Brief Walkthrough of the Logic

1. System Purpose and Functionality

The Payment Management System facilitates secure management of financial transactions within an organization. It supports user authentication, role-based access control, payment processing, status updates, and financial reporting with audit trail functionality.

2. Overall Architecture

Your system follows a Layered Architecture Pattern divided into:

- Presentation Layer (Controllers): Handles user input, menus, and UI navigation.
- Service Layer (Business Logic): Enforces business rules, manages transactions, validation, and audit logging.
- Data Access Layer (DAO): Abstracts direct database interactions including CRUD operations.
- Utility Layer: Handles database connections and configuration management.

3. User Authentication and Roles

- Users register or login with credentials.
- Roles assigned: ADMIN, FINANCE_MANAGER, and VIEWER.
- Role-based access control restricts features like adding/updating payments (only ADMIN and FINANCE_MANAGER allowed) and viewing reports (all roles).

4. Payment Management Workflow

- Add Payment:
    - Login user inputs payment details: amount, type (INCOMING/OUTGOING), category (SALARY, VENDOR_PAYMENT, CLIENT_INVOICE), and optional remarks.
    - System validates input (e.g., positive amount).
    - New payment is created with status PENDING and timestamps.
    - Payment is saved via DAO to the PostgreSQL database.
    - An audit log is recorded capturing who added payment and when.

- Update Payment Status:
    - Authorized users can update payment status through valid transitions (e.g., PENDING → PROCESSING → COMPLETED).
    - Payment status update is persisted in the database.
    - Audit trail logs the status changes.
- Retrieve and List Payments:
    - Payments can be retrieved by ID or user.
    - Listings display payment details including amount, status, type, and category.

5. Reporting

- The system supports generating financial reports by categories based on completed payments.
- Reports include:
    - Monthly Report – aggregates sums by category for a specified month and year.
    - Quarterly Report – aggregates sums by category for a quarter and year.
    - Custom Report – details payments and associated audit log entries within a custom date range.
- Reports can be displayed in the console and exported as CSV files for further analysis.

6. Database Interaction

- Uses PostgreSQL with tables for users, payments, and audit trails.
- DAO classes use JDBC with PreparedStatements to safely execute SQL commands, preventing SQL injection.
- Entities like `User`, `Payment`, and `AuditTrail` map closely to database tables.
- Database connection details are externalized in a configuration (db.properties).

7. Design Patterns Employed

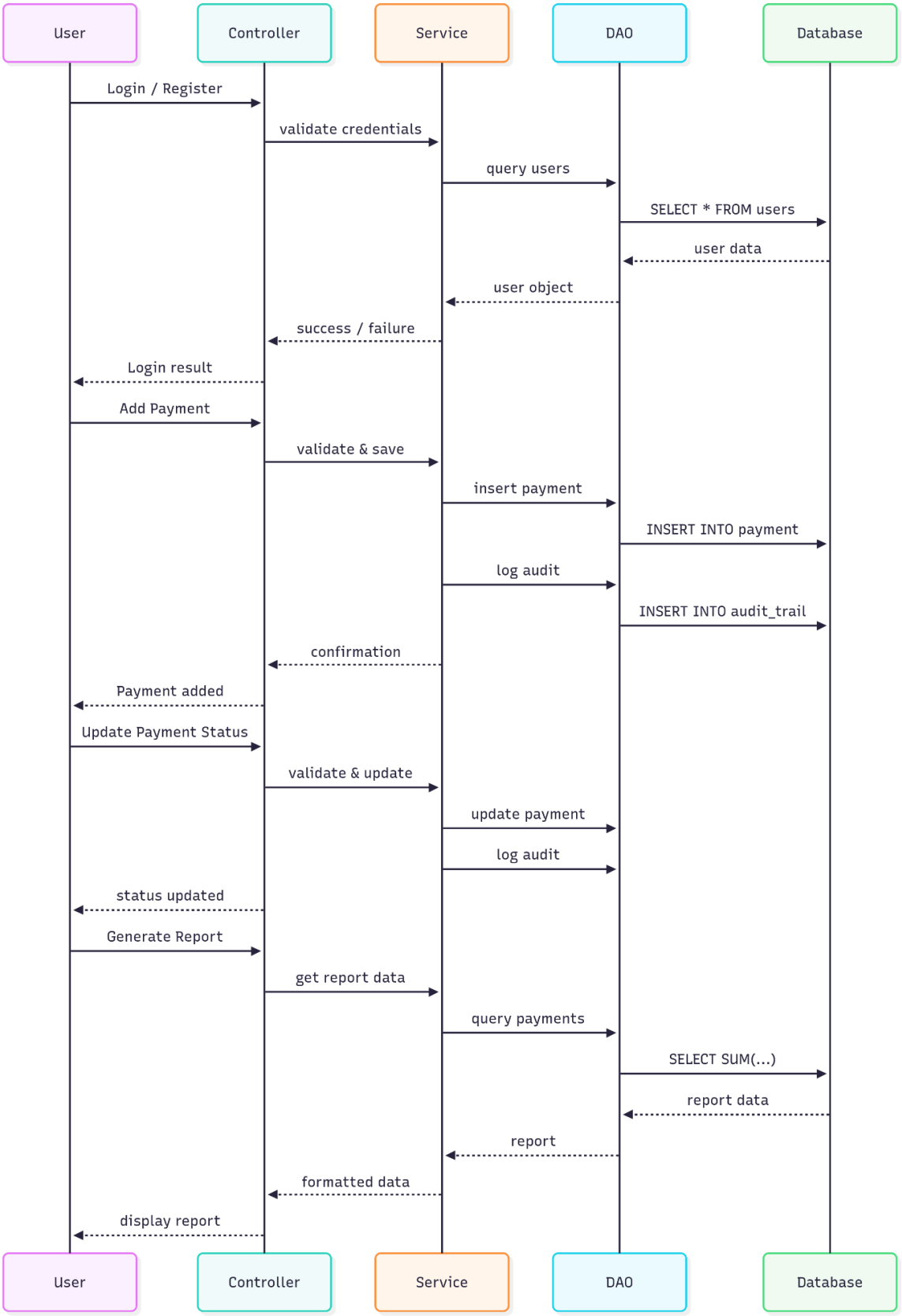
- DAO Pattern: Separates database logic through interfaces like `PaymentDao`, `UserDao`, and `AuditTrailDao`.
- Service Layer: Encapsulates business rules, validating inputs and coordinating DAO operations and audit logging.
- Singleton / Factory: Implicit in service instantiation to promote modularity and easy maintenance.

8. Security and Validation

- User credentials are currently stored in plain text
- Input validations enforce business rules like positive amount and valid status transitions.
- Role-based authorization checks protect sensitive operations.
- SQL queries use PreparedStatements for security.
- Audit trails maintain logs of user actions on payments.

9. Exception Handling

- Uses custom exceptions (`BusinessException`, `NotFoundException`) to handle domain-specific errors gracefully.
- Errors are caught and user-friendly messages displayed in the console UI.


User
Controller
Service
DAO
Database
Login / Register
validate credentials
query users
SELECT * FROM users
user data
user object
success / failure
Login result
Add Payment
validate & save
insert payment
INSERT INTO payment
log audit
INSERT INTO audit_trail
confirmation
Payment added
Update Payment Status
validate & update
update payment
log audit
status updated
Generate Report
get report data
query payments
SELECT SUM(...)
report data
report
formatted data
display report
User
Controller
Service
DAO
Database

10. How It Runs

- Setup Java 17+, Maven, and PostgreSQL 14+.
- Clone the project from https://github.com/abhinaysingh8352/Payment-Managment-System
- Configure `db.properties` with correct database credentials.
- Build the project via Maven.
- Run the `Main` class, which provides a CLI for:
- Use menus to navigate the system according to user roles.