CSE431

Mobile Programming

Fall 2023

Carpool Project

Final Submission

Submitted to

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19P3374

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1. Useful Information

1.1 Driver WebApp URL

https:/carpoolflutter.web.app/

Note while it works on desktop and any device that supports the browser it is designed for mobile use.

1.2 Video Demo

https://www.youtube.com/watch?v=sHWl_9njJxg&ab_channel=mahmoudelnashar

The demo illustrates the main flow of the application with the deadline corner case addressed.

1.3 Testing Accounts

Both accounts work on both applications as a created account is shared between them.

1.test@eng.asu.edu.eg	Password: test1234 (rider with most rides booked)
2.mahmoud@eng.asu.edu.eg	Password: test1234 (driver with most rides issued)

Feel free to create an account with an Asu email (ex: haytham.azmi@eng.asu.edu.eg) you can complete the signup process on only one of the applications either the riders or the drivers apps and use the same login credentials to access both of them

2. Introduction

The submission consists of two separate applications.

1. Riders Application: a mobile application developed using flutter framework to work cross-platform.

2. Drivers Application: a web application developed using flutter-web framework which is a web page accessed through the web browser or using the web view inside the Riders Application.

This carpool project aims to create a customized version of the typical carpool application tailored to the Faculty of Engineering Community at Ain Shams University. Users must have an active @eng.asu.edu.eg account to ensure a closed community.

As the availability of a car is not always guaranteed for the student the application allows the user to become a driver on one occasion and a rider in the other using the same account which he signed up on any of the applications to mitigate the hassle of creating a new account. Also, for convenience the application offers a web view for the drivers' website, so the URL does not need to be memorized.

3. Features

3.1 Riders mobile application

1. Signup.
2. Login.
3. Sign-out
4. Password Reset.
5. Web View to the Drivers' website for faster accessibility.
6. Multiple themes: Dark/Light themes so the user the preferred theme.
7. Saving the logged in state using shared preference so the user is automatically logged in unless the user opts to sign-out.
8. Saving the chosen theme using shared preference.
9. Access profile data offline using sqflite.
10. Choosing a specific ride date.
11. Search for a specific stop.
12. Book a ride from the available rides (earliest the deadlines restrictions provided and latest up to a week from the day of booking).
13. Ride status tracking.
14. View Rides History.
15. Payment with different methods (Cash-Credit Card).
16. Saving and deleting Credit Cards information.
17. Profile viewing
18. Editing profile.
19. Access the Academic Calendar of the current semester to know the holidays.
20. Customer Support.

3.2 Drivers Web application

1. Signup.
2. Login.
3. Sign-out
4. Password Reset.
5. Dashboard with the upcoming rides.
6. History page containing all past rides done.
7. Issuing a ride in which the driver can specify the date, stop, gate, fare, number of passengers, and the brand of the car that will be used.
8. Accept-Reject-Start-End issued rides.
9. Access the Academic Calendar of the current semester to know the holidays.
10. Customer Support.

4. User Interface Design

4.0 Why choose Flutter frameworks.

- The Riders' Application is developed using flutter as the students who are the target of the application have users from both platforms, so a cross-platform application is needed.
- The Drivers' Website was developed using Flutter-web framework so that the design remains consistent with the users who will use both the mobile application and the web application.

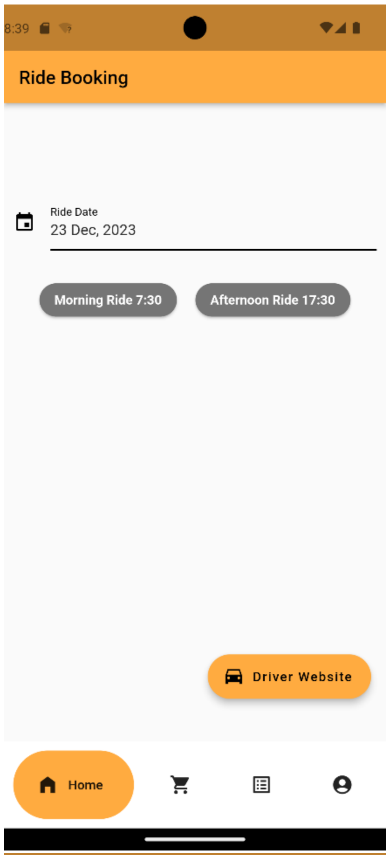
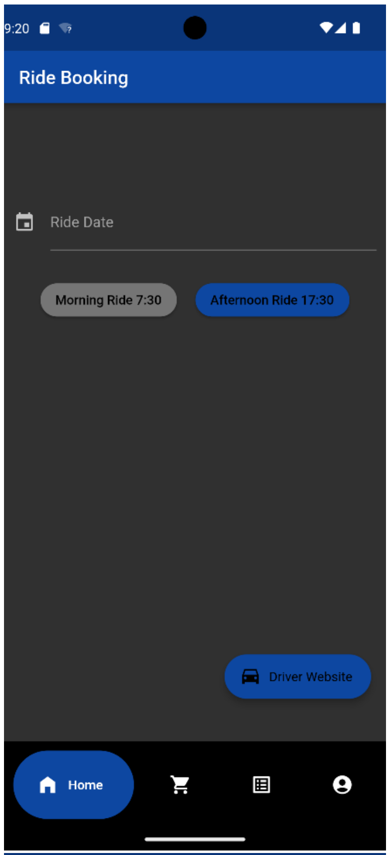
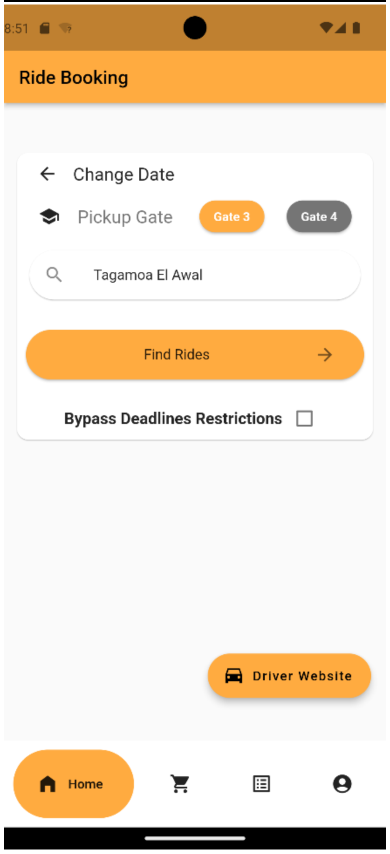
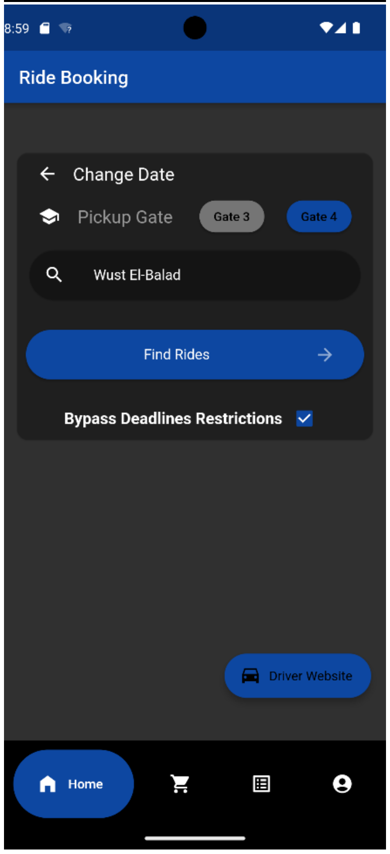
4.1 Rider Application Design

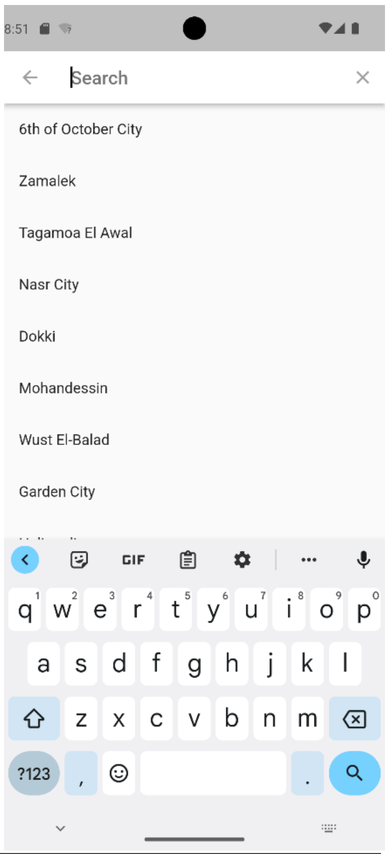
- The Application mainly features 4 main pages which can be navigated between using a bottom navigation bar.

1. Home Page
2. Tracking and Payment Page
3. History Page
4. Account Page

4.1.1 Home Page

- To make it as easy as possible for the user to book a ride the home page of the application is the page from which the user can book a ride.
- Also, it provides fast Access to the Driver Website using a Floating Action Button that opens a Web View
- Users can specify the date using a date picker and choose the timeslot using one of the elevated buttons.
- Upon completion of the previous step an animated switcher changes the view to complete the other steps where the gate is marked as drop-off or pickup depending on the chosen time
- The stops are implemented using recycler view where only the available stops in the specified date and time appear to the user. The user is also able to search for the stop if the list of stops is crowded.
- After all the ride's information being specified the book ride button becomes clickable for the user.
- Clicking the book ride button triggers a bottom modal sheet with all rides of the specified information appearing in a card showing the driver information, ride fare and the car brand.
- Clicking on a card will book the ride and place it in the cart (order tracking and payment page).


8:39
Ride Booking
Ride Date
23 Dec, 2023
Morning Ride 7:30
Afternoon Ride 17:30
Driver Website
Home

9:20
Ride Booking
Ride Date
Morning Ride 7:30
Afternoon Ride 17:30
Driver Website
Home

8:51
Ride Booking
Change Date
Pickup Gate
Gate 3
Gate 4
Tagamoa El Awal
Find Rides
Bypass Deadlines Restrictions
Driver Website
Home

8:59
Ride Booking
Change Date
Pickup Gate
Gate 3
Gate 4
Wust El-Balad
Find Rides
Bypass Deadlines Restrictions
Driver Website
Home



6th of October City

Zamalek

Tagamoa El Awal

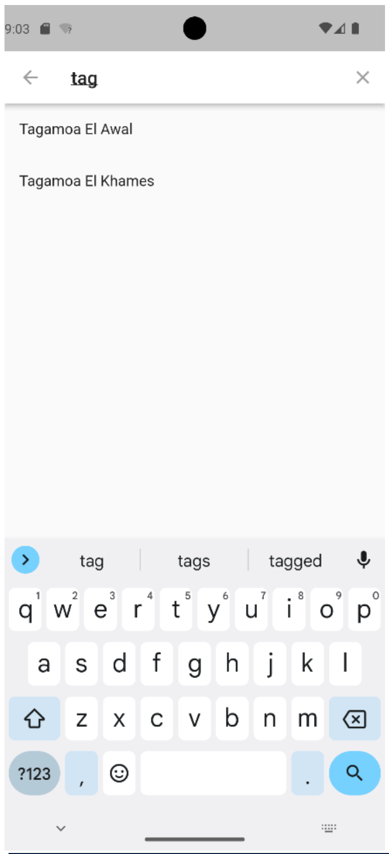
Nasr City

Dokki

Mohandessin

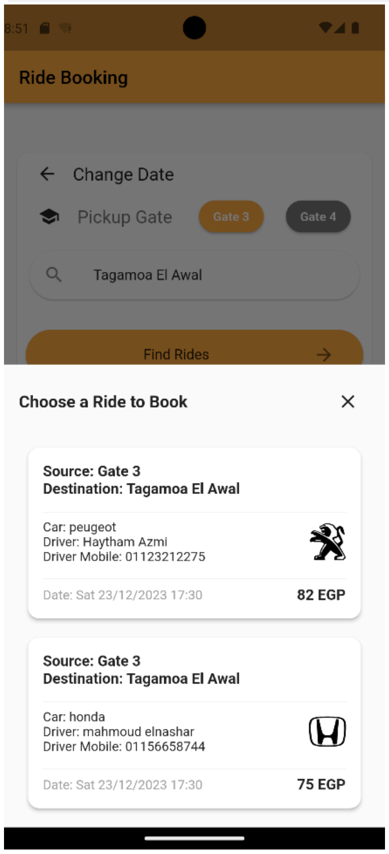
Wust El-Balad

Garden City



Tagamoa El Awal

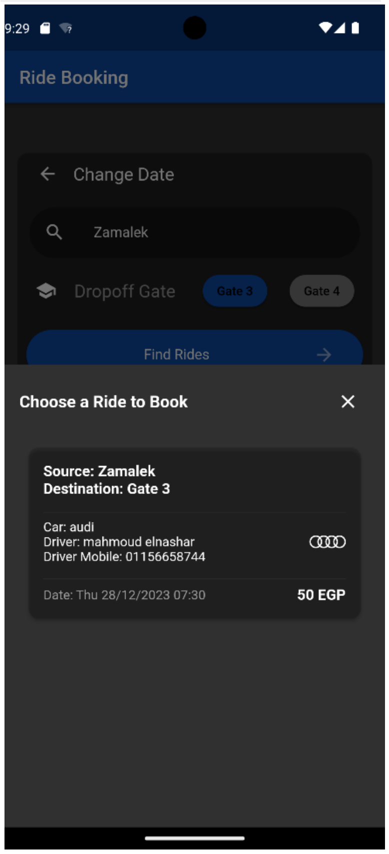
Tagamoa El Khames



Choose a Ride to Book

Source: Gate 3
Destination: Tagamoa El Awal
Car: peugeot
Driver: Haytham Azmi
Driver Mobile: 01123212275
Date: Sat 23/12/2023 17:30 **82 EGP**

Source: Gate 3
Destination: Tagamoa El Awal
Car: honda
Driver: mahmoud elnashar
Driver Mobile: 01156658744
Date: Sat 23/12/2023 17:30 **75 EGP**

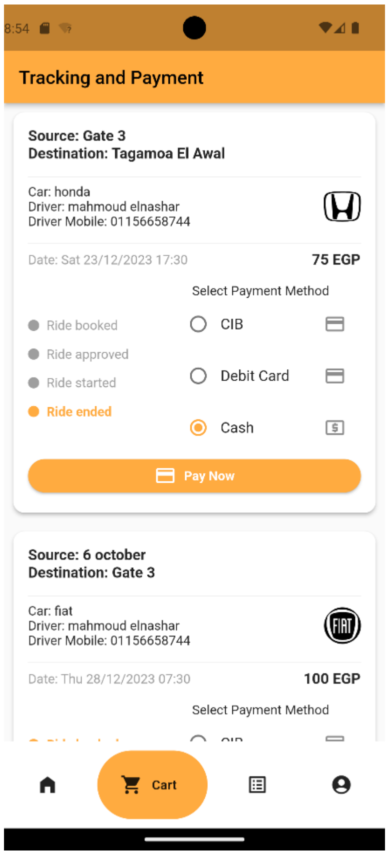


Choose a Ride to Book

Source: Zamalek
Destination: Gate 3
Car: audi
Driver: mahmoud elnashar
Driver Mobile: 01156658744
Date: Thu 28/12/2023 07:30 **50 EGP**

4.1.2 Cart Page

- This page serves as a payment and order tracking page.
- The rider can scroll through the list of all booked future rides to review the details through the displayed cards.
- Tracking: the rider can see the ride life cycle from the booking till the payment it moves in a timeline. (ride booked, approved by driver, ride started, ride finished).
- When the ride is finished the rider has the option to choose the preferred payment method cash or credit card and complete the payment process thus removing the ride from the tracking page.


8:54

Tracking and Payment

Source: Gate 3
Destination: Tagamoa El Awal

Car: honda
Driver: mahmoud elnashar
Driver Mobile: 01156658744

Date: Sat 23/12/2023 17:30 — **75 EGP**

Select Payment Method

- Ride booked
- Ride approved
- Ride started
- Ride ended

CIB / Debit Card / [✓ Cash]

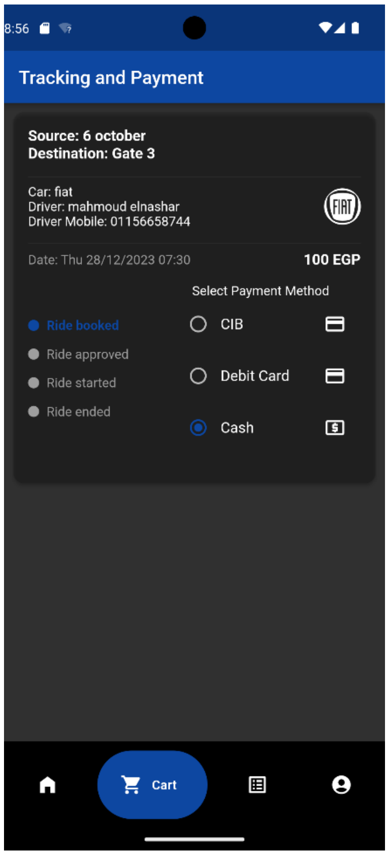
Pay Now

Source: 6 october
Destination: Gate 3

Car: fiat
Driver: mahmoud elnashar
Driver Mobile: 01156658744

Date: Thu 28/12/2023 07:30 — **100 EGP**

Select Payment Method


8:56

Tracking and Payment

Source: 6 october
Destination: Gate 3

Car: fiat
Driver: mahmoud elnashar
Driver Mobile: 01156658744

Date: Thu 28/12/2023 07:30 — **100 EGP**

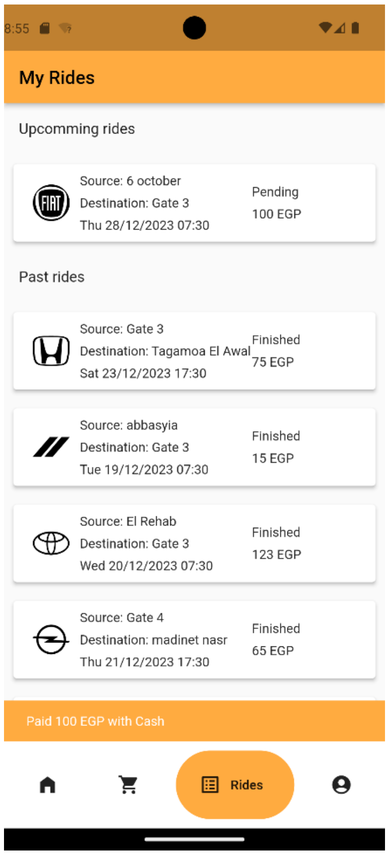
Select Payment Method

- Ride booked
- Ride approved
- Ride started
- Ride ended

CIB / Debit Card / [✓ Cash]

4.1.3 History Page

- Here the user can view all the history including the past rides and the upcoming rides.



8:55

My Rides

Upcomming rides

Source: 6 october
Destination: Gate 3
Thu 28/12/2023 07:30
Pending
100 EGP

Past rides

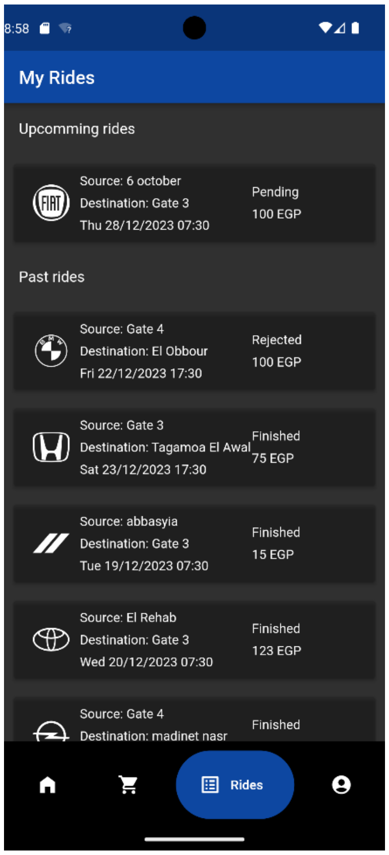
Source: Gate 3
Destination: Tagamoa El Awal
Sat 23/12/2023 17:30
Finished
75 EGP

Source: abbasyia
Destination: Gate 3
Tue 19/12/2023 07:30
Finished
15 EGP

Source: El Rehab
Destination: Gate 3
Wed 20/12/2023 07:30
Finished
123 EGP

Source: Gate 4
Destination: madinet nasr
Thu 21/12/2023 17:30
Finished
65 EGP

Paid 100 EGP with Cash



8:58

My Rides

Upcomming rides

Source: 6 october
Destination: Gate 3
Thu 28/12/2023 07:30
Pending
100 EGP

Past rides

Source: Gate 4
Destination: El Obbour
Fri 22/12/2023 17:30
Rejected
100 EGP

Source: Gate 3
Destination: Tagamoa El Awal
Sat 23/12/2023 17:30
Finished
75 EGP

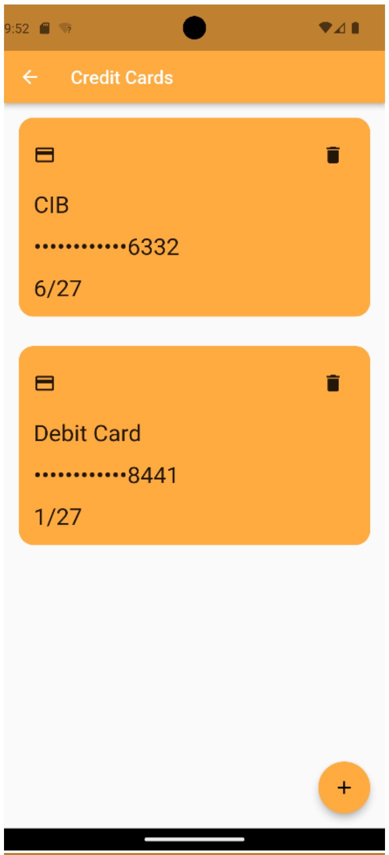
Source: abbasyia
Destination: Gate 3
Tue 19/12/2023 07:30
Finished
15 EGP

Source: El Rehab
Destination: Gate 3
Wed 20/12/2023 07:30
Finished
123 EGP

Source: Gate 4
Destination: madinet nasr
Finished

4.1.4 Account Page

- This page contains profile information along with multiple tiles that serve a function which improves the user experience.
- The list of tiles include:
  1. Edit Profile (To Edit Account information).
  2. Wallet (To Add or Remove Credit Cards).
  3. Academic Calendar (To view the current semester Calendar).
  4. Theme Toggler switch.
  5. Report an issue (Displays the customer service contact email).

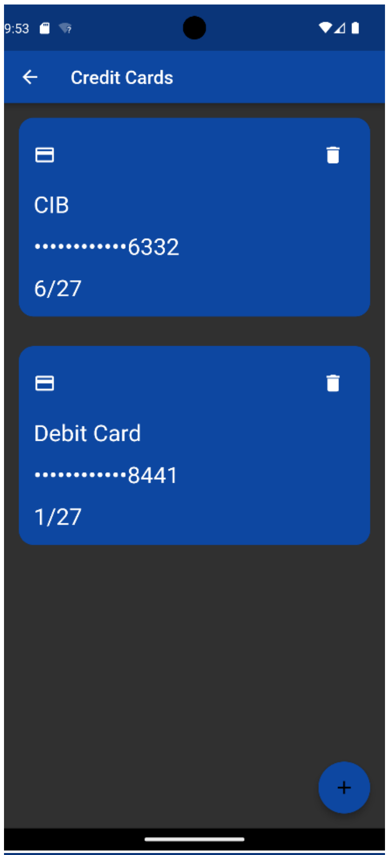


9:52

Credit Cards

CIB
••••••••••••6332
6/27

Debit Card
••••••••••••8441
1/27

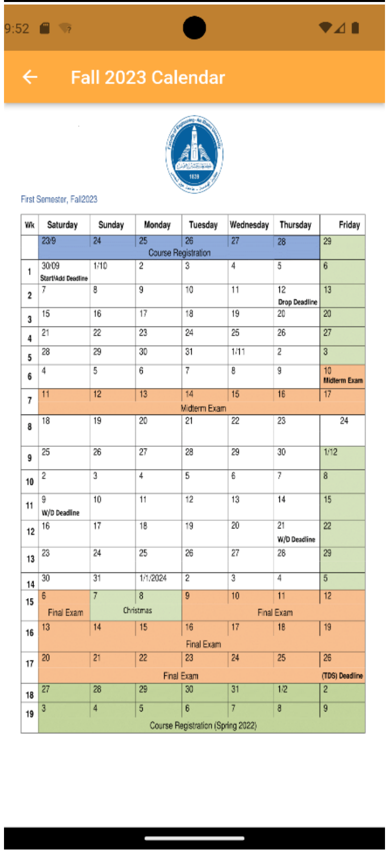


9:53

Credit Cards

CIB
••••••••••••6332
6/27

Debit Card
••••••••••••8441
1/27

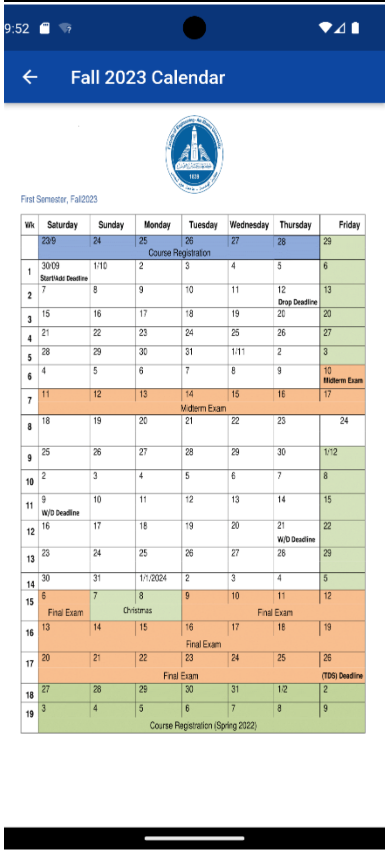


9:52

Fall 2023 Calendar

First Semester, Fall2023

Wk	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	23/9	24	25	26	27	28	29
	Course Registration						
1	30/09 Start/Add Deadline	1/10	2	3	4	5	6
2	7	8	9	10	11	12 Drop Deadline	13
3	15	16	17	18	19	20	20
4	21	22	23	24	25	26	27
5	28	29	30	31	1/11	2	3
6	4	5	6	7	8	9	10 Midterm Exam
7	11	12	13	14	15	16	17
	Midterm Exam						
8	18	19	20	21	22	23	24
9	25	26	27	28	29	30	1/12
10	2	3	4	5	6	7	8
11	9 W/D Deadline	10	11	12	13	14	15
12	16	17	18	19	20	21 W/D Deadline	22
13	23	24	25	26	27	28	29
14	30	31	1/1/2024	2	3	4	5
15	6 Final Exam	7 Christmas	8	9 Final Exam	10	11	12
16	13	14	15	16	17	18	19
	Final Exam						
17	20	21	22	23	24	25	26 (TDS) Deadline
	Final Exam						
18	27	28	29	30	31	1/2	2
19	3	4	5	6	7	8	9
	Course Registration (Spring 2022)						



9:52

Fall 2023 Calendar

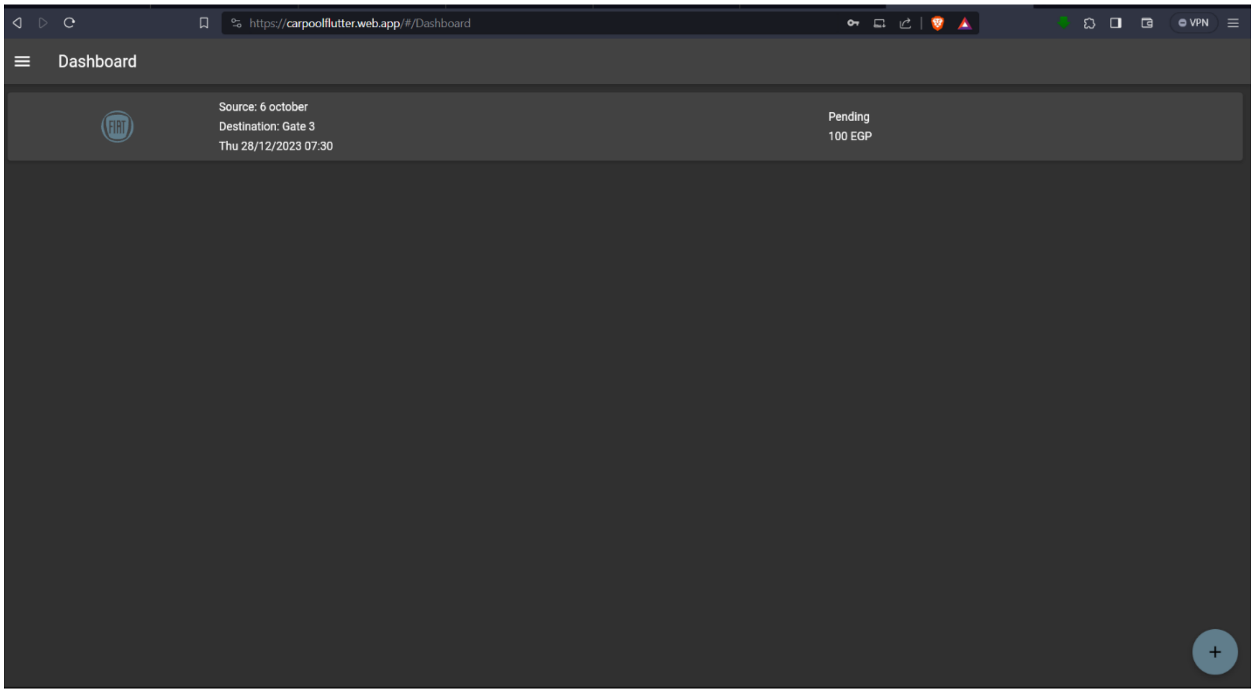
First Semester, Fall2023

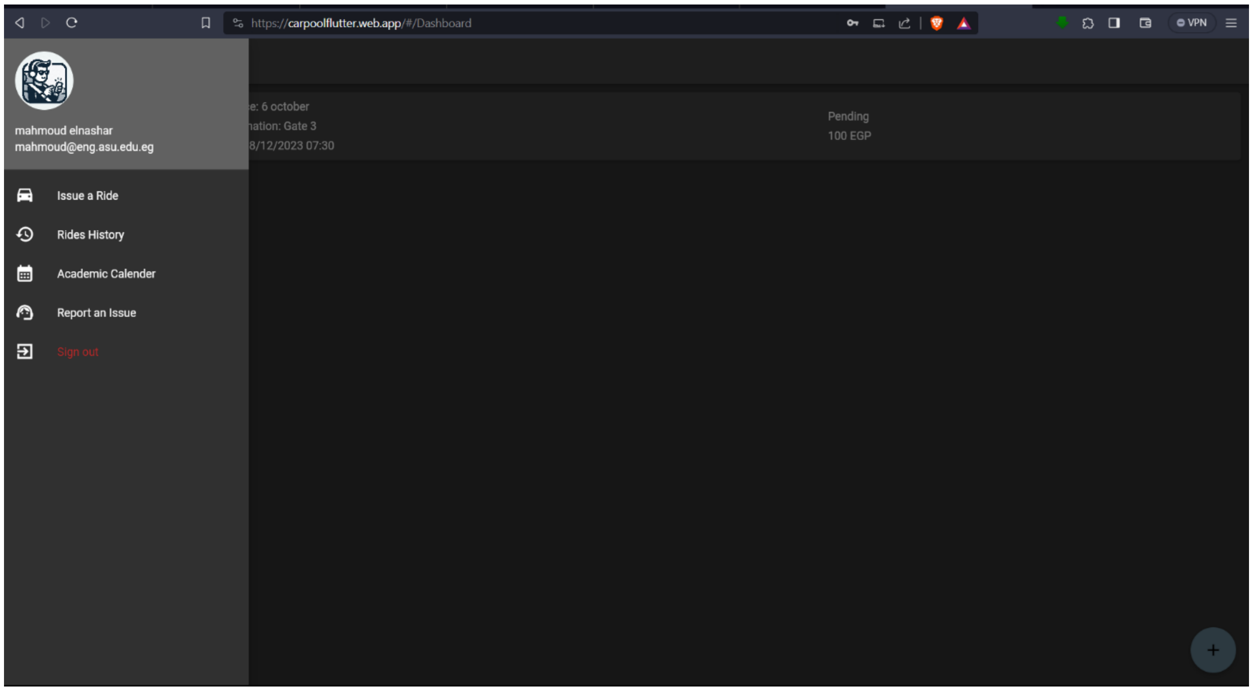
Wk	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	23/9	24	25	26	27	28	29
	Course Registration						
1	30/09 Start/Add Deadline	1/10	2	3	4	5	6
2	7	8	9	10	11	12 Drop Deadline	13
3	15	16	17	18	19	20	20
4	21	22	23	24	25	26	27
5	28	29	30	31	1/11	2	3
6	4	5	6	7	8	9	10 Midterm Exam
7	11	12	13	14	15	16	17
	Midterm Exam						
8	18	19	20	21	22	23	24
9	25	26	27	28	29	30	1/12
10	2	3	4	5	6	7	8
11	9 W/D Deadline	10	11	12	13	14	15
12	16	17	18	19	20	21 W/D Deadline	22
13	23	24	25	26	27	28	29
14	30	31	1/1/2024	2	3	4	5
15	6 Final Exam	7 Christmas	8	9 Final Exam	10	11	12
16	13	14	15	16	17	18	19
	Final Exam						
17	20	21	22	23	24	25	26 (TDS) Deadline
	Final Exam						
18	27	28	29	30	31	1/2	2
19	3	4	5	6	7	8	9
	Course Registration (Spring 2022)						

4.2 Driver Web Application Design

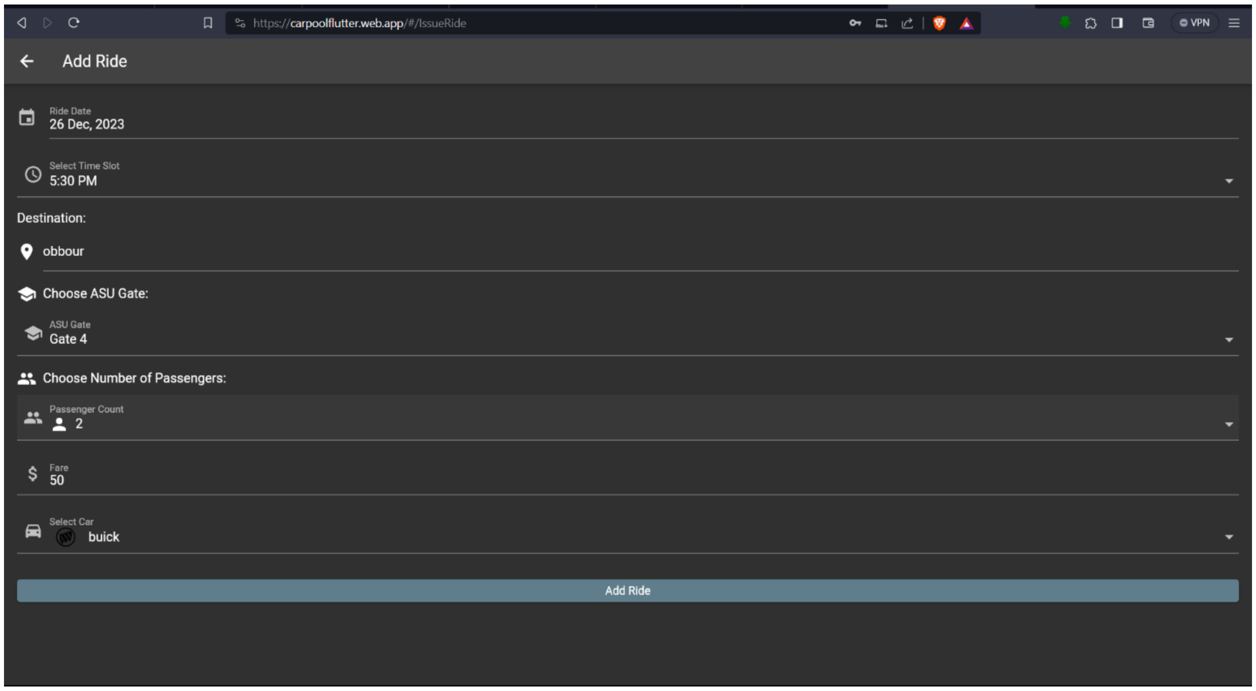
To maintain simplicity and consistency the web application is designed using flutter-web framework

4.2.1 Dashboard





4.2.2 Issue Ride


https://carpoolflutter.web.app/#/IssueRide

Add Ride

Ride Date
26 Dec, 2023

Select Time Slot
5:30 PM

Destination:

obbour

Choose ASU Gate:

ASU Gate
Gate 4

Choose Number of Passengers:

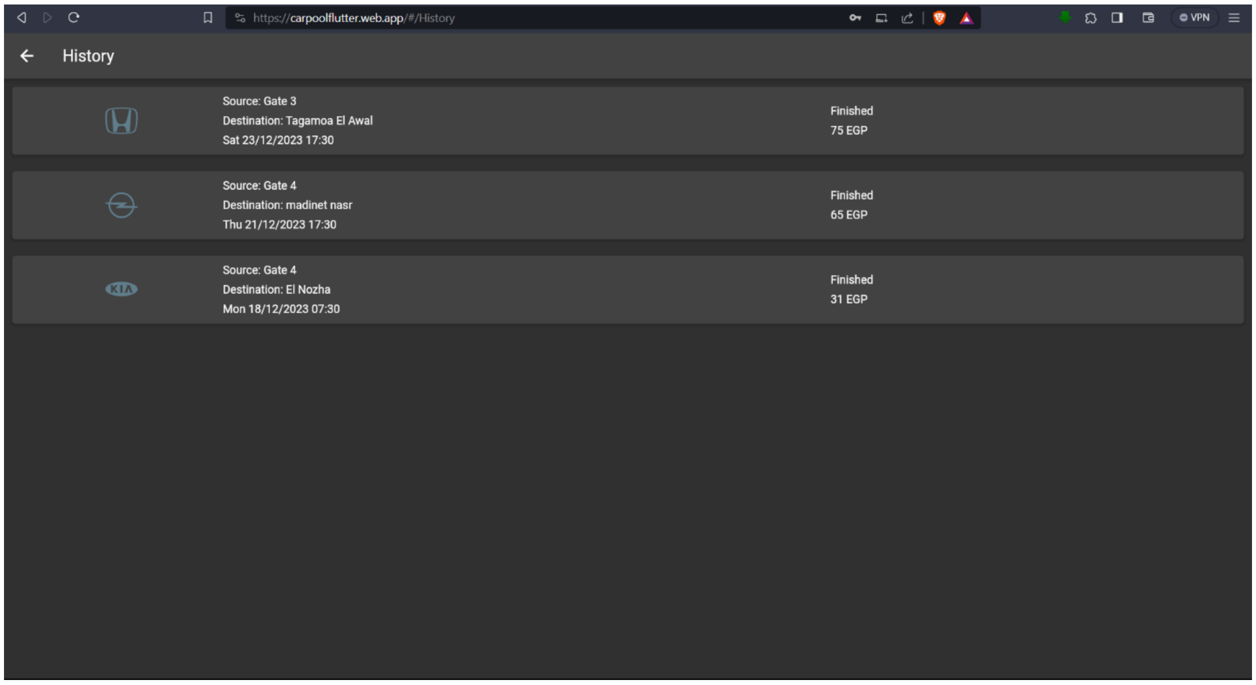
Passenger Count
2

Fare
50

Select Car
buick

Add Ride

4.2.3 Ride History


https://carpoolflutter.web.app/#/History

History

Source: Gate 3
Destination: Tagamoa El Awal
Sat 23/12/2023 17:30
Finished
75 EGP

Source: Gate 4
Destination: madinet nasr
Thu 21/12/2023 17:30
Finished
65 EGP

Source: Gate 4
Destination: El Nozha
Mon 18/12/2023 07:30
Finished
31 EGP

5. Database Structure

The project uses three types of data storing methods.

5.1 Shared Preference

Shared Preferences are used to store the following to allow smoother user experience:

1. Logged in status.
2. Email. (later used to retrieve profile information from sqflite).
3. Theme Preference

```
static String userLoggedInKey = "LOGGEDINKEY";
static String userEmailKey = "EMAILKEY";
static String userThemeKey = "THEMEKEY";
```

5.2 Sqflite

Sqflite is used to retrieve the user profile information so that the information can appear in case of no internet connection.

```
int Version = 1;
initiatedatabase() async {
  String databasedestination = await getDatabasesPath();
  String databasepath = join(databasedestination, 'carpooldb.db');
  Database carpooldb = await openDatabase(
    databasepath,
    version: Version,
    onCreate: (db, version) {
      db.execute('''CREATE TABLE IF NOT EXISTS 'USERS'(
    'ID' INTEGER NOT NULL PRIMARY KEY AUTOINCREMENT,
    'NAME' TEXT NOT NULL,
    'EMAIL' TEXT NOT NULL,
    'PICTURE' TEXT NOT NULL,
    'MOBILE PHONE' TEXT NOT NULL)
     ''');
      print("Users table has been created");
    },

  );
  return carpooldb;
}
```

5.3 Firebase

Firebase is used to:

1. Host the Driver Web Application.

2. allow real time and cloud data storage for all users through firestore.

5.3.1 Firestore structure

The firestore contains two main collections and a sub collection:

1. Users collection which has all users
2. Rides collection which has all rides
3. Credit Card subcollection nested in the user document in users' collection.

```
rules_version = '2';
service cloud.firestore {
  match /databases/{database}/documents {
    // Allow read access to any user document
    match /users/{userId} {
      allow read: if true;  // Allow anyone to read user documents
      allow write: if request.auth.uid == userId;  // Only the user with matching UID can
write
    }

    // Allow read and write access to the "creditCards" collection for the authenticated user
    match /users/{userId}/creditCards/{document=**} {
      allow read, write: if request.auth.uid == userId;
    }

    // Allow read and write access to the "rides" collection for both riders and drivers
    match /rides/{rideId} {
      allow read, write: if request.auth != null;

      // Allow updates to the "Status" field for drivers only
      allow update: if request.auth.uid == resource.data.DriverId;
      // Allow updates to the "Riders" field for riders only
      allow update: if request.auth.uid in
get(/databases/$(database)/documents/rides/$(rideId)).data.Riders;

      // Allow the creation of new rides by drivers
      allow create: if request.auth != null &&
                    'DriverId' in request.resource.data &&
                    request.resource.data.DriverId == request.auth.uid;

      // Allow riders to add themselves to the "Riders" field when creating a new ride
      allow update: if request.auth != null &&
                    'Riders' in request.resource.data &&
                    request.auth.uid in request.resource.data.Riders;
    }
  }
}
```

6 Test Scenario

The following test scenario tests that the driver can issue rides and the rider can book rides the timeline between the rider and the driver is not sequential but parallel as some steps are required from both sides for the other side to continue the workflow.

6.1 Rider Side

- Login
- Choose Date
- Choose Time
- Choose Stop
- Choose Gate
- View Available Rides
- Book Ride
- Navigate to Cart
- Wait for Confirmation
- Wait for Ride Start
- Wait for the Ride to end.
- Pay
- Check History this Ride Card

6.2 Driver Side

- Login
- Issue Ride
- Wait for Riders to book Ride
- Confirm Ride
- Start Ride
- End Ride
- Check History for this Ride Card

T