



Project Description on

Hotel Management System

Course Code :SWE-223

Course Title:Object Oriented Programming

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Hotel Management System

Introduction:

The Hotel Management System is a Java-based desktop application designed to streamline hotel operations through a user-friendly interface. Built with Java Swing, it supports multiple user roles (Admin, Reception, and Guest portal placeholder) and manages key entities like customers, rooms, employees, drivers, and reservations. The system uses a dark-themed UI for modern aesthetics and file-based data persistence for simplicity. It provides CRUD operations, real-time reporting, and workflow automation for efficient hotel administration, making it suitable for small to medium-sized hotels seeking digital transformation.

How to Run:

1.Prerequisites: Ensure Java Development Kit (JDK) 8 or higher is installed on your system.

2.Compilation: Compile all .java files (e.g., using javac *.java in the project directory).

3.Execution: Run the application by executing java MainApp.

4.First Login: Use default credentials (Username: "admin", Password: "admin123") for Admin access. Select roles (Admin/Reception/Guest) from the login screen.

5.Data Files: The system automatically creates .dat files (e.g., customers.dat) for data storage in the project directory.

6.Navigation: Use sidebar menus in dashboards to access features; logout to return to login.

Entity-Relationship Diagram:

The following Entity-Relationship Diagram illustrates the conceptual data model of the Hotel Management System. Currently, data is stored in serialized .dat files, but this diagram serves as a blueprint for potential database implementation.

Entities and Relationships:

1. **Customer:** Stores guest details and links to reservations and room assignments.
2. **HotelRoom:** Manages room inventory with status tracking.
3. **Reservation:** Handles bookings, connecting customers to rooms with dates and financial data.
4. **Employee and Driver:** Independent entities for staff and transportation management.

Key Relationships:

- A Customer can make multiple Reservations (**1:N**).
- A HotelRoom can be reserved multiple times (**1:N**).
- Each Reservation links one Customer to one Room.

This model ensures data integrity and supports the system's CRUD operations.

****Employee and Driver are standalone entities with no direct relationships.**

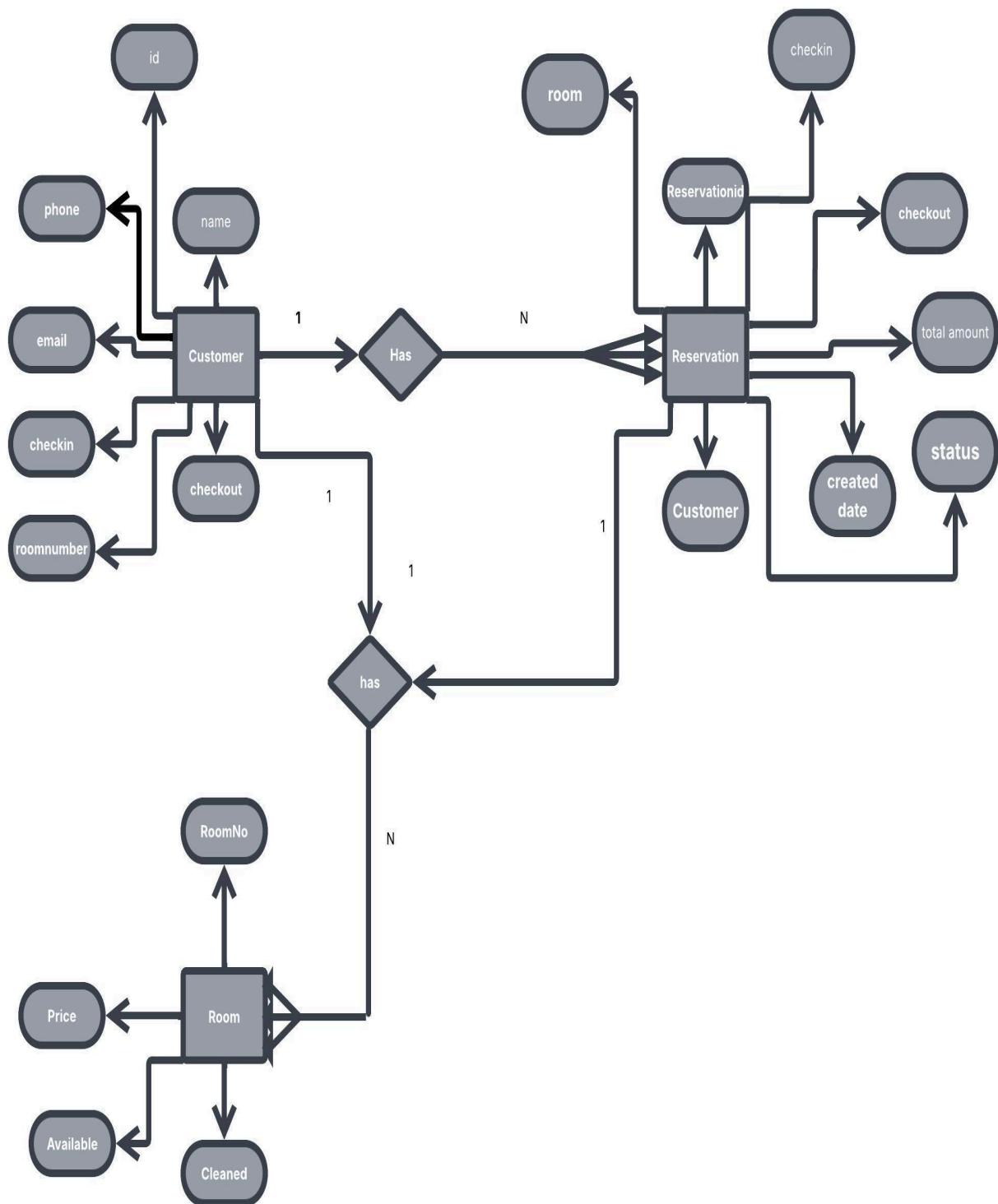
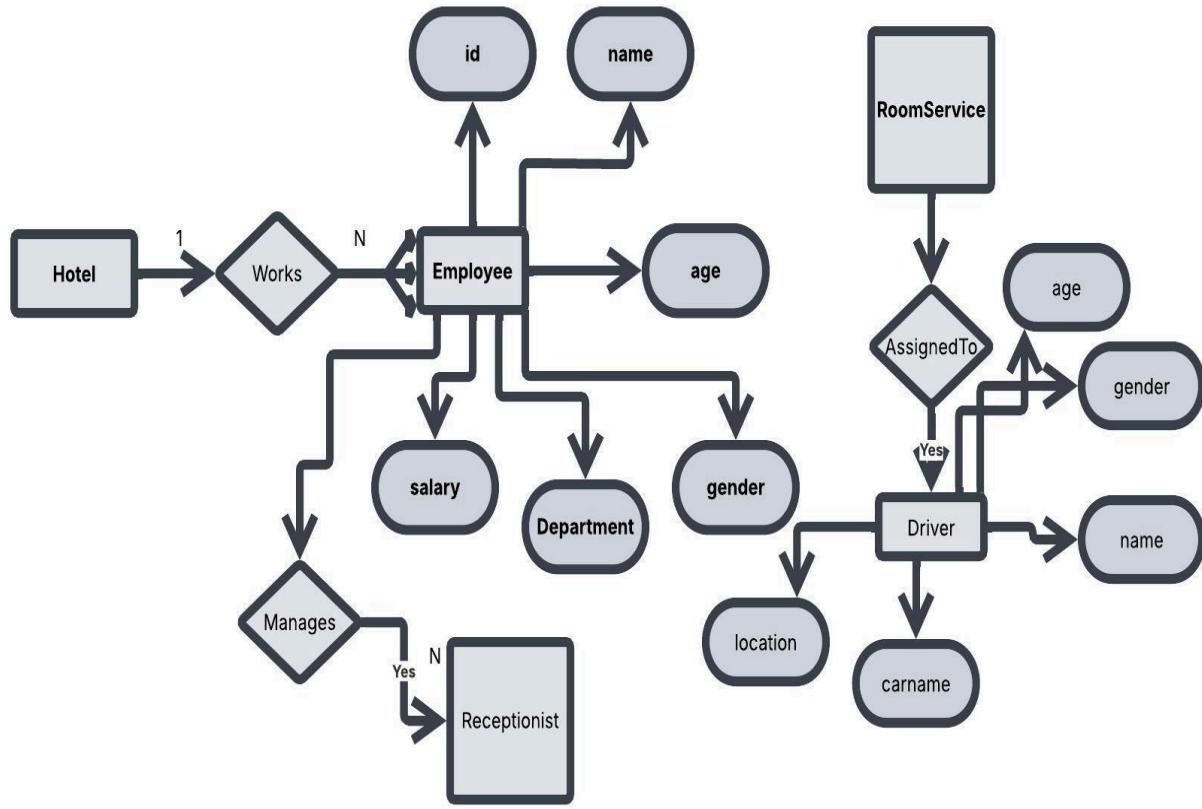
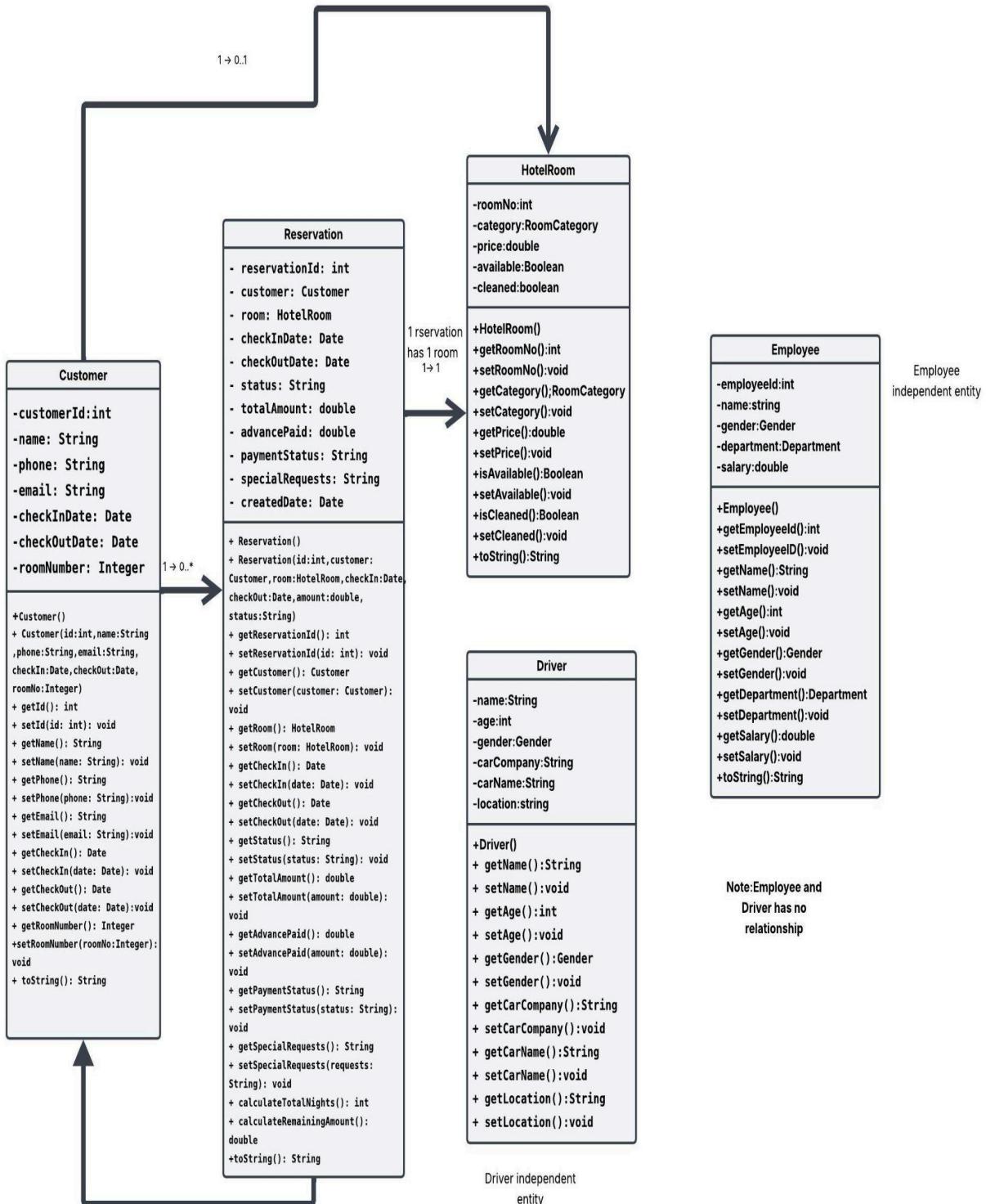


Fig:ER Diagram

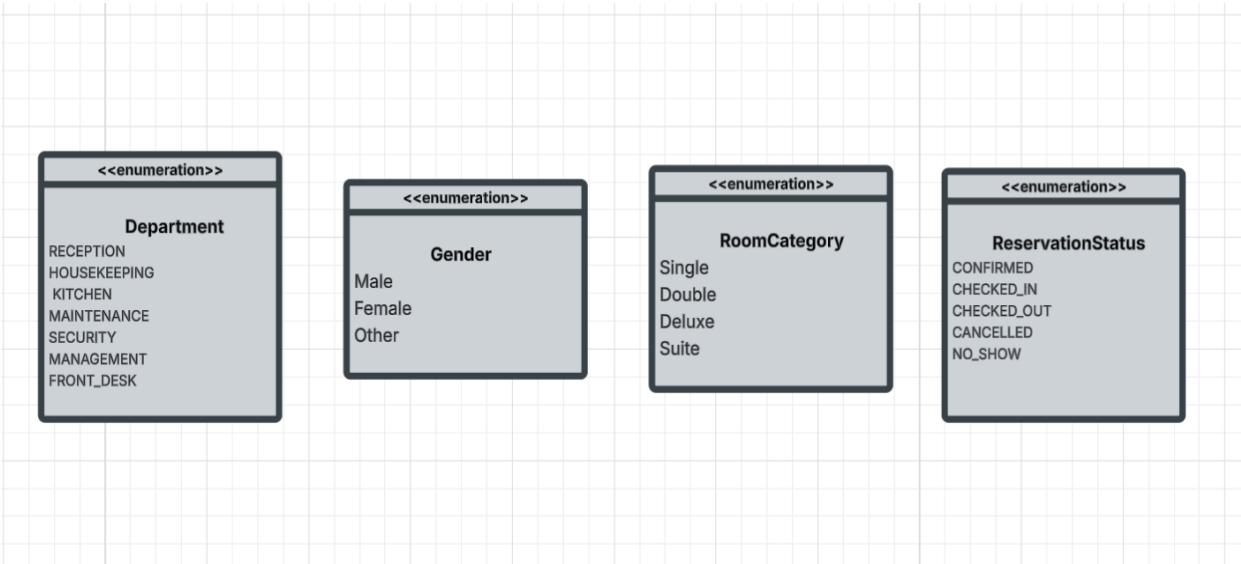


Class Diagram:

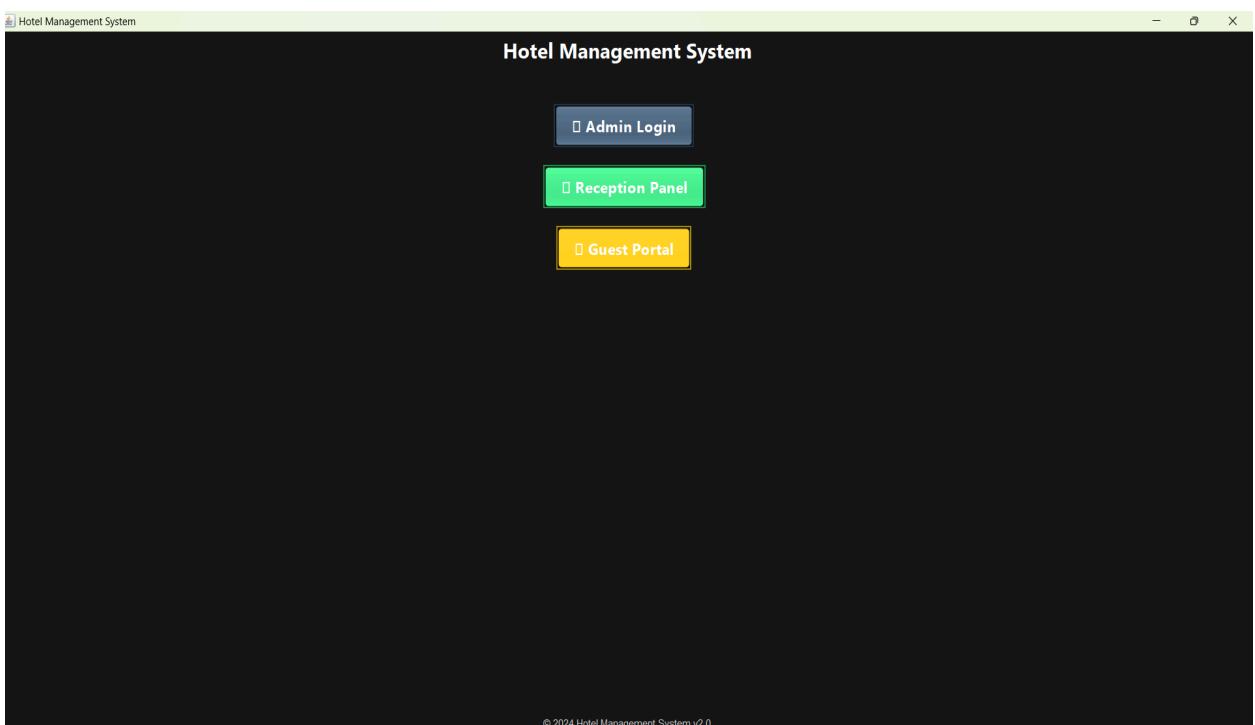
The following Class Diagram illustrates the static structure of the major data entities in the Hotel Management System. It shows classes (Customer, Reservation, HotelRoom, Employee, and Driver), their attributes, methods, and relationships. This diagram is based on the Java classes in the project and uses UML notation to represent associations. Note that Employee and Driver have no dependencies with other entities, as they are standalone in the code.

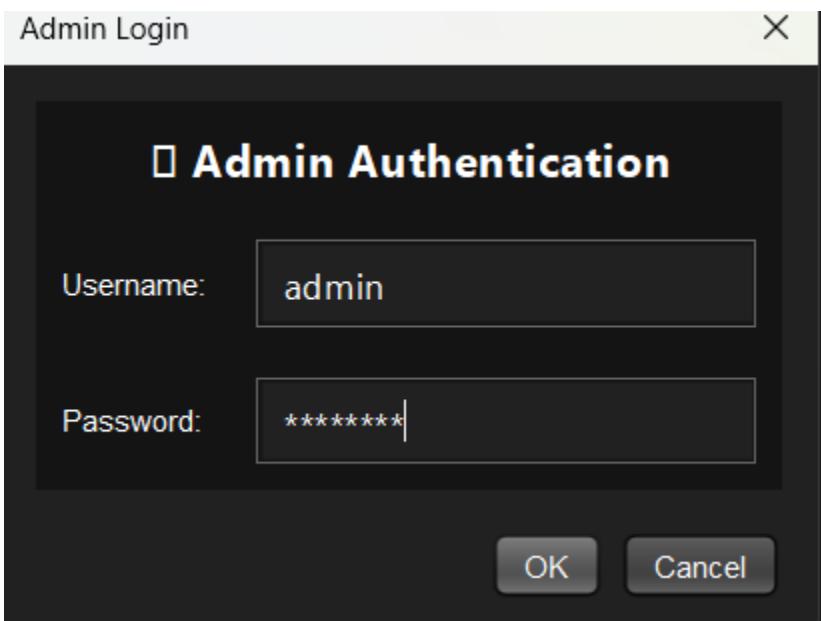


Enum Classes:



Short Glimpse:





Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Reservation Management

Dashboard

Employee Management

Room Management

Driver Management

Customer Management

Reports & Analytics

System Settings

Dashboard Overview

Total Employees	Available Rooms	Total Customers
7	7	2

Occupied Rooms	Revenue Today	Cleaning Issues
1	\$200.00	0

Customer nisa checked in
Customer tisa checked in
Employee karim added
Employee karishma added

Refresh Dashboard

Ready

Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Reservation Management

Dashboard

Employee Management

Room Management

Driver Management

Customer Management

Reports & Analytics

System Settings

Reservation Management

Reservation Form

Customer:	nisa (ID: 1)
Room:	Room 202 - Single Room
Check-in:	31/12/2025, 00:51
Check-out:	31/12/2025, 00:51
Total Amount:	
Status:	CONFIRMED
Special Requests:	

Add Reservation Edit Reservation

Delete Reserva... Clear Form

Reservation List (2)

Reserv...	Custo...	Room	Check-in	Check-...	Amount	Status
1	nisa	Room 201	Tue Dec ...	Tue Dec ...	\$2000.00	CONFIR...
2	tisa	Room 201	Tue Dec ...	Wed Dec ...	\$2000.00	CONFIR...

Reservation Management

Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Employee Management

Employee Form

Name:	<input type="text"/>
Age:	<input type="text"/>
Gender:	<input type="text"/> Male
Department:	<input type="text"/> Reception
Salary (\$):	<input type="text"/>

Add Employee **Edit Employee**

Delete Employee **Clear Form**

Employee List (7)

ID	Name	Age	Gender	Departm...	Salary
1	nisa	21	Female	Manageme...	\$60000.00
2	tisa	22	Female	Reception	\$36000.00
3	ahnaf	26	Male	Kitchen	\$6000.00
4	hrittik	26	Male	Maintenanc...	\$9000.00
5	johson	24	Male	Security	\$5000.00
6	karim	36	Male	Housekeep...	\$9000.00
7	karishma	26	Female	Front Desk	\$15000.00

Employee Management Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Room Management

Room Form

Room No:	<input type="text"/>
Category:	<input type="text"/> SINGLE
Price (\$):	<input type="text"/>

Status: Available Cleaned

Add Room **Edit Room**

Delete Room **Clear Form**

Room List (8)

Room No	Category	Price	Available	Cleaned
201	Single Room	\$2000.00	<input type="checkbox"/>	<input type="checkbox"/>
202	Single Room	\$2000.00	<input type="checkbox"/>	<input type="checkbox"/>
203	Single Room	\$2000.00	<input type="checkbox"/>	<input type="checkbox"/>
204	Double Room	\$6000.00	<input type="checkbox"/>	<input type="checkbox"/>
205	Deluxe Room	\$90000.00	<input type="checkbox"/>	<input type="checkbox"/>
301	Single Room	\$2000.00	<input type="checkbox"/>	<input type="checkbox"/>
302	Double Room	\$6000.00	<input type="checkbox"/>	<input type="checkbox"/>
303	Double Room	\$6000.00	<input type="checkbox"/>	<input type="checkbox"/>

Room Management Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Hotel Management System - Admin Panel

Logout

Driver Management

Driver Form

Name:	<input type="text"/>
Age:	<input type="text"/>
Gender:	<input type="text"/> Male
Car Company:	<input type="text"/>
Car Name:	<input type="text"/>
Location:	<input type="text"/>

Add Driver **Edit Driver**

Delete Driver **Clear Form**

Driver List (4)

Name	Age	Gender	Car Co...	Car Name	Location
rahim	24	Male	toyota	x	railway sta...
rahman	26	Male	toyota	y	airport road
sunny	28	Male	marcedes	u	school road
tahsin	21	Female	x	y	university r...

Driver Management

Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Hotel Management System - Admin Panel

Logout

Customer Management

Customer Form

Customer ID:	<input type="text"/>
Full Name:	<input type="text"/>
Phone:	<input type="text"/>
Email:	<input type="text"/>
Room Number (Opti...	<input type="text"/>
Check-in Date:	<input type="text"/> 31/12/2025, 00:51
Check-out Date:	<input type="text"/> 31/12/2025, 00:51

Add Customer **Edit Customer**

Delete Customer **Clear Form**

Customer List (2)

ID	Name	Phone	Email	Ro...	Check...	Check...
1	nisa	019797...	ttahsin124...	201	Tue Dec ...	Tue Dec ...
2	tisa	017189...	gdyxgcy@...	201	Tue Dec ...	Wed De...

Customer Management

Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Reservation Management

Dashboard

Employee Management

Room Management

Driver Management

Customer Management

Reports & Analytics

System Settings

Reports & Analytics

Financial Occupancy Employee

FINANCIAL REPORT

=====

Total Revenue: \$200.00
Average Revenue per Customer: \$100.00
Total Bookings: 2
Available Rooms: 7
Occupancy Rate: 12.5%

Generated on: Wed Dec 31 00:51:33 GMT+06:00 2025

Export PDF Export Excel

Admin Dashboard - Hotel Management System

Hotel Management System - Admin Panel

Logout

Reservation Management

Dashboard

Employee Management

Room Management

Driver Management

Customer Management

Reports & Analytics

System Settings

System Settings

Hotel Name: Grand Hotel

Admin Email: admin@hotel.com

Backup Frequency: Daily

Save Settings

System Settings Admin | Wed Dec 31 00:51:33 GMT+06:00 2025

Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

[Logout](#)

Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- View Room Status
- Pick-up Service
- Update Room Status
- View All Customers
- View Reports
- Settings

Customer Management

Customer Form

Customer ID:	<input type="text"/>
Full Name:	<input type="text"/>
Phone:	<input type="text"/>
Email:	<input type="text"/>
Room Number (Opti...	<input type="text"/>
Check-in Date:	<input type="date" value="31/12/2025, 00:54"/>
Check-out Date:	<input type="date" value="31/12/2025, 00:54"/>

[Add Customer](#)
[Edit Customer](#)

[Delete Customer](#)
[Clear Form](#)

Customer List (2)

ID	Name	Phone	Email	Ro...	Check-in	Check...
1	nisa	019797...	ttahsin124@...	201	Tue Dec ...	Tue Dec ...
2	tisa	017189...	gdyxgcy@g...	201	Tue Dec ...	Wed Dec...

Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

[Logout](#)

Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- View Room Status
- Pick-up Service
- Update Room Status
- View All Customers
- View Reports
- Settings

Reservation Management

Reservation Form

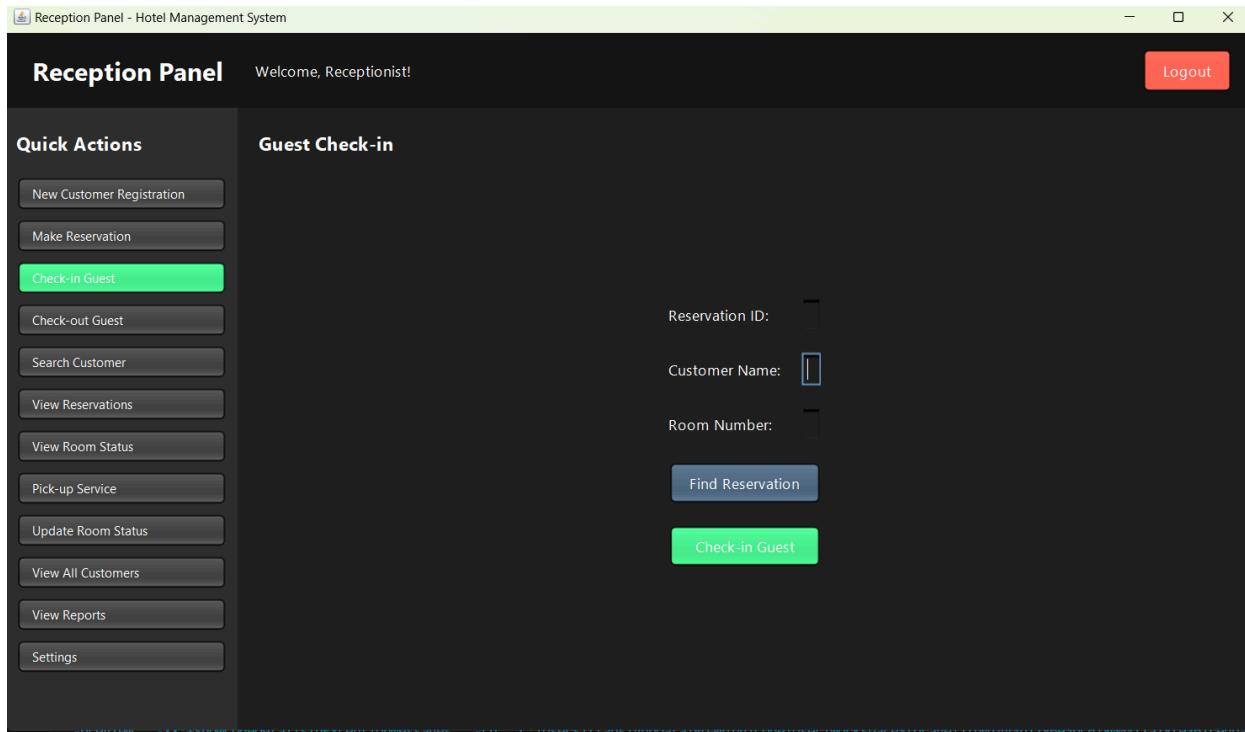
Customer:	<input type="text" value="nisa (ID: 1)"/>
Room:	<input type="text" value="Room 202 - Single Room"/>
Check-in:	<input type="date" value="31/12/2025, 00:54"/>
Check-out:	<input type="date" value="31/12/2025, 00:54"/>
Total Amount:	<input type="text"/>
Status:	<input type="text" value="CONFIRMED"/>
Special Requests:	<input type="text"/>

[Add Reservation](#)
[Edit Reservation](#)

[Delete Reservatio...](#)
[Clear Form](#)

Reservation List (2)

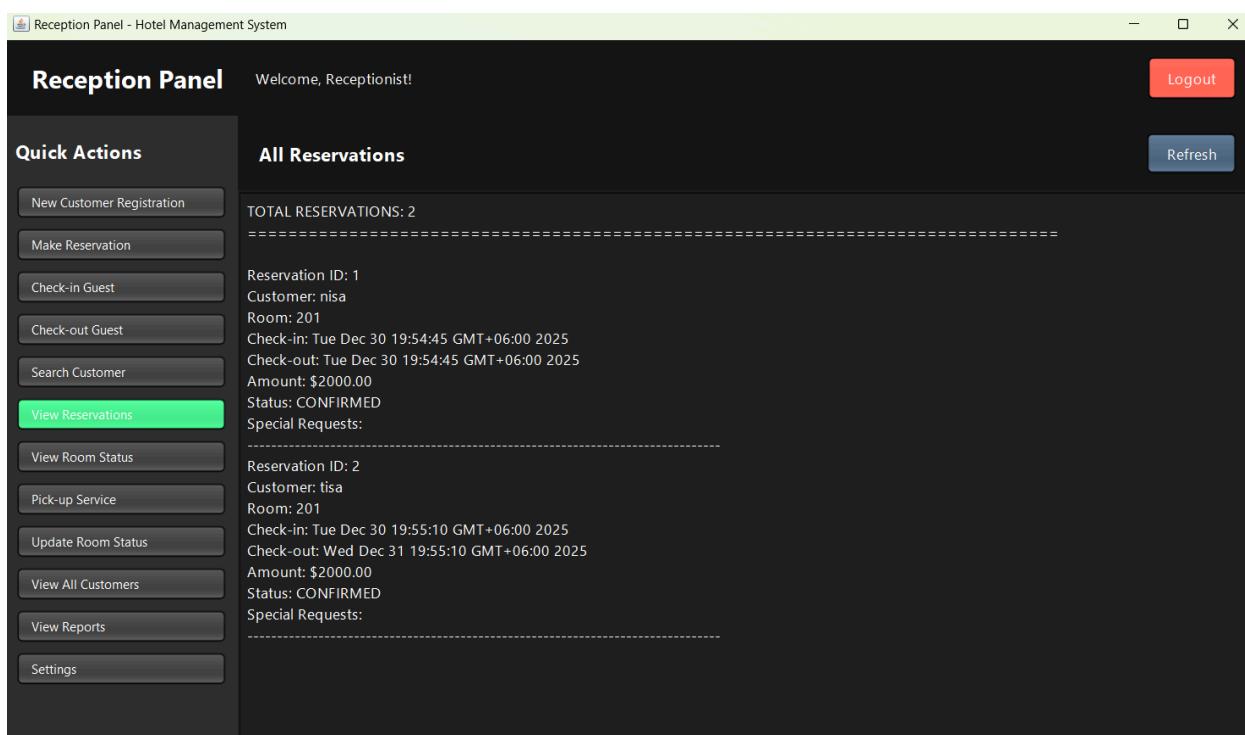
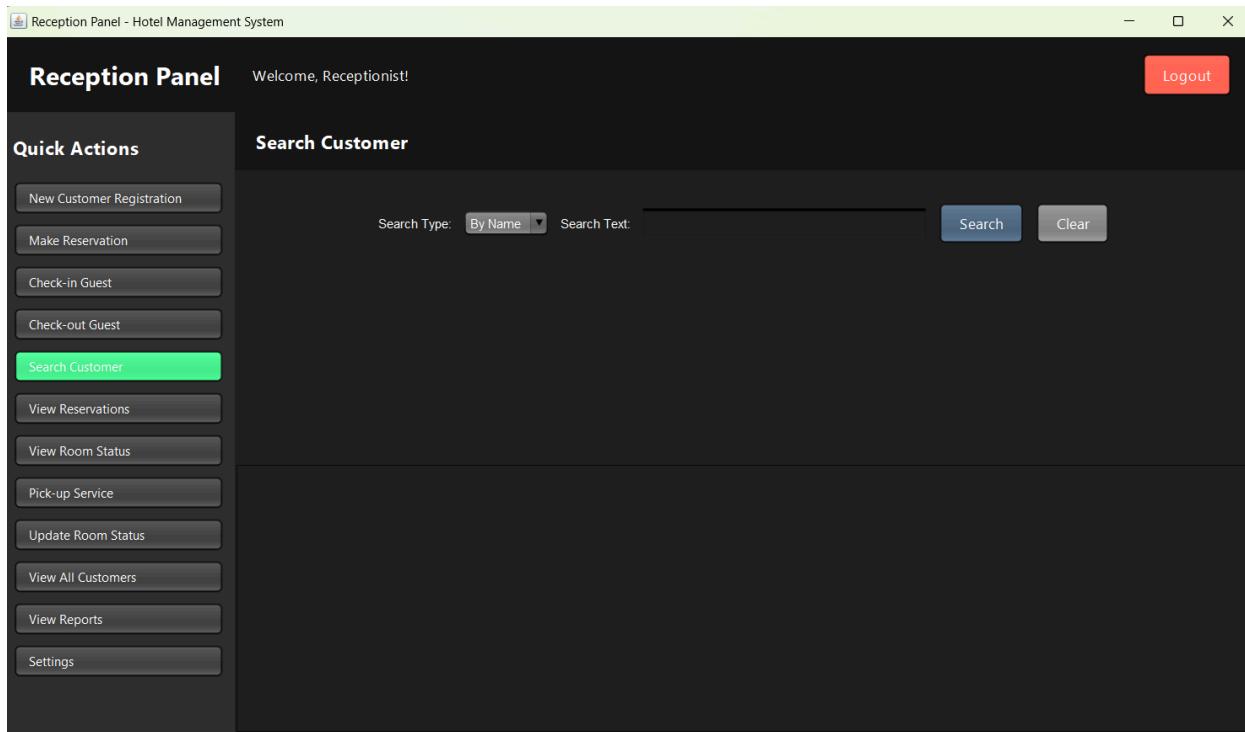
Reserva...	Custo...	Room	Check-in	Check...	Amount	Status
1	nisa	Room 201	Tue Dec 3...	Tue Dec 3...	\$2000.00	CONFIRM...
2	tisa	Room 201	Tue Dec 3...	Wed Dec ...	\$2000.00	CONFIRM...



ID	Name	Phone	Email	Check-In	Check-Out
1	nisa	01979747559	ttahsin124@gmail.com	Tue Dec 30 19:52:46 GMT+0..	Tue Dec 30 19:52:46 GMT+...
2	tisa	0171895623	gdyxgcy@gmail.com	Tue Dec 30 19:54:21 GMT+0..	Wed Dec 31 19:54:21 GMT...

Guest Check-Out

Check Out Selected Guest **Refresh List**



Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

[Logout](#)

Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- View Room Status**
- Pick-up Service
- Update Room Status
- View All Customers
- View Reports
- Settings

Room Status Overview

Total: 8 rooms

Room No	Category	Price	Available	Cleaned
201	Single Room	\$2000.00	<input type="checkbox"/> Occupied	<input type="checkbox"/> Clean
202	Single Room	\$2000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
203	Single Room	\$2000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
204	Double Room	\$6000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
205	Deluxe Room	\$90000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
301	Single Room	\$2000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
302	Double Room	\$6000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
303	Double Room	\$6000.00	<input type="checkbox"/> Available	<input type="checkbox"/> Clean

Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

[Logout](#)

Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- Pick-up Service**
- Update Room Status
- View All Customers
- View Reports
- Settings

Available Drivers

Total: 4 drivers

Name	Age	Gender	Car Company	Car Name	Location
rahim	24	Male	toyota	x	railway station
rahman	26	Male	toyota	y	airport road
sunny	28	Male	marcedes	u	school road
tahsin	21	Female		x	university road

Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

Logout

Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- View Room Status
- Pick-up Service
- Update Room Status**
- View All Customers
- View Reports
- Settings

Update Room Status

Room No	Category	Available	Cleaned
201	Single Room	<input type="checkbox"/> Occupied	<input type="checkbox"/> Clean
202	Single Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
203	Single Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
204	Double Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
205	Deluxe Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
301	Single Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
302	Double Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean
303	Double Room	<input type="checkbox"/> Available	<input type="checkbox"/> Clean

Toggle Availability **Toggle Cleaned** **Refresh**

Reception Panel - Hotel Management System

Reception Panel

Welcome, Receptionist!

Logout

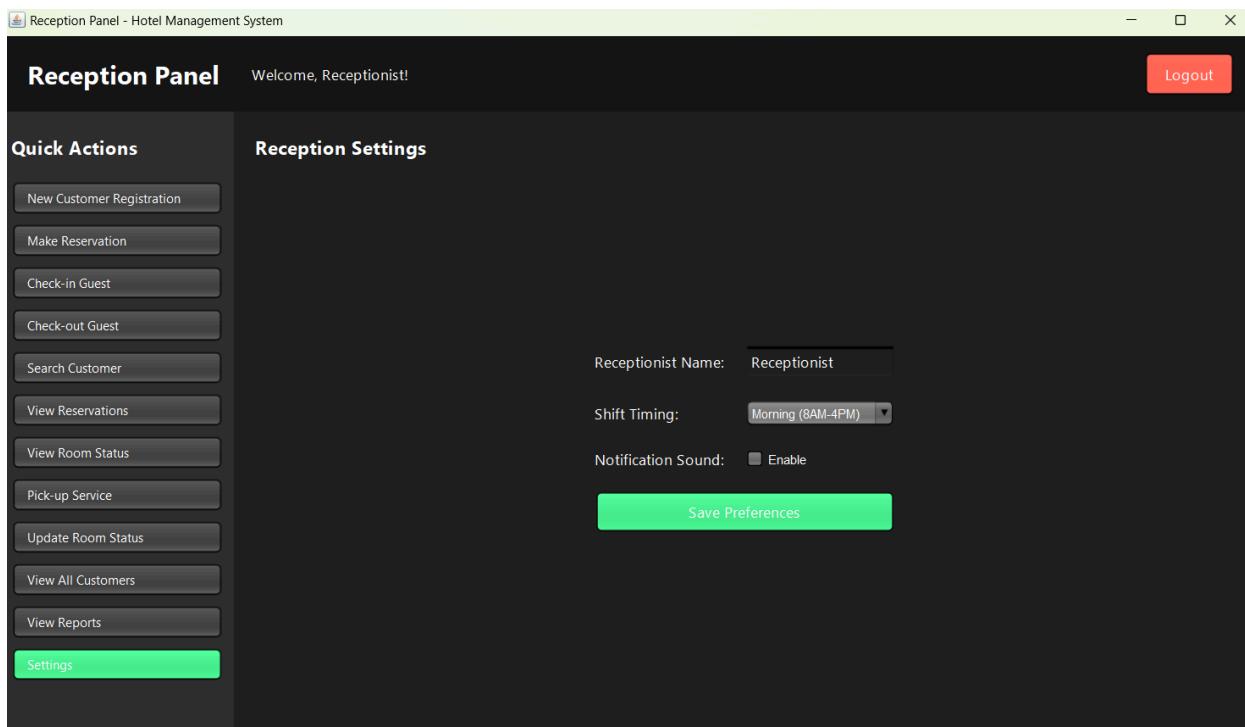
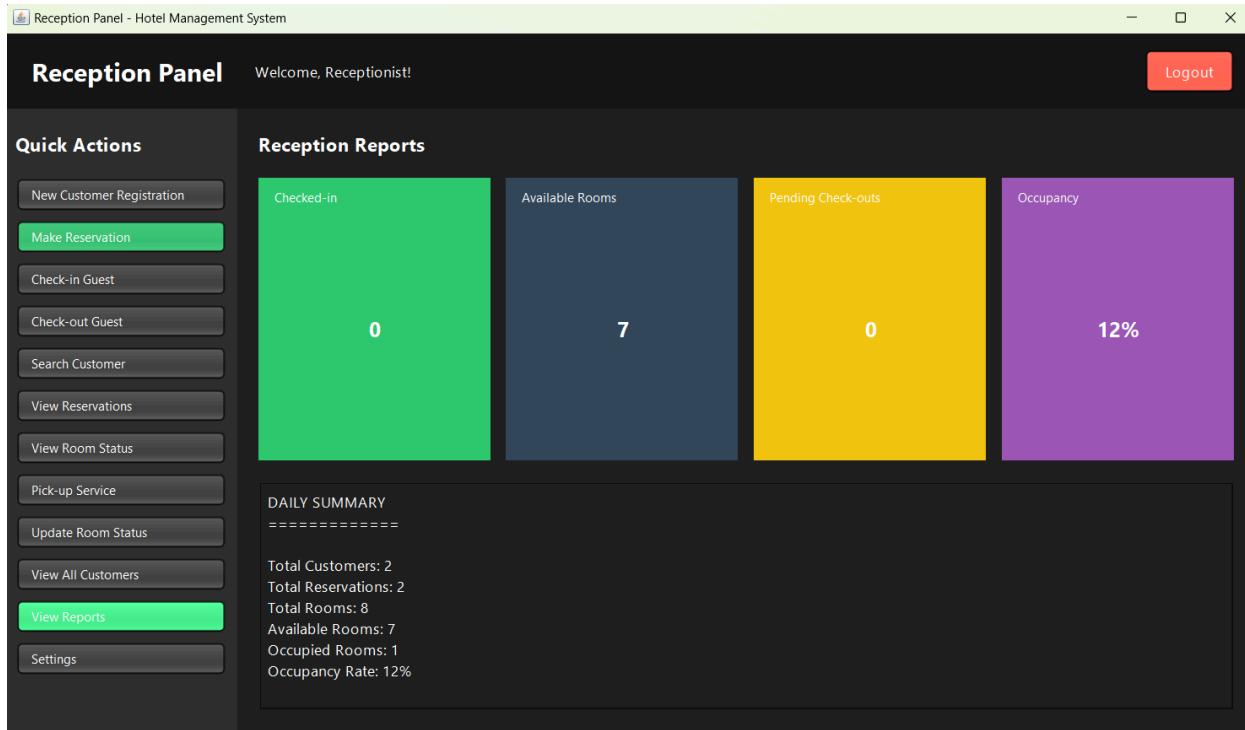
Quick Actions

- New Customer Registration
- Make Reservation
- Check-in Guest
- Check-out Guest
- Search Customer
- View Reservations
- View Room Status
- Pick-up Service
- Update Room Status
- View All Customers**
- View Reports
- Settings

All Customers

Total: 2 customers

ID	Name	Phone	Email	Check-In	Check-Out
1	nisa	01979747559	ttahsin124@gmail.com	Tue Dec 30 19:52:46 GMT+0...	Tue Dec 30 19:52:46 GMT+0...
2	tisa	0171895623	gdyxgcy@gmail.com	Tue Dec 30 19:54:21 GMT+0...	Wed Dec 31 19:54:21 GMT+0...



Objectives:

- 1. To develop a comprehensive, role-based system for managing hotel operations, including customer check-ins/check-outs, room allocation, and reservations.**
- 2. To provide real-time analytics and reporting for better decision-making.**
- 3. To ensure data integrity, user-friendly interfaces, and scalability for hotel staff.**
- 4. To demonstrate Java Swing proficiency in building desktop applications with modular design.**

Motivation:

Traditional hotel management relies on manual processes, leading to inefficiencies, errors, and delays. This project was motivated by the need for a digital solution to automate tasks like customer registration, room status updates, and financial tracking. With the growing demand for streamlined hospitality services, the system addresses real-world pain points such as occupancy monitoring and staff coordination, while serving as an educational tool for learning Java GUI development and data management.

Core System Architecture:

Technology Stack and Design Patterns

- **Programming Language:** Java (object-oriented, platform-independent)
- **GUI Framework:** Swing with Nimbus Look and Feel for modern aesthetics
- **Data Persistence:** File-based storage using Java Object Serialization
- **Design Pattern:** Model-View-Controller (MVC) inspired architecture
- **UI Framework:** Custom theming system with consistent color schemes and fonts

Key Architectural Components:

1. Entry Point and Authentication

- **MainApp.java:** Serves as the application's main entry point, initializing the Swing event dispatch thread
- **LoginFrame.java:** Implements a multi-role authentication system with secure credential validation
- **Security Features:** Basic username/password authentication with role-based access control

2. Dashboard Interfaces

- **AdminDashboard.java:** Comprehensive administrative interface with card-based navigation
- **ReceptionDashboard.java:** Front-desk focused interface with quick-action sidebar
- **Navigation:** CardLayout-based panel switching for seamless user experience

3. Management Modules

Each management module follows a consistent pattern:

- **Form Panel:** Data entry and editing interface
- **Table Panel:** Data display and selection interface

CRUD Operations: Create, Read, Update, Delete functionality

Validation: Input validation and error handling

4. Data Models

- **Customer.java:** Encapsulates guest information including personal details, stay dates, and room assignments
- **Employee.java:** Represents staff members with department, salary, and demographic information

- **HotelRoom.java:** Defines room properties including category, pricing, and status flags
- **Driver.java:** Manages transportation service providers and their vehicle details
- **Reservation.java:** Handles booking information with status tracking and financial data

5. Utility and Support Classes

- **FileUtil.java:** Provides generic save/load operations for data persistence
- **UITheme.java:** Centralizes theming constants and UI component styling methods
- **Enums:** Gender.java, Department.java, RoomCategory.java, ReservationStatus.java for type safety

Detailed Feature Breakdown:

Authentication and Access Management

- Login System Implementation:
- Multi-modal login interface with role selection
- Credential validation against hardcoded admin credentials
- Session management with logout functionality
- Role-based dashboard redirection

Security Considerations:

- Input sanitization on login forms
- Confirmation dialogs for sensitive operations
- Basic access control preventing unauthorized feature access

Customer Relationship Management

Customer Registration and Management (**CustomerFormPanel.java**):

- Comprehensive customer profile creation with validation
- Editable customer records with real-time form updates
- Search functionality across multiple criteria

- Room assignment tracking and management

Check-in/Check-out Processes (CheckOutPanel.java):

- Streamlined guest arrival processing
- Automated room status updates upon check-in
- Secure check-out procedure with confirmation prompts
- Customer record archival upon departure

Customer Search and Analytics (SearchCustomerPanel.java):

- Multi-criteria search (name, phone, email, room number)
- Real-time search results display
- Customer history and statistics tracking



Room Inventory and Management

Room Administration (RoomPanel.java):

- Dynamic room inventory management
- Category-based room classification (Single, Double, Deluxe, Suite)
- Pricing structure management
- Availability and cleaning status tracking

Room Status Updates (UpdateRoomStatusPanel.java):

- Real-time room status modification
- Toggle functionality for availability and cleaning states
- Immediate data persistence and UI refresh

Room Status Overview (RoomListPanel.java):

- Comprehensive room status dashboard
- Visual indicators for availability and maintenance needs
- Statistical summaries and occupancy metrics

Human Resources Management

Employee Administration (EmployeePanel.java):

- Complete employee lifecycle management
- Department-based organization
- Salary and demographic data tracking
- Age and salary validation rules

Driver Management (DriverPanel.java):

- Transportation service provider database
- Vehicle information tracking
- Location-based driver assignment capabilities

Reservation and Booking System

Reservation Processing (ReservationPanel.java):

- End-to-end reservation creation workflow
- Customer-room-date association
- Financial calculation and tracking
- Status management (Confirmed, Checked-in, Checked-out, Cancelled)

Reservation Tracking (ViewReservationsPanel.java):

- Comprehensive reservation database viewing
- Status-based filtering and sorting
- Customer and room association display
- Financial summary and reporting

Business Intelligence and Reporting

Dashboard Analytics (AdminDashboard.java - Dashboard Panel):

- Real-time KPI display (employee count, room availability, customer metrics)
- Revenue tracking and occupancy calculations
- Recent activity feeds and system notifications

Advanced Reporting (AdminDashboard.java - Reports Panel):

- Financial performance analysis
- Occupancy rate calculations
- Employee productivity metrics
- Export-ready report generation (PDF/Excel interfaces prepared)

Reception Reports (ReceptionDashboard.java):

- Daily operational summaries
- Quick statistics for front-desk staff
- Real-time occupancy and availability metrics

System Configuration and Settings

Administrative Settings (AdminDashboard.java):

- Hotel configuration management
- System-wide parameter adjustment
- Backup frequency configuration

User Preferences (ReceptionDashboard.java):

- Receptionist-specific settings
- Notification and sound preferences
- Shift timing management

Data Flow and Business Logic

Customer Lifecycle

- **Registration:** Customer data entry and validation
- **Reservation:** Room booking with date and requirement specification
- **Check-in:** Reservation activation and room assignment
- **Stay Management:** Room status and service tracking
- **Check-out:** Service completion and record archival

Room Lifecycle

- **Creation:** Room inventory addition with specifications
- **Reservation:** Availability status changes
- **Occupation:** Check-in processing and status updates
- **Maintenance:** Cleaning status management
- **Release:** Check-out processing and availability restoration

Reservation Workflow

- **Creation:** Customer-room-date association
- **Confirmation:** Status update and customer notification
- **Check-in:** Status change to active occupation
- **Management:** Special request handling and adjustments
- **Completion:** Check-out processing and financial settlement

User Experience Design

Interface Consistency

- **Color Scheme:** Professional dark theme with high contrast ratios
- **Typography:** Segoe UI font family with hierarchical sizing
- **Component Styling:** Consistent button styles, form layouts, and table designs
- **Feedback Systems:** Status messages, confirmation dialogs, and error handling

Navigation Patterns

- **Sidebar Navigation:** Quick access to primary functions
- **Card-Based Layouts:** Efficient screen space utilization
- **Split Pane Interfaces:** Simultaneous form and data viewing
- **Contextual Actions:** Dynamic button enabling based on selection state

Data Presentation

- **Table Interfaces:** Sortable, selectable data grids with custom rendering
- **Form Validation:** Real-time input validation with user feedback
- **Status Indicators:** Visual cues for system states and data conditions

Technical Implementation Details

File-Based Persistence

- **Serialization:** Java Object Serialization for data storage
- **File Structure:** Separate .dat files for each data entity
- **Error Handling:** Robust file I/O with exception management
- **Data Integrity:** Atomic save operations and backup considerations

UI Component Architecture

- **Custom Components:** Extended Swing components with theming
- **Event Handling:** Action listeners and selection models
- **Layout Management:** BorderLayout, BoxLayout, and GridBagLayout combinations
- **Threading:** SwingUtilities for proper EDT management

Validation and Error Handling

- **Input Validation:** Type checking, range validation, and business rule enforcement
- **User Feedback:** JOptionPane dialogs for confirmations and errors
- **Exception Management:** Try-catch blocks with user-friendly error messages

Deployment and Usage

System Requirements

- **Java Runtime:** JDK 8 or higher
- **Operating System:** Cross-platform (Windows, macOS, Linux)
- **Memory:** Minimal RAM requirements for file-based operations

- **Storage:** Local file system access for data persistence

Installation and Setup

- **Compilation:** Compile all Java source files
- **Execution:** Run MainApp class
- **Initial Setup:** Use default admin credentials for first access
- **Data Initialization:** System creates data files as needed

Operational Workflow

- **System Startup:** Launch via MainApp
- **Authentication:** Role-based login
- **Dashboard Access:** Feature-specific navigation
- **Data Operations:** CRUD operations across modules
- **Reporting:** Analytics and export functions
- **System Maintenance:** Settings and configuration

Challenges and Limitations:

Challenges: Implementing consistent UI theming across components, handling file-based data concurrency, and ensuring input validation for diverse user inputs. Debugging Swing event handling and layout issues was time-intensive.

Limitations: File-based storage lacks scalability for large datasets (no database integration). No encryption for data security. Guest portal is a placeholder. Limited to desktop-only (no web/mobile versions). Potential performance issues with large data files. No automated backups or advanced error recovery.

Conclusion:

The Hotel Management System successfully demonstrates a practical application of Java Swing for building a functional, user-centric hotel management tool. It achieves its objectives by providing efficient workflows, real-time insights, and role-based access, while highlighting the power of object-oriented design. Despite limitations in scalability and security, it serves as a solid foundation for real-world use and further enhancements like database integration. This project not only solves operational challenges but also educates on GUI development, data handling, and software engineering principles, paving the way for more advanced hospitality software solutions.