Database Schema

Introduction

This document provides a detailed description of the database schema for the application. It outlines the tables, columns, data types, relationships, and constraints that will define the structure of the project's data storage.

Database System

- **System:** PostgreSQL
- **Data Modeling Approach:** Relational Database Model

Table Definitions

1. Users

- **Description:** Stores information about registered users, including customers and administrators.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
username	VARCHAR(255)	UNIQUE, NOT NULL
email	VARCHAR(255)	UNIQUE, NOT NULL
password_hash	TEXT	NOT NULL
role	VARCHAR(50)	NOT NULL, DEFAULT 'CUSTOMER', CHECK (role IN ('CUSTOMER', 'ADMIN'))
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

2. Products

- **Description:** Stores details about the video game products available for sale.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
title	VARCHAR(255)	NOT NULL
description	TEXT	NULLABLE
platform	VARCHAR(100)	NOT NULL
genre	VARCHAR(100)	NOT NULL
price	NUMERIC(10, 2)	NOT NULL, CHECK (price >= 0)
stock_quantity	INTEGER	NOT NULL, DEFAULT 0, CHECK (stock_quantity >= 0)
cover_image_url	TEXT	NULLABLE
release_date	DATE	NULLABLE
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

3. Carts

- **Description:** Represents a user's shopping cart, holding items before checkout. Each user has one active cart.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
user_id	UUID	UNIQUE, NOT NULL, FOREIGN KEY (user_id) REFERENCES Users(id) ON DELETE CASCADE
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

4. CartItems

- **Description:** Represents individual items within a user's shopping cart. This is a junction table between `Carts` and `Products`.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
cart_id	UUID	NOT NULL, FOREIGN KEY (cart_id) REFERENCES Carts(id) ON DELETE CASCADE
product_id	UUID	NOT NULL, FOREIGN KEY (product_id) REFERENCES Products(id) ON DELETE CASCADE
quantity	INTEGER	NOT NULL, CHECK (quantity > 0)
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

- **Compound Constraint:** UNIQUE (cart_id, product_id) (A specific product can only appear once as a line item in a given cart; quantity is adjusted).

5. Orders

- **Description:** Stores information about registered users, including customers and administrators.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
user_id	UUID	NOT NULL, FOREIGN KEY (user_id) REFERENCES Users(id) ON DELETE SET NULL
total_amount	NUMERIC(10, 2)	NOT NULL, CHECK (total_amount >= 0)
status	VARCHAR(50)	NOT NULL, DEFAULT 'PENDING', CHECK (status IN ('PENDING', 'PROCESSING', 'SHIPPED', 'DELIVERED', 'CANCELLED'))
shipping_address_line1	TEXT	NOT NULL
shipping_address_line2	TEXT	NULLABLE
shipping_city	VARCHAR(100)	NOT NULL
shipping_postal_code	VARCHAR(20)	NOT NULL
shipping_country	VARCHAR(100)	NOT NULL

Column	Data Type	Constraints
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

6. OrderItems

- **Description:** Represents individual line items within a customer's order. This is a junction table between `Orders` and `Products`.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
order_id	UUID	NOT NULL, FOREIGN KEY (order_id) REFERENCES Orders(id) ON DELETE CASCADE
product_id	UUID	NOT NULL, FOREIGN KEY (product_id) REFERENCES Products(id) ON DELETE RESTRICT
quantity	INTEGER	NOT NULL, CHECK (quantity > 0)
price_at_purchase	NUMERIC(10, 2)	NOT NULL, CHECK (price_at_purchase >= 0)
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

7. Reviews

- **Description:** Stores customer reviews and ratings for products.
- **Columns:**

Column	Data Type	Constraints
id	UUID	PRIMARY KEY
user_id	UUID	NOT NULL, FOREIGN KEY (user_id) REFERENCES Users(id) ON DELETE CASCADE

product_id	UUID	NOT NULL, FOREIGN KEY (product_id) REFERENCES Products(id) ON DELETE CASCADE
rating	INTEGER	NOT NULL, CHECK (rating >= 1 AND rating <= 5)
comment	TEXT	NULLABLE
review_date	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
created_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP
updated_at	TIMESTAMP WITH TIME ZONE	NOT NULL, DEFAULT CURRENT_TIMESTAMP

- **Compound Constraint:** `UNIQUE (user_id, product_id)` (A user can only review a specific product once).

Relationships

- **Users to Carts:** One-to-One (A user has one active cart). Enforced by `UNIQUE` constraint on `Carts.user_id`.
- **Users to Orders:** One-to-Many (A user can have many orders).
- **Users to Reviews:** One-to-Many (A user can write many reviews, but only one per product).
- **Carts to Products (via CartItems):** Many-to-Many (A cart can contain many products, and a product can be in many carts). `CartItems` is the join table.
- **Orders to Products (via OrderItems):** Many-to-Many (An order can contain many products, and a product can be in many orders over time). `OrderItems` is the join table.
- **Products to Reviews:** One-to-Many (A product can have many reviews).

Entity-Relationship Diagram (ERD)