

# **CONSTRAINTS AND VALIDATIONS**

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## **1. Categories Table**

- PRIMARY KEY (category\_id) ensures each category has a unique identifier.
  - UNIQUE (category\_name) prevents duplicate category names in the system.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at sets the current time when the record is created or updated.
  - DEFAULT 'N' ON is\_deleted marks new records as not deleted by default.
  - CHECK (TRIM(category\_name) IS NOT NULL AND LENGTH(TRIM(category\_name)) > 0) ensures that the name is not empty or whitespace.
  - CHECK (is\_deleted IN ('Y', 'N')) restricts the deletion flag to valid values only.
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## **2. Warehouses Table**

- PRIMARY KEY (warehouse\_id) uniquely identifies each warehouse.
  - UNIQUE (warehouse\_code) ensures each warehouse has a distinct code.
  - NOT NULL constraints on city, state, country, manager\_name, and contact\_number enforce required information.
  - CHECK (REGEXP\_LIKE(contact\_number, '^[0-9 +\\-]+\$')) validates the format of the contact number, allowing digits, spaces, plus, and hyphen.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at automatically sets the time of creation and last update.
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## **3. Inventory Table**

- PRIMARY KEY (inventory\_id) makes each inventory record uniquely identifiable.
- CHECK (stock\_level >= 0) prevents negative stock values.
- CHECK (reorder\_threshold >= 0) ensures the reorder trigger point is non-negative.
- FOREIGN KEY (warehouse\_id) enforces a valid relationship to an existing warehouse.
- DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at logs creation and update timestamps automatically.

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## 4. Products Table

- PRIMARY KEY (product\_id) uniquely identifies each product.
- UNIQUE (product\_name) ensures no duplicate product names exist.
- FOREIGN KEY (category\_id) enforces a valid category assignment.
- FOREIGN KEY (inventory\_id) links each product to one inventory record.
- CHECK (LENGTH(TRIM(product\_name)) > 0) ensures product name isn't blank.
- CHECK (price >= 0) enforces non-negative pricing.
- DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at timestamps creation and updates.

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## 5. Customers Table

- PRIMARY KEY (customer\_id) identifies each customer uniquely.
- UNIQUE (phone) ensures no duplicate phone numbers.
- CHECK (REGEXP\_LIKE(email, '^[A-Za-z0-9.\_%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}\$')) validates email format.
- CHECK (gender IN ('M', 'F', 'O')) limits gender values to Male, Female, or Other.
- DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at sets the current time automatically.

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## 6. Addresses Table

- PRIMARY KEY (address\_id) uniquely identifies each address.
  - FOREIGN KEY (customer\_id) ensures each address is linked to a valid customer.
  - DEFAULT 'N' ON is\_default and is\_deleted initializes both flags to 'N'.
  - CHECK (is\_default IN ('Y', 'N') AND is\_deleted IN ('Y', 'N')) restricts these fields to valid values only.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at timestamps record events.
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## 7. Customer\_Orders Table

- PRIMARY KEY (order\_id) ensures uniqueness for each order.
  - FOREIGN KEY (customer\_id) ensures the order belongs to a valid customer.
  - FOREIGN KEY (shipping\_address\_id) enforces a valid address for delivery.
  - CHECK (order\_status IN ('Pending', 'Shipped', 'Delivered', 'Cancelled')) restricts status to defined states.
  - CHECK (total\_amount >= 0) ensures the order amount is non-negative.
  - DEFAULT CURRENT\_DATE ON order\_date sets the order date automatically.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at records time of change.
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## 8. Payments Table

- PRIMARY KEY (payment\_id) uniquely identifies each payment.
  - FOREIGN KEY (order\_id) ties each payment to a valid order.
  - CHECK (payment\_method IN ('Credit Card', 'Debit Card', 'PayPal', 'Bank Transfer', 'Cash', 'Other')) restricts accepted payment methods.
  - CHECK (payment\_status IN ('Pending', 'Completed', 'Failed', 'Refunded', 'Cancelled')) ensures payment status is valid.
  - CHECK (amount\_paid >= 0) enforces non-negative payments.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at tracks time of record change.
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## 9. Order\_Items Table

- PRIMARY KEY (order\_item\_id) makes each line item uniquely identifiable.
  - FOREIGN KEY (product\_id) ensures the product exists.
  - FOREIGN KEY (order\_id) ties each item to a specific order.
  - CHECK (product\_quantity > 0) enforces a minimum quantity of 1.
  - CHECK (unit\_price >= 0) ensures prices are non-negative.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at logs changes.
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## 10. Returns Table

- PRIMARY KEY (return\_id) uniquely identifies each return.
  - UNIQUE FOREIGN KEY (order\_item\_id) ties each return to one order item (1:1 relationship).
  - CHECK (status IN ('Pending', 'Approved', 'Rejected', 'Completed')) ensures return status is valid.
  - CHECK (return\_amount >= 0) prohibits negative return amounts.
  - CHECK (returned\_quantity > 0) requires at least one item to be returned.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at automatically sets timestamps.
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## 11. Discounts Table

- PRIMARY KEY (discount\_id) identifies each discount uniquely.
  - UNIQUE (promo\_code) ensures no duplicate discount codes.
  - FOREIGN KEY (product\_id) links the discount to a valid product.
  - CHECK (REGEXP\_LIKE(promo\_code, '^[A-Z0-9]+\$')) enforces uppercase alphanumeric promo code format.
  - CHECK (discount\_percentage >= 0 AND discount\_percentage <= 100) restricts discount range.
  - CHECK (start\_date <= end\_date) ensures valid date range for the promotion.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at records the time of creation or update.
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## 12. Suppliers Table

- PRIMARY KEY (supplier\_id) uniquely identifies each supplier.
  - UNIQUE (contact\_number) and UNIQUE (email) prevent duplication.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at timestamps events.
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### 13. Suppliers\_Products Table

- PRIMARY KEY (supplier\_product\_id) uniquely identifies each supply entry.
  - FOREIGN KEY (product\_id) ensures the supplied product exists.
  - FOREIGN KEY (supplier\_id) enforces supplier validity.
  - CHECK (supply\_price > 0) ensures cost is positive.
  - UNIQUE (product\_id, supplier\_id) prevents duplicate product-supplier combinations.
  - DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at timestamps supply entries.
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### 14. Warehouse\_Orders Table

- PRIMARY KEY (order\_id) identifies each warehouse order.
- FOREIGN KEY (warehouse\_id) links the order to a valid warehouse.
- FOREIGN KEY (supplier\_id) enforces supplier existence.
- FOREIGN KEY (inventory\_id) ties the order to an inventory record.
- CHECK (total\_quantity > 0) ensures the quantity ordered is positive.
- UNIQUE (warehouse\_id, supplier\_id, inventory\_id) prevents duplicate combinations in procurement.
- DEFAULT CURRENT\_TIMESTAMP ON created\_at, updated\_at records order activity timestamps.