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Section: D-11

Database Management System Assignment #4

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Introduction

1.1 Project Overview:

The project we have worked on is called **CityWheelsPK**. This is an application which is meant to rival apps like **Uber**, **InDrive**, **Yango**, etc. The purpose of this app is to connect **Passengers** with **Drivers** who are wanting to reach to a designated location on time. The main idea is to offer a modern, reliable, and easy-to-use ride-hailing experience specifically made for users in **Pakistan**, where public transport can sometimes be unpredictable or unavailable.

For this reason, the app needs a **fully functional, normalized database** to store and manage essential data such as **user profiles**, **vehicle information**, **ride records**, **payment details**, **support requests**, **feedback**, and **promotional offers**. All of these elements must work together smoothly so that passengers can quickly book a ride, drivers can be assigned efficiently, and the business operations can run without confusion or error.

So in this project, we will give a **detailed explanation** of everything we have done, starting from creating the **ERD diagrams** to building the **relational schema**, designing **HTML forms**, and implementing backend functionality using **Node.js**. We have tried to follow good design practices while also learning new technologies that are used in real-world web development.

1.2 Objectives of the CityWheelsPK App:

The **CityWheelsPK** software seeks to make Pakistani urban travel easier. The software facilitates **speedy ride booking** for passengers, allows drivers to **make money** by offering transportation, and allows the business to handle all **transactions online**. The app is designed with the goal of creating a smooth experience for both the driver and the passenger.

Ease of use, data integrity, safe storage, and smooth communication between drivers and passengers are important goals. That means the app should be easy to use even for a person who is not very tech-savvy, and it should never lose or corrupt important data like bookings or payments.

There are many key features that need to be supported through this system. This includes **driver and passenger registration**, **vehicle administration**, **booking and cancellation of rides**, **collection of feedback**, **handling of support complaints**, and **secure online payments**. Every one of these features needs to be stored properly in a **backend database**, which makes it possible for the app to remember and manage everything.

Our objective in this project is to use **SQL** and a **normalized database structure** along with a **basic functional user interface** to create a system that can support all of these needs. This is not only a database project but also an exercise in planning, organizing, and building a small version of what could become a real-world app.

1.3 Problem Statement and Assumptions:

This is going to be a **completely new app**, so we will most likely face a number of issues during development. For example, how should we register a driver? How should we register a passenger? What information needs to be stored when someone books a ride? These are questions we had to think about carefully.

We plan to make a **SQL database file** in which we will create **entities** for everything that we will use for this app. This includes drivers, vehicles, passengers, rides, payments, promotions, support tickets, and feedback. Each table must have the right fields and be connected properly to other tables using primary and foreign keys.

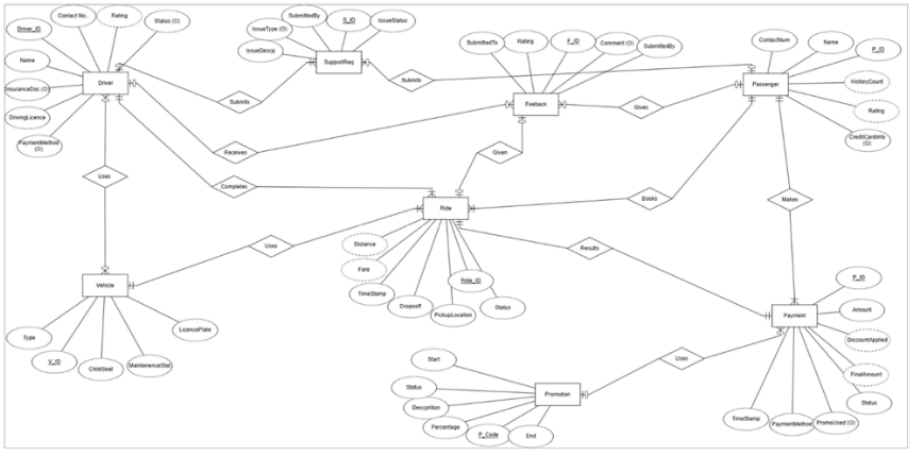
We are also going to be making the app using **HTML**, basically meaning HTML **forms** where we will take data from the user and store it in our **SQL database**, which is done with the help of **Node.js** — something completely new that we are learning in this project.

Since this is our first time building a full-stack system like this, we had to make **assumptions** along the way. For example, we assumed that each driver can only use one vehicle at a time, and that each passenger will have a stored account. We also assumed that feedback will always include a rating and that payments will be digital (like through credit cards or wallet apps).

With the **introduction out of the way**, let's get into the features we have implemented and how we implemented them step by step to bring CityWheelsPK to life.

Explanation of Code and System Design:

2.1 Entity-Relationship Diagram (ERD):



Scenario Based Research Answer

4.1 Expansion and Data Sharing Considerations

CityWheelsPK plans to expand its services to other GCC countries and maybe even internationally. As part of this growth, the company is thinking of sharing the personal data of its users with new branches in different countries. This includes data like names, phone numbers, credit card info, ride history, ratings, and other personal details.

While sharing data might help the new branches operate smoothly, this raises serious legal and ethical concerns. Every country has its own rules when it comes to data privacy and cross-border data sharing. CityWheelsPK will need to follow both Pakistani laws and the laws of the countries it expands into. If not handled properly, the company could face legal penalties and lose user trust.

4.2 Pakistan PDPL vs. GDPR (International Law)

In Pakistan, the law that covers data protection is called the **Personal Data Protection Bill (PDPL)**. This law requires companies to collect personal data only when needed, and only with the user's consent. The data must be kept secure and should not be transferred to other countries unless those countries have similar privacy protections.

Now if we compare this with the **General Data Protection Regulation (GDPR)** used in the European Union, GDPR is much stricter. It also requires consent, security, and clear reasons for collecting or sharing data. Under GDPR, companies are not allowed to send personal data to countries that don't have strong privacy laws unless extra protection is used, like encryption or contracts.

So if CityWheelsPK wants to expand to countries like the UAE, Qatar, or Saudi Arabia, it must check if those countries have laws that match the level of protection under PDPL or GDPR. If they don't, the company must take extra steps before sharing data.

4.3 Recommendations and Ethical Points

Even if the law allows data sharing, it's important to follow ethical practices. CityWheelsPK should always ask users for permission before sharing their data with any international branch. The company should explain what data is being shared, why it is being shared, and how it will be protected.

They should also allow users to say no to data sharing if they are uncomfortable. This builds trust. Only the necessary data should be shared, not the full profile. In short, legal compliance and user privacy should be treated as the top priorities when the company grows globally.

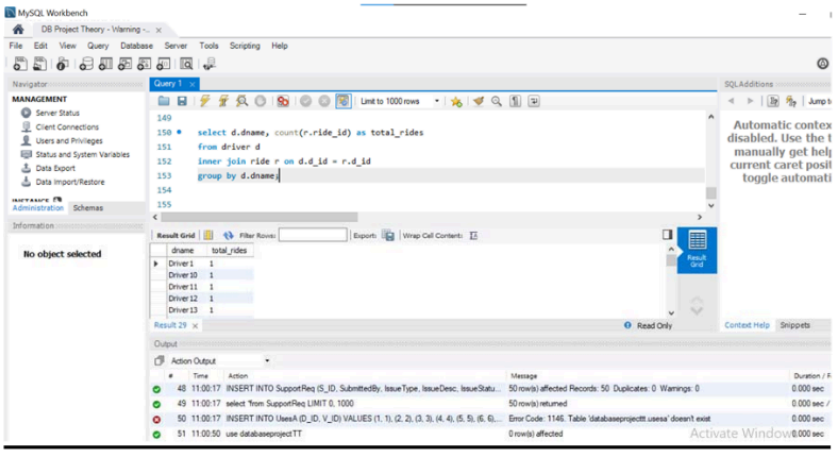
References:

Government of Pakistan. (2021). *Personal Data Protection Bill.* Ministry of Information Technology & Telecommunication.

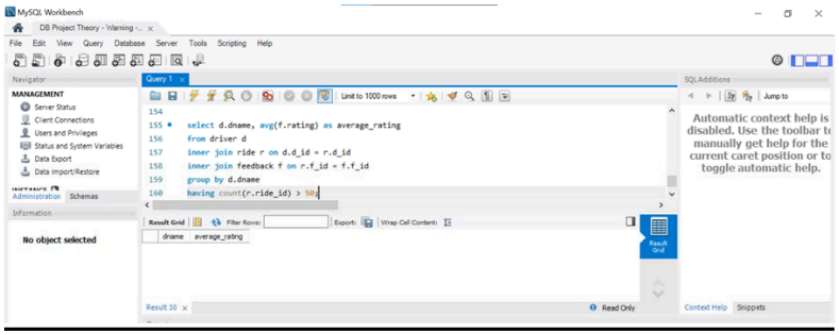
European Union. (2016). *General Data Protection Regulation (GDPR).* Official Journal of the European Union.

SQL Queries and Execution Outpiut:

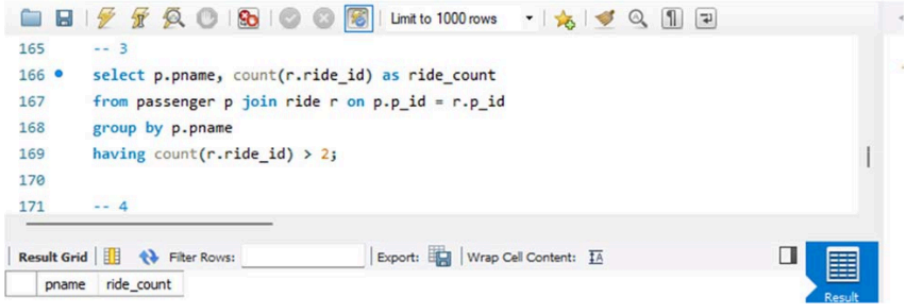
1. List drivers and the total number of rides they have completed



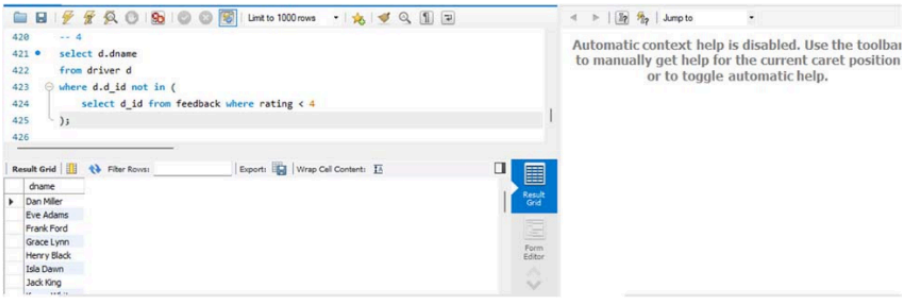
2. Find the average rating of drivers who have completed more than 50 rides (None)



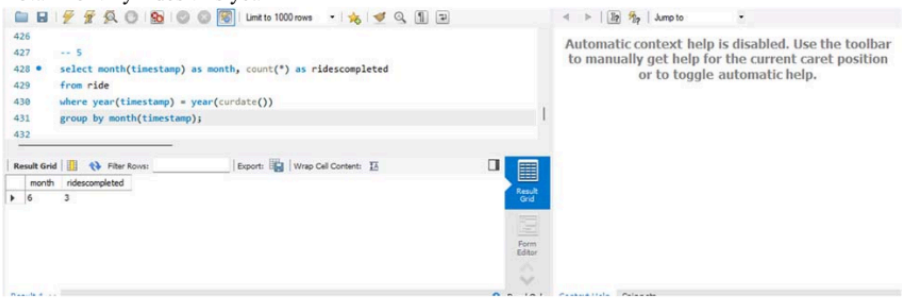
3. Passengers who used CityWheelsPK >20 times



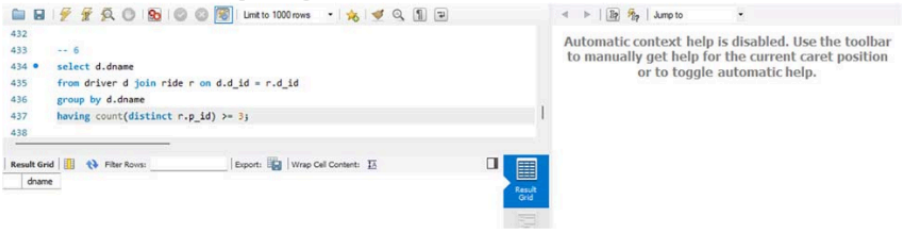
4. Drivers never rated below 4



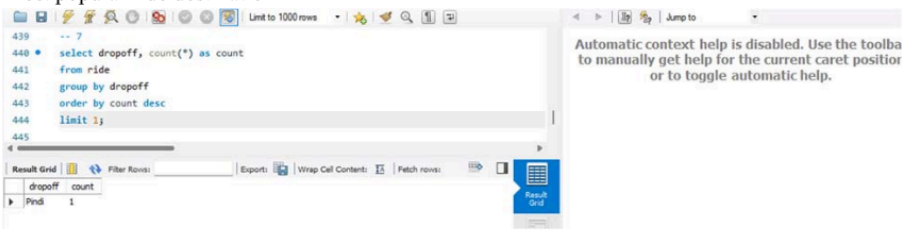
5. Total monthly rides this year



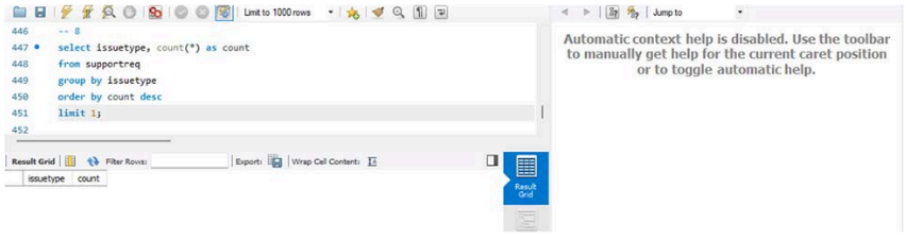
6. Drivers with 3+ different passengers



7. Most popular ride destination

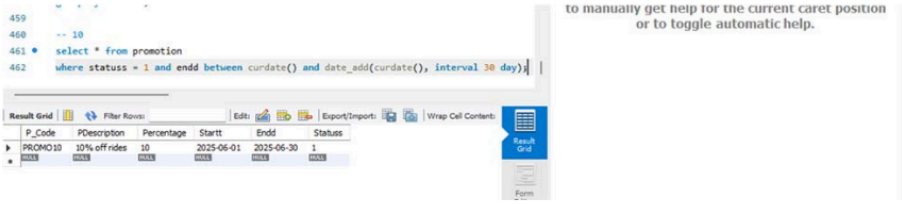


8. Most common support issue



9. Driver-wise total earnings

10. Active promotions expiring within 30 days



Conclusion:

CityWheels.pk is a Pakistan based transportation app made for the masses to solve the rising problem of expensive and low-quality transportation options. As part of the developing team it was a very enlightening journey where we learned a lot and used state of the art data handling techniques to create an efficient backbone for our app where data integrity and user privacy was our first priority.

Using Node.js instead of PHP enabled us to increase efficiency greatly and reduce loading times which provides a seamless experience to the users. The app is very easy to use as we made a user centric design for our interfaces. The overall environment is made without any bloatware of clutter so the user is not overwhelmed by the design.

Along this whole journey the citywheels.pk team learned a lot and the concept of backend-frontend relation was made clearer. Alongside all this we would like to give a huge shout-out to our senior project supervisor Mr Zeeshan Akram for his Mentorship.

Mustafa Waheed Khan

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