Project Protocol: Media Ratings Platform (MRP)

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1. App Design

Design Decisions

- **Architecture**: A **Layered Architecture** (`Handler` -> `Service` -> `Repository` -> `Database`) was chosen to enforce **Separation of Concerns** (SoC) and adhere to SOLID principles. This allows for easier testing and maintenance.
- **No Frameworks**: Adhering to strict project constraints, no heavy frameworks (like Spring Boot or Hibernate) were used.
    - **HTTP Server**: `com.sun.net.httpserver.HttpServer` is used for handling REST requests.
    - **Persistence**: **Pure JDBC** is used for database interactions to demonstrate understanding of low-level SQL handling.
- **Database & Security**:
    - **PostgreSQL**: Used as the relational database.
    - **SQL Injection Prevention**: All SQL queries use `PreparedStatement` to sanitise inputs.
    - **Singleton Pattern**: `DatabaseManager` is a singleton to manage a central database connection (simulating a simple connection pool/manager).
- **Data Transfer Objects (DTOs)**: `UserDTO` and `MediaDTO` are used to decouple the API layer (JSON structure) from the Model/Database layer. This prevents sensitive data (like password hashes) from accidentally leaking and allows the API schema to evolve independently of the DB schema.
- **Authentication**:
    - **Token-Based Auth**: Custom implementation using persistent tokens stored in the database.
    - **Format**: `mrp-token-<UUID>` (excluding PII like username from the token string for better security).
    - **Password Hashing**: SHA-256 is used for hashing passwords.

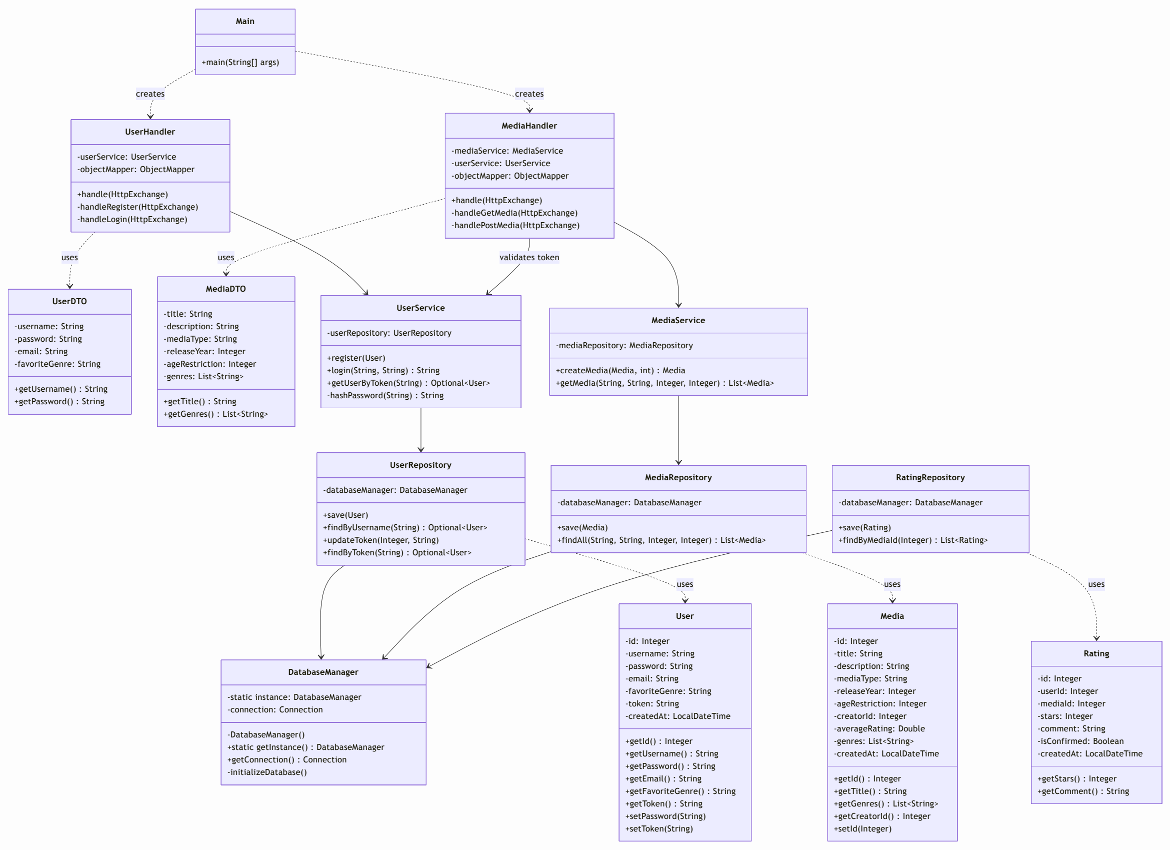
- **Builder Pattern**: Implemented in Models (`User`, `Media`, `Rating`) to handle complex object construction with many optional fields cleanly.

Project Structure

The application is structured into the following packages:

- **`at.fhtw.swen1.mrp.data`**: Infrastructure layer handling database connections and creation.
- **`at.fhtw.swen1.mrp.dto`**: Plain Old Java Objects (POJOs) for JSON serialization/deserialization.
- **`at.fhtw.swen1.mrp.handler`**: The Controller layer. Responsible for parsing HTTP requests, validating input, calling services, and creating HTTP responses.
- **`at.fhtw.swen1.mrp.model`**: The Domain layer. Represents the core business entities.
- **`at.fhtw.swen1.mrp.repository`**: The Persistence layer. Contains all SQL logic and conversion from `ResultSet` to Models.
- **`at.fhtw.swen1.mrp.service`**: The Business Logic layer. Orchestrates business rules (e.g., verifying user existence before registration, hashing passwords).

2. Class Diagram


Main
+main(String[] args)
creates
creates
UserHandler
-userService: UserService
-objectMapper: ObjectMapper
+handle(HttpExchange)
-handleRegister(HttpExchange)
-handleLogin(HttpExchange)
MediaHandler
-mediaService: MediaService
-userService: UserService
-objectMapper: ObjectMapper
+handle(HttpExchange)
-handleGetMedia(HttpExchange)
-handlePostMedia(HttpExchange)
uses
uses
validates token
UserDTO
-username: String
-password: String
-email: String
-favoriteGenre: String
+getUsername() : String
+getPassword() : String
MediaDTO
-title: String
-description: String
-mediaType: String
-releaseYear: Integer
-ageRestriction: Integer
-genres: List<String>
+getTitle() : String
+getGenres() : List<String>
UserService
-userRepository: UserRepository
+register(User)
+login(String, String) : String
+getUserByToken(String) : Optional<User>
-hashPassword(String) : String
MediaService
-mediaRepository: MediaRepository
+createMedia(Media, int) : Media
+getMedia(String, String, Integer, Integer) : List<Media>
UserRepository
-databaseManager: DatabaseManager
+save(User)
+findByUsername(String) : Optional<User>
+updateToken(Integer, String)
+findByToken(String) : Optional<User>
MediaRepository
-databaseManager: DatabaseManager
+save(Media)
+findAll(String, String, Integer, Integer) : List<Media>
RatingRepository
-databaseManager: DatabaseManager
+save(Rating)
+findByMediaId(Integer) : List<Rating>
uses
uses
uses
DatabaseManager
-static instance: DatabaseManager
-connection: Connection
-DatabaseManager()
+static getInstance() : DatabaseManager
+getConnection() : Connection
-initializeDatabase()
User
-id: Integer
-username: String
-password: String
-email: String
-favoriteGenre: String
-token: String
-createdAt: LocalDateTime
+getId() : Integer
+getUsername() : String
+getPassword() : String
+getEmail() : String
+getFavoriteGenre() : String
+getToken() : String
+setPassword(String)
+setToken(String)
Media
-id: Integer
-title: String
-description: String
-mediaType: String
-releaseYear: Integer
-ageRestriction: Integer
-creatorId: Integer
-averageRating: Double
-genres: List<String>
-createdAt: LocalDateTime
+getId() : Integer
+getTitle() : String
+getGenres() : List<String>
+getCreatorId() : Integer
+setId(Integer)
Rating
-id: Integer
-userId: Integer
-mediaId: Integer
-stars: Integer
-comment: String
-isConfirmed: Boolean
-createdAt: LocalDateTime
+getStars() : Integer
+getComment() : String