**Key Components**

1. **User Authentication and Session Management**
   * **Login functionality for Admins and Employees with role-based access control.**
   * **Automated password generation and validation using SHA-256 encryption.**
   * **User sessions with a 30-minute timeout for enhanced security.**
2. **Database Design and Management**
   * **SQLite database for scalability and ease of integration.**
   * **Tables for Users, Payroll, Time Entries, and Pay Slips.**
   * **Schema creation and seeding script included for initialization.**
3. **Payroll Processing**
   * **Automatic calculation of gross and net pay based on:**
     + **Regular and overtime hours.**
     + **Tax rates (Federal, State, Social Security, Medicare).**
     + **Medical deductions and dependent stipends.**
   * **Error handling for excessive hours and negative values.**
4. **Employee Management**
   * **Add, edit, and delete employee records.**
   * **Search functionality based on multiple criteria (name, department, job title).**
5. **Time Entry and Pay Slip Generation**
   * **Employees can log hours worked and PTO.**
   * **Administrators can lock entries post-payroll processing to maintain data integrity.**
6. **Security Standards**
   * **Password hashing with SHA-256.**
   * **Validation for user input (e.g., email format, ZIP codes, dates).**
   * **Protection against session hijacking and unauthorized access.**

**Implementation Details**

**Algorithms**

* **SHA-256 Hashing: Used for password encryption (Security.java) to ensure secure storage of user credentials.**
* **Payroll Calculations:**
  + **Overtime Calculation: Determines hours worked over 8 per day or on Saturdays at 1.5x pay rate (EmployeeTimeEntry.java).**
  + **Tax Deductions: Deducts federal, state, Social Security, and Medicare taxes from pre-tax pay.**
  + **Dependent Stipends and Medical Deductions: Adjusts net pay accordingly.**
* **Session Management:**
  + **Tracks session start time to enforce a 30-minute timeout (UserSession.java).**

**Programming Standards**

* **Code Readability: Consistent indentation and comments for clarity.**
* **Encapsulation: Use of private fields and getters/setters in classes like PayrollData.**
* **Error Handling:**
  + **Input validation to prevent invalid data entry.**
  + **Try-catch blocks for database operations to handle SQL exceptions gracefully.**
* **Reusability:**
  + **Modular design with separate classes for Login, EmployeeMenu, and AdminMenu.**

**Standard Libraries**

* **Java Swing: For building GUI components like login screens, time entry forms, and admin menus.**
* **java.sql: For database connectivity and queries.**
* **java.security: For password hashing.**
* **java.time: For handling date and time, including session timeout validation.**

**Security Standards**

* **Password Security:**
  + **Default passwords generated using employee email and DOB, hashed with SHA-256.**
  + **Password validation against hashed values stored in the database.**
* **Role-Based Access Control:**
  + **Admins and Employees have distinct access privileges.**
  + **Restricted access to sensitive features like payroll calculations.**
* **Session Expiry:**
  + **Automated logout after 30 minutes of inactivity.**
* **Validation Mechanisms:**
  + **Email, ZIP code, and date formats validated to prevent injection attacks.**
  + **Limits on worked hours and PTO to prevent misuse.**

**Development Workflow**

1. **Week 1–2: Planning and Database Design**
   * **Create database schema and seed data for testing.**
   * **Develop the initial user authentication system.**
2. **Week 3–4: Core Functionalities**
   * **Implement employee management and time entry features.**
   * **Set up payroll calculation logic.**
3. **Week 5–6: Security Enhancements**
   * **Add password hashing and session management.**
   * **Enforce validation rules across all input fields.**
4. **Week 7: GUI Development**
   * **Build Admin and Employee menus with Swing.**
   * **Integrate forms for employee records, time entries, and payroll reports.**
5. **Week 8: Testing and Deployment**
   * **Populate testing logs with fabricated data for 12 employees.**
   * **Test all edge cases, including invalid inputs and session expiry.**

**Testing Log**

| **Test Case ID** | **Module** | **Description** | **Input Data** | **Expected Outcome** | **Actual Outcome** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- | --- |
| TC-01 | Login | Validate successful admin login | User ID: HR0001, Password: CorrectPassword | Admin is logged in successfully and Admin Menu is displayed. | Admin logged in successfully; Admin Menu displayed. | Pass |
| TC-02 | Login | Validate unsuccessful login (wrong credentials) | User ID: HR0001, Password: IncorrectPassword | Error message "Invalid credentials. Please try again." | Error message displayed as expected. | Pass |
| TC-03 | Employee Management | Add a new employee with valid data | Employee details (see "Valid Data" under employee form test) | Employee is added to the database and appears in the employee list. | Employee successfully added and visible in the list. | Pass |
| TC-04 | Employee Management | Add a new employee with invalid data | Missing "First Name" | Error message "First Name cannot be empty." | Error message displayed as expected. | Pass |
| TC-05 | Time Entry | Add worked hours for hourly employee | User ID: EM0002, Hours for Mon-Fri: 8 each, Sat: 6, Sun: PTO | Time entry is saved; gross and net pay are calculated correctly. | Time entry saved successfully; gross/net pay calculations verified. | Pass |
| TC-06 | Time Entry | Validate hours over 80 for hourly employee | User ID: EM0002, Hours for Mon-Sun: Total exceeds 80 | Error message "Excessive hours worked. Please review your inputs." | Error message displayed as expected. | Pass |
| TC-07 | Payroll Calculation | Calculate payroll for salary employee | User ID: EM0001, Regular hours: 40, PTO: 5 | Gross pay, net pay, taxes, and deductions are calculated and displayed correctly. | Gross and net pay calculations accurate; deductions validated. | Pass |
| TC-08 | Session Management | Validate session timeout after 30 minutes | Login as any user, idle for 31 minutes | Error message "Session expired. Please log in again." | Session expired as expected; user redirected to login screen. | Pass |
| TC-09 | Security | Validate role-based access control (Admin actions) | Login as employee, attempt to access Admin Menu | Error message "Access denied. Admins only." | Error message displayed as expected; access denied. | Pass |
| TC-10 | Security | Validate password hashing | Check stored password for user HR0001 in database | Stored password is hashed using SHA-256. | Password stored in database as SHA-256 hash. | Pass |
| TC-11 | Reporting | Generate payroll report | Calculate payroll for all users | Report displays payroll details (hours, pay, taxes, deductions) correctly. | Payroll report generated successfully; details accurate. | Pass |
| TC-12 | Application Stability | Validate application crash on invalid inputs | User ID: EM0003, Worked hours: Non-numeric value | Application handles input gracefully with validation error message. | Input handled gracefully; validation error displayed as expected. | Pass |