### ****📌 Challenges Faced in Developing the Vehicle Rental System****

Developing the **Vehicle Rental System** came with multiple challenges, especially as a beginner navigating both **technical tools and project structuring principles**. Below is a detailed explanation of the key challenges faced during development.

### ****1, Learning GitHub from Scratch****

One of the most difficult challenges was **understanding how to use GitHub**, as there was no prior experience with version control systems.

* Initially, GitHub seemed **complex and overwhelming**, requiring multiple steps to upload files, create repositories, and track changes.
* Watching **YouTube tutorials** helped gain an understanding, but applying Git commands correctly and managing branches took time.
* The **workflow confusion**—whether to commit, push, or pull—made managing progress difficult.

Despite these difficulties, using GitHub **became easier over time**, allowing better organization and collaboration. While some concepts like **pull requests and merging** still required additional learning, the basic functionality was successfully applied.

### ****2️⃣ Structuring a Real-World Project****

Another major challenge was **organizing a full system** beyond basic Java concepts.

* Understanding **how different classes should interact** (Vehicle, Customer, Rental, and MainSystem) was tricky.
* Combining different components into a **cohesive system** required following step-by-step rules from the instructor.
* At first, there was confusion on **which methods belong to which class**, causing errors in object relationships.
* Developing a logical **flow of execution** (user interaction → data storage → retrieval) was difficult without clear planning.

Over time, structuring improved by **following UML diagrams** and **adjusting the code through iteration**, resulting in a well-organized system.

### ****3️⃣ Difficulty Implementing GPS Tracking****

The **GPS tracking feature** was one of the biggest obstacles due to **hardware limitations**.

* The project required **real-time GPS data**, but accessing hardware like GPS modules or APIs wasn't feasible.
* Without proper hardware, implementing location tracking became **technically impractical** within the Java-based system.
* Alternative solutions like **mock data simulation** were considered, but they didn’t fully meet the project requirements.

This feature remains an **unresolved challenge**, but could be implemented in the future with **external APIs or physical GPS modules**.

### ****4️⃣ Structuring Code for Readability****

Ensuring **clean and readable code** was another difficulty, especially in formatting and organizing logic.

* Writing **long functions** made debugging harder, requiring code splitting into **smaller, structured methods**.
* Keeping **proper indentation and naming conventions** took extra effort.
* Understanding **stream filtering** and organizing **data retrieval methods** correctly was confusing at first.

By refining the code iteratively, following beginner-friendly naming conventions, and ensuring **proper structuring**, the final version became **more readable and functional**.

### ****📌 Conclusion****

The **Vehicle Rental System** development was filled with technical challenges ranging from **learning GitHub, structuring real-world projects, integrating GPS tracking, and writing clean code**. Despite the obstacles, consistent learning, following project rules, and iterative improvement **led to a functional, well-organized system**. Future improvements, especially in **hardware integration and advanced features**, will help make the system even better.