



## PROGRAMMING PROJECT REPORT

COURSES CODE & NAME	PROGRAMMING (K_BCS_oo4)
FACULTY	SCHOOL OF TECHNOLOGY AND ARCHITECTURE
STUDENTS NAME & MATRIC NUMBER	<ol style="list-style-type: none"><li>1. NUR ALEESA RIZAL (100007381)</li><li>2. CHARVI SHARMA (100006734)</li><li>3. DEV CHAUDHARY (100006200)</li><li>4. PALAKSHA BORA (100007676)</li><li>5. DAKSH PATEL (100007931)</li></ol>
LECTURERS' NAME	PROFESSOR PAUL TANZER PROFESSOR PETER DILLINGER

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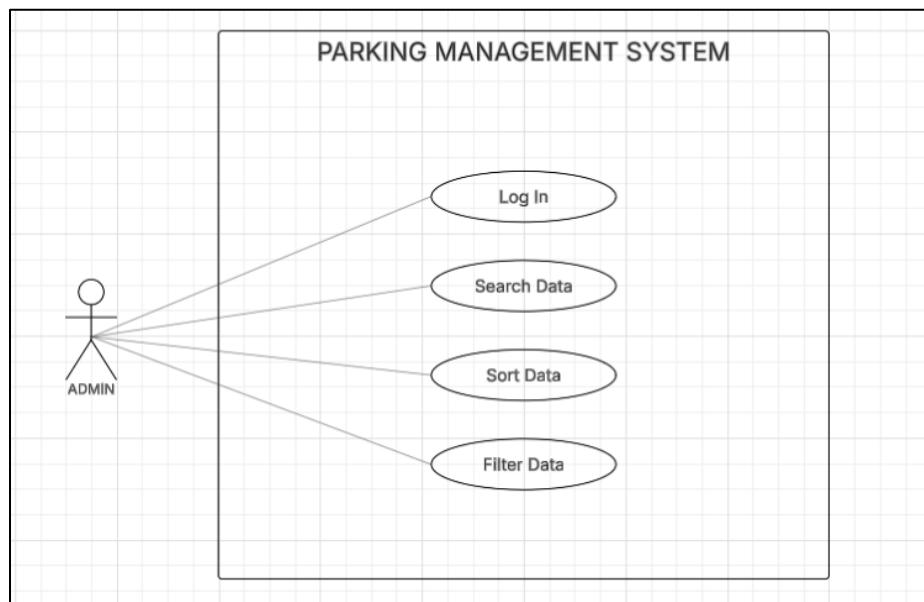
## Introduction

In this Programming course, we have been tasked as group of 5 to develop a software project that is able to manage a large amount of data, that utilizes the methods and techniques that has been taught in the class. We have decided on a **Parking Management System**.

## Logic Flow

There is one user role with access to the system: the **Admin**. When the system starts, the login page is displayed and the **Admin** enters their credentials. After successful login, the **Admin** is redirected to the dashboard, where past parking records are shown. From the dashboard, the **Admin** can search, filter and sort the data as needed.

The image below illustrates how the **Admin** interacts with the main features of the Parking Management System.



# Highlight Features

The main features you can find in the Parking Management System are the **Search**, **Filter** and **Sort** feature.

## 1. Search

The following screenshots compare the interface before and after applying a plate search. This feature **searches** the history table and displays records that match the entered plate number.

A screenshot of the "Parking Management System" application window. The title bar says "Parking Management System". Below it is a toolbar with buttons for "Plate", "Status", "Type", "Sort", "Exit time (newest)", "Apply", "Clear", and "Refresh". A dropdown menu "History section" is open. The main area is a table with columns: ID, Plate, Type, Status, Entry Time, Exit Time, and Amount. The table contains 20 rows of data. At the bottom left, a message says "Loaded 9970 ticket(s.)".

ID	Plate	Type	Status	Entry Time	Exit Time	Amount
844	B OF 4176	CAR	CLOSED	2026-02-16T00:12:05	2026-02-16T12:12:05	12.0
8693	M DM 1033	TRUCK	CLOSED	2026-02-15T23:56:05	2026-02-16T11:56:05	12.0
6270	HH AI 5329	CAR	CLOSED	2026-02-15T23:55:05	2026-02-16T11:55:05	12.0
1290	HH ZX 5634	TRUCK	CLOSED	2026-02-15T23:41:05	2026-02-16T11:41:05	12.0
9961	F AQ 634	BIKE	CLOSED	2026-02-15T23:17:05	2026-02-16T11:17:05	12.0
4629	B FS 9057	TRUCK	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0
5239	HH WM 7139	BIKE	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0
447	S BA 8687	CAR	CLOSED	2026-02-15T22:55:05	2026-02-16T10:55:05	12.0
6334	B TF 8452	CAR	CLOSED	2026-02-15T23:10:05	2026-02-16T10:31:05	12.0
9861	F IT 7813	CAR	CLOSED	2026-02-15T22:27:05	2026-02-16T10:27:05	12.0
6784	F VP 5876	CAR	CLOSED	2026-02-15T23:23:05	2026-02-16T10:23:05	11.0
2639	M WE 3383	BIKE	CLOSED	2026-02-16T00:16:05	2026-02-16T10:16:05	10.0
8486	M JU 9572	TRUCK	CLOSED	2026-02-15T22:13:05	2026-02-16T10:13:05	12.0
1559	S QV 2866	BIKE	CLOSED	2026-02-15T22:11:05	2026-02-16T10:11:05	12.0
1472	F SX 3630	TRUCK	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0
8068	HH GH 7382	CAR	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0

Before the **Admin** inputs a specific car plate in the search bar.

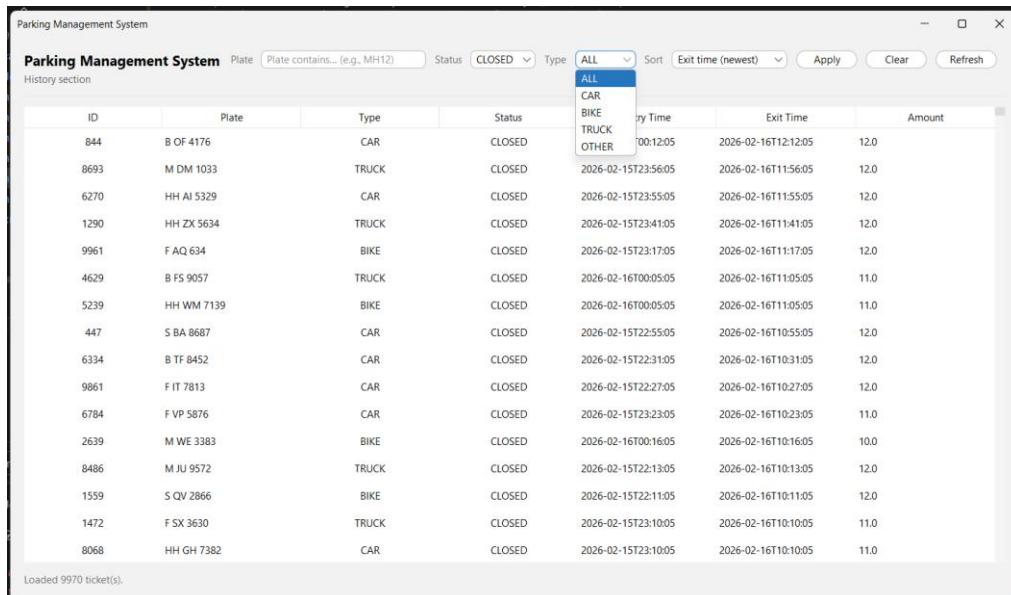
A screenshot of the "Parking Management System" application window. The title bar says "Parking Management System". Below it is a toolbar with buttons for "Plate", "Status", "Type", "Sort", "Exit time (newest)", "Apply", "Clear", and "Refresh". A dropdown menu "History section" is open. The main area is a table with columns: ID, Plate, Type, Status, Entry Time, Exit Time, and Amount. The table contains 1 row of data. At the bottom left, a message says "Loaded 1 ticket(s.)".

ID	Plate	Type	Status	Entry Time	Exit Time	Amount
844	B OF 4176	CAR	CLOSED	2026-02-16T00:12:05	2026-02-16T12:12:05	12.0

After the **Admin** inputs the specific car plate. (Exp: **B OF 4176** is entered & is displayed upon after clicking apply)

## 2. Filter

For the filter feature, this allows the **Admin** to filter through different vehicle types. The vehicle types consist of **CAR, BIKE, TRUCK, OTHER**.

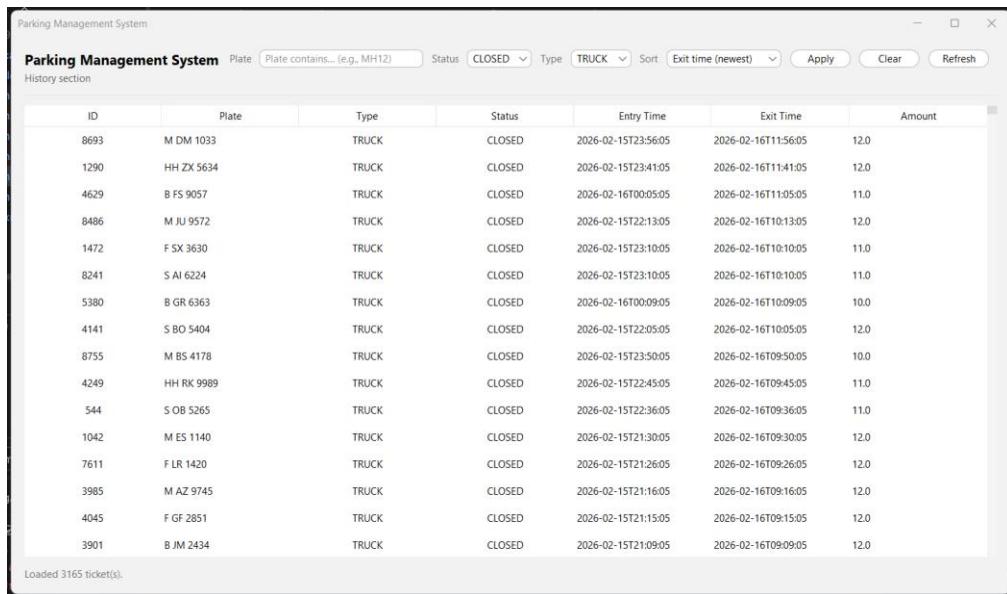


The screenshot shows a Windows application window titled "Parking Management System". At the top, there are several input fields: "Plate" (Plate contains... (e.g., MH12)), "Status" (CLOSED), "Type" (a dropdown menu currently showing "ALL"), and "Sort" (Exit time (newest)). Below these are buttons for "Apply", "Clear", and "Refresh". A message at the bottom left says "Loaded 9970 ticket(s)".

A dropdown menu is open under the "Type" field, listing "ALL", "CAR", "BIKE", "TRUCK", and "OTHER". The "ALL" option is currently selected.

ID	Plate	Type	Status	Entry Time	Exit Time	Amount
844	B OF 4176	CAR	CLOSED	2026-02-15T23:56:05	2026-02-16T12:12:05	12.0
8693	M DM 1033	TRUCK	CLOSED	2026-02-15T23:55:05	2026-02-16T11:56:05	12.0
6270	HH AI 5329	CAR	CLOSED	2026-02-15T23:55:05	2026-02-16T11:55:05	12.0
1290	HH ZX 5634	TRUCK	CLOSED	2026-02-15T23:41:05	2026-02-16T11:41:05	12.0
9961	F AQ 634	BIKE	CLOSED	2026-02-15T23:17:05	2026-02-16T11:17:05	12.0
4629	B FS 9057	TRUCK	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0
5239	HH WM 7139	BIKE	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0
447	S BA 8687	CAR	CLOSED	2026-02-15T22:55:05	2026-02-16T10:55:05	12.0
6334	B TF 8452	CAR	CLOSED	2026-02-15T22:31:05	2026-02-16T10:31:05	12.0
9861	F IT 7813	CAR	CLOSED	2026-02-15T22:27:05	2026-02-16T10:27:05	12.0
6784	F VP 5876	CAR	CLOSED	2026-02-15T23:23:05	2026-02-16T10:23:05	11.0
2639	M WE 3383	BIKE	CLOSED	2026-02-16T00:16:05	2026-02-16T10:16:05	10.0
8486	M JU 9572	TRUCK	CLOSED	2026-02-15T22:13:05	2026-02-16T10:13:05	12.0
1559	S QV 2866	BIKE	CLOSED	2026-02-15T22:11:05	2026-02-16T10:11:05	12.0
1472	F SX 3630	TRUCK	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0
8068	HH GH 7382	CAR	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0

The table displays all types of Vehicles.



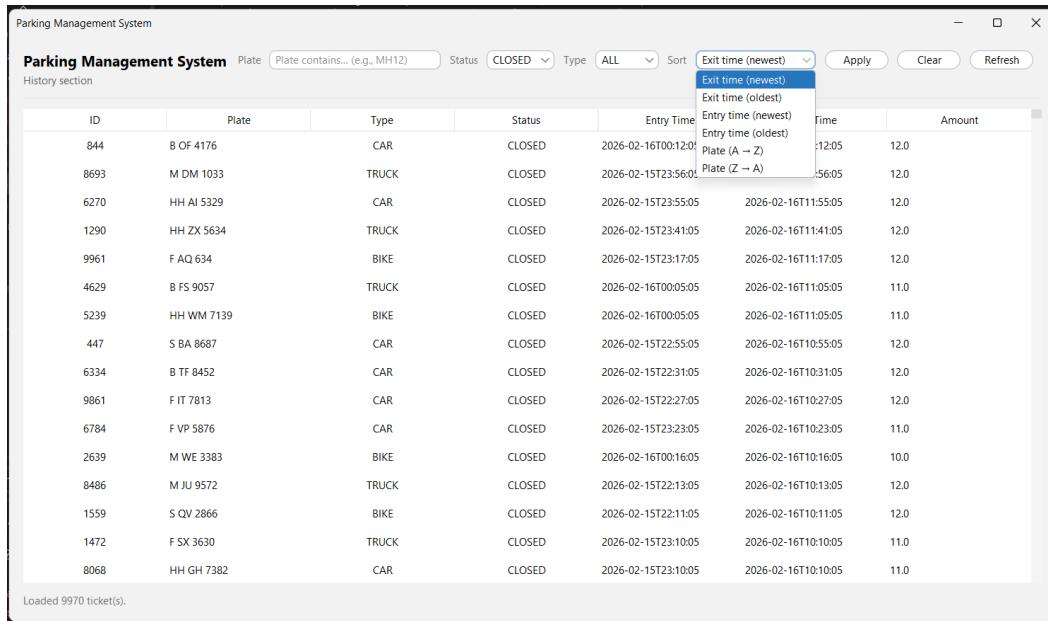
The screenshot shows the same application window as the previous one, but with a different filter applied. The "Type" dropdown now shows "TRUCK". The table below lists 3165 tickets, all of which are for TRUCKS.

ID	Plate	Type	Status	Entry Time	Exit Time	Amount
8693	M DM 1033	TRUCK	CLOSED	2026-02-15T23:56:05	2026-02-16T11:56:05	12.0
1290	HH ZX 5634	TRUCK	CLOSED	2026-02-15T23:41:05	2026-02-16T11:41:05	12.0
4629	B FS 9057	TRUCK	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0
8486	M JU 9572	TRUCK	CLOSED	2026-02-15T22:13:05	2026-02-16T10:13:05	12.0
1472	F SX 3630	TRUCK	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0
8241	S AI 6224	TRUCK	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0
5380	B GR 6363	TRUCK	CLOSED	2026-02-16T00:09:05	2026-02-16T10:09:05	10.0
4141	S BO 5404	TRUCK	CLOSED	2026-02-15T22:05:05	2026-02-16T10:05:05	12.0
8755	M BS 4178	TRUCK	CLOSED	2026-02-15T23:50:05	2026-02-16T09:50:05	10.0
4249	HH RK 9989	TRUCK	CLOSED	2026-02-15T22:45:05	2026-02-16T09:45:05	11.0
544	S OB 5265	TRUCK	CLOSED	2026-02-15T22:36:05	2026-02-16T09:36:05	11.0
1042	M ES 1140	TRUCK	CLOSED	2026-02-15T21:30:05	2026-02-16T09:30:05	12.0
7611	F LR 1420	TRUCK	CLOSED	2026-02-15T21:26:05	2026-02-16T09:26:05	12.0
3985	M AZ 9745	TRUCK	CLOSED	2026-02-15T21:16:05	2026-02-16T09:16:05	12.0
4045	F GF 2851	TRUCK	CLOSED	2026-02-15T21:15:05	2026-02-16T09:15:05	12.0
3901	B JM 2434	TRUCK	CLOSED	2026-02-15T21:09:05	2026-02-16T09:09:05	12.0

The table display a specific Vehicle type, which is **TRUCK**.

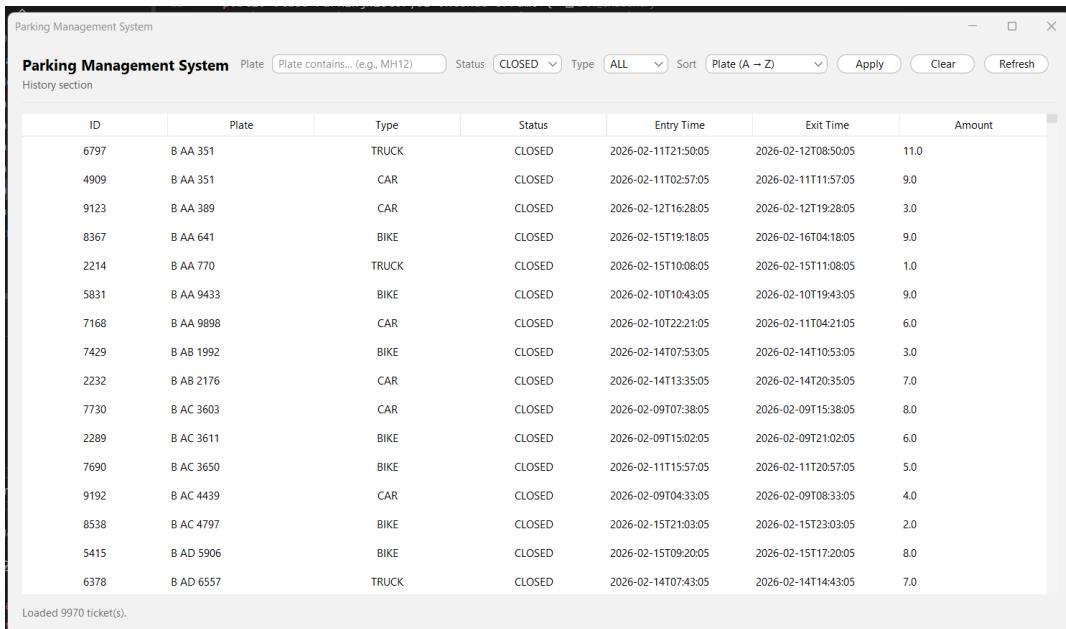
### 3. Sort

As for the sort feature, it allows the **Admin** to sort records by **Exit Time** (newest/oldest), **Entry Time** (newest/oldest) and **Car Plate** (A-Z or Z-A).



ID	Plate	Type	Status	Entry Time	Exit Time	Time	Amount
844	B OF 4176	CAR	CLOSED	2026-02-16T00:12:05	2026-02-16T11:55:05	12:05	12.0
8693	M DM 1033	TRUCK	CLOSED	2026-02-15T23:56:01	2026-02-16T11:55:05	12:05	12.0
6270	HH AI 5329	CAR	CLOSED	2026-02-15T23:55:05	2026-02-16T11:55:05	12.0	12.0
1290	HH ZX 5634	TRUCK	CLOSED	2026-02-15T23:41:05	2026-02-16T11:41:05	12.0	12.0
9961	F AQ 634	BIKE	CLOSED	2026-02-15T23:17:05	2026-02-16T11:17:05	12.0	12.0
4629	B FS 9057	TRUCK	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0	11.0
5239	HH WM 7139	BIKE	CLOSED	2026-02-16T00:05:05	2026-02-16T11:05:05	11.0	11.0
447	S BA 8687	CAR	CLOSED	2026-02-15T22:55:05	2026-02-16T10:55:05	12.0	12.0
6334	B TF 8452	CAR	CLOSED	2026-02-15T22:31:05	2026-02-16T10:31:05	12.0	12.0
9861	F IT 7813	CAR	CLOSED	2026-02-15T22:27:05	2026-02-16T10:27:05	12.0	12.0
6784	F VP 5876	CAR	CLOSED	2026-02-15T23:23:05	2026-02-16T10:23:05	11.0	11.0
2639	M WE 3383	BIKE	CLOSED	2026-02-16T00:16:05	2026-02-16T10:16:05	10.0	10.0
8486	M JU 9572	TRUCK	CLOSED	2026-02-15T22:13:05	2026-02-16T10:13:05	12.0	12.0
1559	S QV 2866	BIKE	CLOSED	2026-02-15T22:11:05	2026-02-16T10:11:05	12.0	12.0
1472	F SX 3630	TRUCK	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0	11.0
8068	HH GH 7382	CAR	CLOSED	2026-02-15T23:10:05	2026-02-16T10:10:05	11.0	11.0

Before the **Admin** chooses a sort category. The table display the **Exit Time (newest)** from the start.



ID	Plate	Type	Status	Entry Time	Exit Time	Time	Amount
6797	B AA 351	TRUCK	CLOSED	2026-02-11T21:50:05	2026-02-12T08:50:05	11.0	
4909	B AA 351	CAR	CLOSED	2026-02-11T02:57:05	2026-02-11T11:57:05	9.0	
9123	B AA 389	CAR	CLOSED	2026-02-12T16:28:05	2026-02-12T19:28:05	3.0	
8367	B AA 641	BIKE	CLOSED	2026-02-15T19:18:05	2026-02-16T04:18:05	9.0	
2214	B AA 770	TRUCK	CLOSED	2026-02-15T10:08:05	2026-02-15T11:08:05	1.0	
5831	B AA 9433	BIKE	CLOSED	2026-02-10T10:43:05	2026-02-10T19:43:05	9.0	
7168	B AA 9898	CAR	CLOSED	2026-02-10T22:21:05	2026-02-11T04:21:05	6.0	
7429	B AB 1992	BIKE	CLOSED	2026-02-14T07:53:05	2026-02-14T10:53:05	3.0	
2232	B AB 2176	CAR	CLOSED	2026-02-14T11:35:05	2026-02-14T20:35:05	7.0	
7730	B AC 3603	CAR	CLOSED	2026-02-09T07:38:05	2026-02-09T15:38:05	8.0	
2289	B AC 3611	BIKE	CLOSED	2026-02-09T15:02:05	2026-02-09T21:02:05	6.0	
7690	B AC 3650	BIKE	CLOSED	2026-02-11T15:57:05	2026-02-11T20:57:05	5.0	
9192	B AC 4439	CAR	CLOSED	2026-02-09T04:33:05	2026-02-09T08:33:05	4.0	
8538	B AC 4797	BIKE	CLOSED	2026-02-15T21:03:05	2026-02-15T23:03:05	2.0	
5415	B AD 5906	BIKE	CLOSED	2026-02-15T09:20:05	2026-02-15T17:20:05	8.0	
6378	B AD 6557	TRUCK	CLOSED	2026-02-14T07:43:05	2026-02-14T14:43:05	7.0	

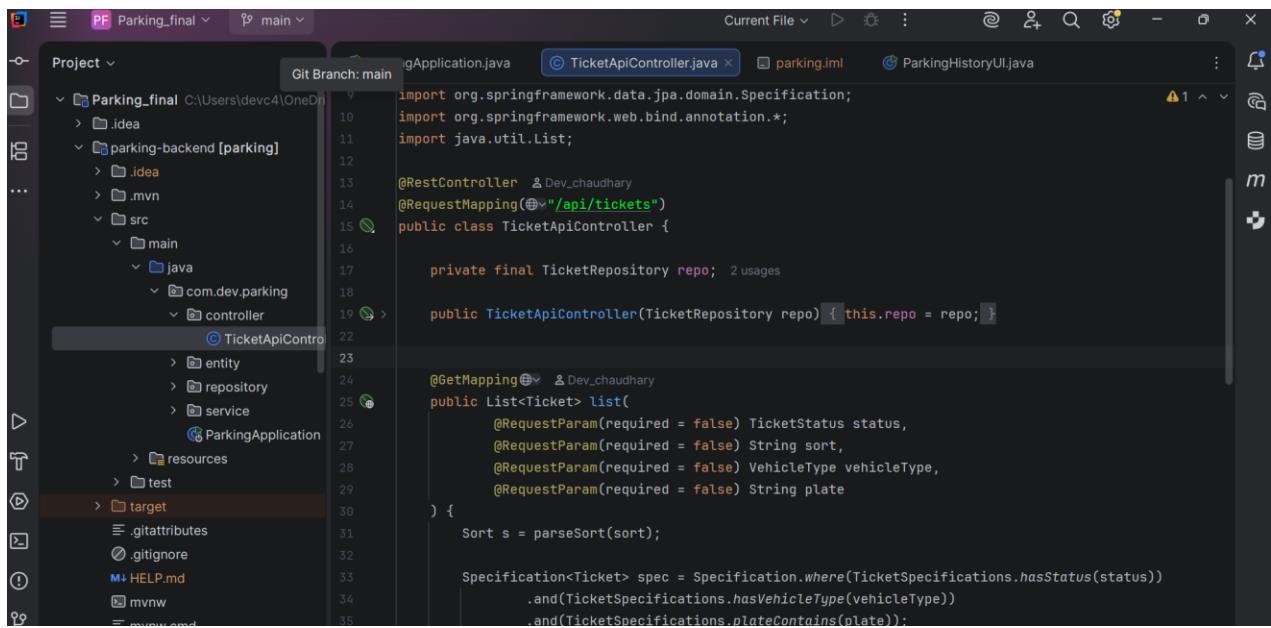
The **Admin** chose the Car Plate category in ascending order.

# Technologies

The main tools used for this project are **IntelliJ IDEA**, **MySQL Workbench**, and **GitHub**.

## 1. IntelliJ IDEA

IntelliJ IDEA is the primary development environment used to build the Parking Management System. It was used to write, run, and debug the Java (Swing) client and the Spring Boot backend.



The screenshot shows the IntelliJ IDEA interface with the following details:

- Project View:** Shows the project structure under "Parking\_final". The "src" folder contains "main" which has "java" and "com.dev.parking" packages. "com.dev.parking" contains "TicketApiController" and other files like "entity", "repository", "service", and "ParkingApplication".
- Code Editor:** Displays the code for "TicketApiController.java". The code defines a REST controller for managing tickets using a TicketRepository.

```
import org.springframework.data.jpa.domain.Specification;
import org.springframework.web.bind.annotation.*;
import java.util.List;

@RestController
@RequestMapping("/api/tickets")
public class TicketApiController {

    private final TicketRepository repo;

    public TicketApiController(TicketRepository repo) {
        this.repo = repo;
    }

    @GetMapping
    public List<Ticket> list(
        @RequestParam(required = false) TicketStatus status,
        @RequestParam(required = false) String sort,
        @RequestParam(required = false) VehicleType vehicleType,
        @RequestParam(required = false) String plate
    ) {
        Sort s = parseSort(sort);
        Specification<Ticket> spec = Specification.where(TicketSpecifications.hasStatus(status))
            .and(TicketSpecifications.hasVehicleType(vehicleType))
            .and(TicketSpecifications.plateContains(plate));
    }
}
```

## 2. MySQL Workbench

MySQL Workbench is used to manage the project database, where all parking records are stored. It allows us to create and maintain tables, run SQL queries, and view or update data when needed.

The screenshot shows the MySQL Workbench interface with a query results grid. The grid displays data from the 'tickets' table, which has columns: id, amount, entryTime, exitTime, status, vehicleType, plate, and ticketID. The data includes various entries for different vehicles (CAR, OTHER, TRUCK) at different times and with different plate numbers. The interface also shows the Navigator pane with the 'parking\_db' schema selected, and the bottom pane shows the output of the executed SQL query.

## 3. GitHub

GitHub is used for version control and collaboration. It stores the complete project source code (backend and Swing client) in a shared repository, allowing team members to contribute through branches, track changes, and merge updates safely.

The screenshot shows a GitHub repository page for 'Parking-management-system'. The repository has 6 branches and 0 tags. The main branch is active. The repository was last updated 7 minutes ago. The 'About' section indicates no description, website, or topics provided. The 'Activity' section shows 0 stars, 0 watching, and 0 forks. The 'Releases' section shows no releases published. The 'Packages' section shows no packages published. The 'Contributors' section lists three contributors: charvisharma110-maker, Devchaudhary-code, and meesarizal.

## Conclusion.

In conclusion, with this given task, it has taught us the various usage and importance of the development process for a system and how it influences our everyday life.

For future additional features that we plan on adding would be for example, a pagination component in the dashboard, where the table of data is displayed. For a proper, easier navigation rather than having to scroll through the table. Aside from that, a register entry/exit feature that allows the **Admin** to manually register new vehicles into the parking lot or modify the exit time for vehicles that wish to leave.

## Important Details

1. GitHub Repository Link - <https://github.com/Devchaudhary-code/Parking-management-system.git>
2. Admin Log in Details
  - Username: admin
  - Password: admin123