Product are in many-to-many relationship, resolved by an associative entity: TRANSACTION_DETAIL.
PK of TRANSACTION_DETAIL is: Transaction_ID, Product_ID
FKs: Transaction_ID from TRANSACTION, Product_ID from PRODUCT

Business Rules related to entity COMMENT

- **BR13:** A user can comment on multiple products.

- **BR14:** A product can have comments from many users.
PK of COMMENT is: Comment_ID
FKs: User_ID from USER, Product_ID from PRODUCT

Business Rules related to entity RATING

- **BR15:** A user can give only one rating per product.
- **BR16:** A product can receive ratings from many users.
PK of RATING is: User_ID, Product_ID
FKs: User_ID from USER, Product_ID from PRODUCT

Business Rules related to QR_PAYMENT

- **BR17:** Each transaction has exactly one QR code for payment.
- **BR18:** QR payment must store the QR code and verification status.
PK of QR_PAYMENT is: Payment_ID
FK: Transaction_ID from TRANSACTION
→ Relationship: **TRANSACTION (1) — (1) QR_PAYMENT**