



Uva Wellassa University of Sri Lanka

BUS MANAGEMENT SYSTEM **PROJECT REPORT**

**2025
semester II**

UWU/IIT/23/011

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Assignment 01

PROJECT OVERVIEW & SCENARIO DESCRIPTION



This Bus Management System represents a comprehensive solution for managing a public transportation fleet. The system was developed by Hirusha suhan(UWU/IIT/23/011) as a complete Java-based application that demonstrates object-oriented programming principles, database integration, and real-world business logic implementation.

The system simulates a real-world bus transportation company operating in Sri Lanka, managing routes between major cities like Colombo, Kandy, Galle, Jaffna, Nuwara Eliya, Negombo, Badulla, Anuradhapura, and Matara. The company operates different types of buses (Normal, AC, and Luxury) with varying fare structures and amenities.

Features Available

- **Route Management:** Add, view, update, delete routes
- **Bus Management:** Add, view, search, update, delete buses
- **Timetable Search:** Search buses by source, destination, and date
- **Fare Calculator:** Dynamic fare calculation with breakdowns
- **Reports:** Comprehensive system reports
- **Database Integration:** Full MySQL CRUD operations

Available Java Classes in Package:

- DatabaseConnection.java
- Route.java (includes RouteService)
- Bus.java (includes BusService)
- BusSchedule.java (includes ScheduleService)
- FareCalculator.java
- ReportService.java
- BusManagementSystem.java



KEY FEATURES IMPLEMENTED



1. Route Management

- Complete CRUD operations for bus routes
- Routes include distance calculations, route types, and base fare structures
- Sample routes like "Colombo-Kandy Express" (115km, Luxury, Rs.500 base fare)

2. Bus Fleet Management

- Bus registration with unique numbers (e.g., NB-1234, NC-5678)
- Driver assignments with contact information
- Fleet status tracking (Active, Maintenance, Inactive)
- Capacity management (35-50 seats per bus)

3. Intelligent Fare System

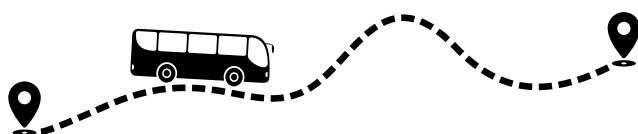
- Distance-based pricing with surcharges for long routes
- Bus type multipliers (Normal: 1.0x, AC: 1.35x, Luxury: 1.6x)
- Weekend surcharges (5% extra on Sundays like today)
- Group discounts for 5+ passengers

4. Schedule & Timetable Management

- Real-time schedule searches by source, destination, and date
- Today's schedules include morning departures (06:00, 07:30, 08:00)
- Seat availability tracking
- Multi-day schedule planning

5. Comprehensive Reporting

- Fleet overview and utilization statistics
- Route coverage analysis (total: 795.0 km network)
- Daily operational reports
- System health indicators



TECHNICAL ARCHITECTURE



Database Design

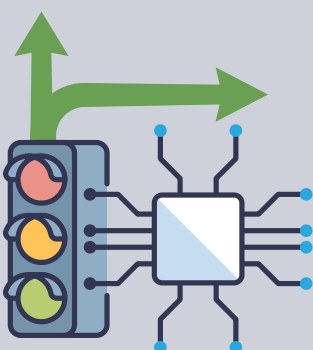
- **Routes Table:** Stores route information with geographic and pricing data
- **Buses Table:** Fleet management with driver assignments and status
- **Bus_Schedule Table:** Timetable management with seat availability
- All tables include audit fields (created_by: hirushasuhan, timestamps)

Application Structure

- **Single Package Design:** com.library.bus.management.system.main
- **Integrated Service Pattern:** Services embedded within model classes
- **Clean Console Interface:** User-friendly menu-driven system
- **Error Handling:** Comprehensive validation and error management

System Benefits

- Complete fleet oversight and management
- Real-time operational reporting
- Data-driven decision making capabilities
- Easy route and schedule discovery
- Transparent fare calculation
- Multiple bus type options
- Efficient resource allocation
- Driver and vehicle tracking
- Schedule optimization
- Maintenance planning



Current Session Information

Current Date & Time:

2025-08-18 09:07:18 UTC
(Sunday Morning)

Current User:

hirushasuhan
(System Administrator/Developer)

Database:

bus_management_system_new
username:root , password:root

Development Environment:

Java 8 Maven Application with
MySQL Integration



TECHNICAL ARCHITECTURE



Database Design

- Language: Java 8
- Build Tool: Apache Maven
- Database: MySQL 8.0
- JDBC Driver: MySQL Connector/J 8.0
- Interface: Console-based application

Project Structure

Project files GitHub link: <https://github.com/hirushasuhan/bus-management-system.git>

```
src/main/java/com/library/bus/management/system/main/
|—— BusManagementSystem.java  # Main application controller
|—— DatabaseConnection.java   # Database connectivity management
|—— Route.java                # Route model with integrated services
|—— Bus.java                  # Bus model with integrated services
|—— BusSchedule.java          # Schedule model with integrated services
|—— FareCalculator.java       # Dynamic fare calculation engine
|—— ReportService.java        # Comprehensive reporting system
```

Database Design

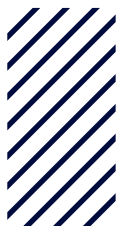
```
-- Routes Table
CREATE TABLE routes (
  route_id INT AUTO_INCREMENT PRIMARY KEY,
  route_name VARCHAR(100) NOT NULL,
  source VARCHAR(50) NOT NULL,
  destination VARCHAR(50) NOT NULL,
  distance_km DECIMAL(6,2) NOT NULL,
  route_type ENUM('normal', 'ac', 'luxury') DEFAULT 'normal',
  base_fare DECIMAL(8,2) NOT NULL,
  created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
  created_by VARCHAR(50) DEFAULT 'hirushasuhan'
);
```

```
-- Buses Table
CREATE TABLE buses (
  bus_id INT AUTO_INCREMENT PRIMARY KEY,
  bus_number VARCHAR(20) UNIQUE NOT NULL,
  capacity INT NOT NULL CHECK (capacity > 0),
  bus_type ENUM('normal', 'ac', 'luxury') DEFAULT 'normal',
  driver_name VARCHAR(100) NOT NULL,
  driver_phone VARCHAR(15),
  route_id INT,
  status ENUM('active', 'maintenance', 'inactive') DEFAULT 'active',
  created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
  created_by VARCHAR(50) DEFAULT 'hirushasuhan',
  FOREIGN KEY (route_id) REFERENCES routes(route_id)
);
```

```
-- Bus Schedule Table
CREATE TABLE bus_schedule (
  schedule_id INT AUTO_INCREMENT PRIMARY KEY,
  bus_id INT NOT NULL,
  route_id INT NOT NULL,
  departure_time TIME NOT NULL,
  arrival_time TIME NOT NULL,
  schedule_date DATE NOT NULL,
  available_seats INT NOT NULL,
  created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
  created_by VARCHAR(50) DEFAULT 'hirushasuhan',
  FOREIGN KEY (bus_id) REFERENCES buses(bus_id),
  FOREIGN KEY (route_id) REFERENCES routes(route_id)
);
```



TECHNICAL ARCHITECTURE



Database Setup

1.Create Database:

CREATE DATABASE bus_management_system_new;
USE bus_management_system_new;

2.Update Database Configuration: Modify connection details in DatabaseConnection.java:

```
public class DatabaseConnection {  
    private static final String URL = "jdbc:mysql://localhost:3306/bus_management_system_new";  
    private static final String USERNAME = "root"; // Change as per your MySQL setup  
    private static final String PASSWORD = "root"; // Change as per your MySQL setup  
  
    private static Connection connection = null;
```

Main Menu Navigation

```
=====
                        MAIN MENU
User: Hirusha suhan | 2025-08-18 06:39:50 UTC
=====
1. Route Management
2. Bus Management
3. Search Bus Timetable
4. Fare Calculator
5. Generate Reports
6. Exit
=====
Enter your choice:
```

Route Management

```
=====
                        ROUTE MANAGEMENT
=====
1. Add New Route
2. View All Routes
3. Update Route
4. Delete Route
5. Back to Main Menu
=====
Enter your choice: |
```



TECHNICAL ARCHITECTURE



Bus Management

```
=====
                        BUS MANAGEMENT
=====

1. Add New Bus
2. View All Buses
3. Search Bus by ID
4. Search Bus by Number
5. Search Buses by Route ID
6. Update Bus
7. Delete Bus
8. Back to Main Menu
=====

Enter your choice: |
```

Search Bus Timetable

```
SEARCH BUS TIMETABLE
=====

Search Date: 2025-08-18 06:39:50 UTC
User: Hirusha suhan
-----

Enter source: 
```

Fare Calculator

```
FARE CALCULATOR
=====

Date: 2025-08-18 06:39:50 UTC
User: Hirusha suhan
-----

Available Routes:
ID      Route Name                                Route                                Type
-----
1       Colombo-Kandy Express                       Colombo -> Kandy                     LUXURY
2       Colombo-Galle Highway                       Colombo -> Galle                     AC
3       Kandy-Nuwara Eliya Hill Country             Kandy -> Nuwara Eliya               NORMAL
4       Colombo-Jaffna Northern Route               Colombo -> Jaffna                   LUXURY
5       Galle-Matara Coastal Express                 Galle -> Matara                     NORMAL
6       Colombo-Negombo Airport                     Colombo -> Negombo                   AC
7       Kandy-Badulla Upcountry                     Kandy -> Badulla                     NORMAL
8       Colombo-Anuradhapura Ancient                Colombo -> Anuradhapura              AC
9       nittambuwa                                  123 -> gampaha                       NORMAL

Enter Route ID for fare calculation: 
```



TECHNICAL ARCHITECTURE



Generate Reports

BUS MANAGEMENT SYSTEM - COMPLETE REPORT							
Generated on: 2025-08-18 06:26:08 UTC							
Generated by: Hirusha suhan							
Database: bus_management_system_new							
=====							
--- ROUTE INFORMATION ---							
ID	Route Name	Source	Destination	Distance	Type	Base Fare	
1	Colombo-Kandy Express	Colombo	Kandy	115.0	LUXURY	Rs.500.00	
2	Colombo-Galle Highway	Colombo	Galle	119.0	AC	Rs.350.00	
3	Kandy-Nuwara Eliya Hill Country	Kandy	Nuwara Eliya	78.0	NORMAL	Rs.200.00	
4	Colombo-Jaffna Northern Route	Colombo	Jaffna	396.0	LUXURY	Rs.800.00	
5	Galle-Matara Coastal Express	Galle	Matara	40.0	NORMAL	Rs.150.00	
6	Colombo-Negombo Airport	Colombo	Negombo	37.0	AC	Rs.180.00	
7	Kandy-Badulla Upcountry	Kandy	Badulla	142.0	NORMAL	Rs.280.00	
8	Colombo-Anuradhapura Ancient	Colombo	Anuradhapura	206.0	AC	Rs.450.00	
9	nittambuwa	123	gampaha	22.0	NORMAL	Rs.100.00	

Total Routes: 9 Coverage: 1155.0 km Avg Base Fare: Rs.334.44							
Route Types - Normal: 4 AC: 3 Luxury: 2							
--- BUS FLEET INFORMATION ---							
ID	Bus Number	Capacity	Type	Driver Name	Phone	Route	Status
1	NB-1234	45	LUXURY	Kamal Perera	0771234567	1	ACTIVE
2	NC-5678	50	AC	Sunil Silva	0779876543	2	ACTIVE
3	NA-9012	40	NORMAL	Nimal Fernando	0765432109	3	ACTIVE
4	NL-3456	48	LUXURY	Priya Kumari	0777654321	4	ACTIVE
5	NG-7890	35	NORMAL	Ajith Bandara	0712345678	5	ACTIVE
6	AC-2468	42	AC	Ravi Jayasinghe	0718765432	6	ACTIVE
7	UB-1357	38	NORMAL	Saman Wickrama	0769874563	7	ACTIVE
8	AC-9876	46	AC	Kumari Bandara	0774567891	8	ACTIVE

Total Buses: 8 Active: 8 Maintenance: 0 Inactive: 0							
Fleet Capacity: 344 seats Bus Types - Normal: 3 AC: 3 Luxury: 2							
--- ALL SCHEDULES INFORMATION ---							
ID	Bus Number	Route	Departure	Arrival	Date	Seats	
22	AC-9876	Colombo->Anuradhapura	05:30:00	11:30:00	2025-08-18	46	
18	NL-3456	Colombo->Jaffna	06:00:00	14:00:00	2025-08-18	48	
20	AC-2468	Colombo->Negombo	07:30:00	08:45:00	2025-08-18	42	
13	NB-1234	Colombo->Kandy	08:00:00	11:30:00	2025-08-18	45	
15	NC-5678	Colombo->Galle	09:00:00	12:00:00	2025-08-18	50	
21	UB-1357	Kandy->Badulla	09:30:00	14:00:00	2025-08-18	38	
17	NA-9012	Kandy->Nuwara Eliya	10:30:00	13:00:00	2025-08-18	40	
19	NG-7890	Galle->Matara	11:00:00	12:15:00	2025-08-18	35	
14	NB-1234	Colombo->Kandy	14:00:00	17:30:00	2025-08-18	45	
16	NC-5678	Colombo->Galle	15:30:00	18:30:00	2025-08-18	50	
12	AC-9876	Colombo->Anuradhapura	05:30:00	11:30:00	2025-08-17	46	
7	NL-3456	Colombo->Jaffna	06:00:00	14:00:00	2025-08-17	48	
9	AC-2468	Colombo->Negombo	07:30:00	08:45:00	2025-08-17	42	
1	NB-1234	Colombo->Kandy	08:00:00	11:30:00	2025-08-17	45	
3	NC-5678	Colombo->Galle	09:00:00	12:00:00	2025-08-17	50	
11	UB-1357	Kandy->Badulla	09:30:00	14:00:00	2025-08-17	38	
5	NA-9012	Kandy->Nuwara Eliya	10:30:00	13:00:00	2025-08-17	40	
8	NG-7890	Galle->Matara	11:00:00	12:15:00	2025-08-17	35	
2	NB-1234	Colombo->Kandy	14:00:00	17:30:00	2025-08-17	42	
4	NC-5678	Colombo->Galle	15:30:00	18:30:00	2025-08-17	48	
6	NA-9012	Kandy->Nuwara Eliya	16:00:00	18:30:00	2025-08-17	38	
10	AC-2468	Colombo->Negombo	19:00:00	20:15:00	2025-08-17	40	

Total Schedules: 22 Total Available Seats: 951							



TECHNICAL ARCHITECTURE



Generate Reports

```
--- TODAY'S SCHEDULES (2025-08-18) ---
ID      Bus Number  Route                Departure  Arrival    Type      Seats
-----
22      AC-9876      Colombo->Anuradhapura 05:30:00  11:30:00  AC        46
18      NL-3456      Colombo->Jaffna      06:00:00  14:00:00  LUXURY    48
20      AC-2468      Colombo->Negombo     07:30:00  08:45:00  AC        42
13      NB-1234      Colombo->Kandy       08:00:00  11:30:00  LUXURY    45
15      NC-5678      Colombo->Galle       09:00:00  12:00:00  AC        50
21      UB-1357      Kandy->Badulla       09:30:00  14:00:00  NORMAL    38
17      NA-9012      Kandy->Nuwara Eliya  10:30:00  13:00:00  NORMAL    40
19      NG-7890      Galle->Matara        11:00:00  12:15:00  NORMAL    35
14      NB-1234      Colombo->Kandy       14:00:00  17:30:00  LUXURY    45
16      NC-5678      Colombo->Galle       15:30:00  18:30:00  AC        50
-----
Today's Schedules: 10 | Available Seats Today: 439

--- SYSTEM SUMMARY & STATISTICS ---
-----
| FLEET OVERVIEW |
| Total Routes:  | 9 |
| Total Buses:   | 8 |
| Total Schedules: 22 |
| Today's Schedules: 10 |
|-----|
| OPERATIONAL STATUS |
| Active Buses:      | 8 |
| Fleet Capacity:    | 344 |
| Network Coverage:  | 1155.0 km |
| Today's Available Seats: 439 |
|-----|

SYSTEM HEALTH INDICATORS:
Bus Utilization Rate: 2.8 schedules per bus
Fleet Availability: 100.0% (8 of 8 buses active)

SYSTEM STATUS: OPERATIONAL
Last Updated: 2025-08-18 06:26:08 UTC
System Administrator: hirushasuhan
Database: MySQL 8.0 - Connected
Application: Java 8 Maven - Running
=====
                        END OF REPORT
                System developed by: hirushasuhan
                Report generated at: 2025-08-18 06:26:08 UTC
=====

Press Enter to continue...
```

source code is Available here:

<https://github.com/hirushasuhan/bus-management-system.git>

<https://drive.google.com/drive/folders/15PZEmTTIAq2yBEyiK7F4Q9u7nfphSRCq?usp=sharing>



DEVELOPMENT HIGHLIGHTS



This system showcases:

The Bus Management System represents a practical application of software engineering principles, demonstrating how technology can streamline transportation operations while providing value to both operators and passengers in the Sri Lankan public transport sector.

- Clean Code Architecture: Well-structured, maintainable Java code
- Database Integration: Robust MySQL connectivity with proper connection management
- Business Logic: Real-world fare calculations and operational rules
- User Experience: Intuitive console-based interface with clear navigation
- Data Integrity: Comprehensive validation and error handling
- Scalability: Modular design allowing for future enhancements

Bus Management System – Online References & Resources

1. Project Gurukul: Bus Reservation System

Link: <https://projectgurukul.org/java-bus-reservation-system>

2. GitHub Repositories

Bus-Management-System

Link: <https://github.com/s-a-c-h-i-n/Bus-Management-System>

Link: <https://github.com/shahidsiddiqui786/BusManagementSystem>

3. DataFlair: Java Project – Bus Reservation System

Link: <https://www.scribd.com/document/430351053/A-Mini-Project-Report>

source code is Available here:

<https://github.com/hirushasuhan/bus-management-system.git>

<https://drive.google.com/drive/folders/15PZEmTTIAq2yBEyik7F4Q9u7nfphSRCq?usp=sharing>