INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGY - IICT, SUST

SHAHJALAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

PROJECT REPORT

ON

VEHICLE REQUISITION SERVICE AUTOMATION

Submitted To:
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Vehicle Requisition Service Automation

1 Introduction

1.1 Overview

Vehicle Requisition Service Automation aims to digitalize the process of vehicle reservations and requisition in SUST. This project will minimize human error throughout the whole process and provide transparency among users. Currently, the process of vehicle requisition is completely manual, which makes the process very lengthy, tedious, and time-killing. There is a lot of back-and-forth communication involved in reserving a car and the experience can be unpleasant sometimes. This whole problem can be solved by digitalizing and automating the process of vehicle requisition.

This project aims to automate the process of reserving transportation by building a web application that lets teachers and officials submit a reservation request and see their reservation history and their acceptance and rejections. This web application also allows transport section staff to view all pending reservation requests in one place, and approve or reject those requests based on driver availability, which can also be seen by the transport section staff in a separate tab. Drivers can also use this web application to see their past reservations and upcoming drives.

To do so, we first categorize everyone in the requisition process involved into three distinct user groups: Teachers and Officials, Transport Section Staff, and Drivers. Then, we collect requirements from all of these user groups to understand their needs and pain points, and what could be improved by automating the requisition process. Then, we narrow these requirements down and translate them into technical terminologies. After that, we create necessary diagrams like use case diagrams, entity relationship diagrams, data-flow diagrams, etc. to further narrow down the scope of the project. Then we built the platform using different languages and technologies like JavaScript, NodeJS, MySQL, and so on.

1.2 Project Objectives & Scope

This section discusses the objectives and scopes of the Vehicle Requisition Service Automation software. Objectives refers to the goals we tried to achieve by building this software. Scope refers to the intended user base, the limitations, and future plans. The objectives and scope are outlined below:

1.2.1 Objectives

- To build a web application that will automate the whole vehicle requisition procedure
- To create a user-specific platform that lets everyone involved in the vehicle requisition process play their role in a frictionless manner
- To bring transparency to the vehicle reservation process

- To minimize the amount of back-and-forth phone calls between the parties
- To create a one-stop solution for teachers and officials, transport section staff, and drivers
- To let transport staffs view all requests at the same location
- To let transport staffs view all drivers, their availability, and past and upcoming reservations

1.2.2 Scope

Vehicle Requisition Service Automation is a one-stop solution for all parties involved. This web application makes the process of vehicle requisition smooth, frictionless, and transparent. By reducing the human interaction factor from the process, this application makes the vehicle requisition process fast and simple. This web application is scoped only within the vehicle requisition system of SUST, although it can be easily adjusted and enhanced to support a more generalized and standardized vehicle requisition process all around. The intended user base is the teachers and officials of SUST, the transport section staff of SUST, and drivers that work for SUST. All of them will have access to the system via an authentication system. This software is very user-specific, so users will have assigned roles that will be handled on the server side. The future plan is to deploy this web application and let users use this system to make their life easy.

2 Requirements Analysis

2.1 Elicitation Method

To gather requirements from users, first, we had to determine whom our user base is exactly going to be. In SUST, the vehicle reservation process mainly involves three kinds of people:

1. Teachers and Officials, who submit a reservation request.
2. Transport Section Staff, who handle requisition requests and assign drivers.
3. Drivers who drive cars at the assigned time.

After determining the user base and the user categories, we had to learn the requirements of each of these users. We went to people belonging to each of these categories and asked them the following questions:

- How they are involved in the whole requisition process?
- In which part of the process do they come in and play their role?
- What exact steps do they follow?
- What sort of problems, issues, annoyance, or pain points do they face in the whole process?
- What could be done in a better way to minimize or eliminate their problems and make the whole process as smooth and frictionless as possible?
- What do they think about automating the whole process?

We noted down the responses, consulted our course supervisor Dr. Ahsan Habib, and proceeded as per his guidance and instructions. We then translated the requirements we gathered into technical details, examined the current system, and reflected on what could be improved by bringing automation into the equation.

2.2 Study and Analysis of Existing System

The vehicle requisition system that's currently in place is handled completely manually. There is no automation at work. Today, if a teacher or an official wants to reserve a car, they have to first inform the transport section official, who handles assigning drivers to their job if they're available. The transport section official then checks which drivers are available at that particular time. If he finds someone who's available, he assigns him to the job. The driver is then notified by the transport section official about his upcoming duty. This whole process is done via back-and-forth phone calls. Needless to say, this process has several shortcomings:

- A lot of friction due to back-and-forth communication
- No digital records kept
- Difficult for transport section staff to keep track of driver's availability
- Lack of transparency from the teachers perspective
- Drivers need to memorize their upcoming duty schedules, instead of having a one-stop place to look at
- Hard to keep track of when a journey starts and when it ends

2.3 Proposed System

Our proposed system, Vehicle Requisition Service Automation, is a web application that fully automates the process of reserving and requesting a vehicle. This does so by building a very user-specific application platform, where each user has a role assigned. This way, a driver gets to see only what a driver needs to see, while a transport section staff has access to all the information he needs to approve or reject a reservation request. In our software, users get to sign in using their credentials. After that, depending on user type, the user gets routed to specific pages that are relevant to his user role. From there, a teacher can request a reservation by filling up an application where he has to enter the date, the time, and the reason. The transport staff can see all the pending requests in one place, and assign drivers to those reservation requests if the drivers are available. The drivers also get notified about their upcoming drives. This proposed system eliminates the friction associated with back-and-forth communication, and plays its role as a middleman between all users involved.

2.4 Benefits To The Users

The users of our proposed system, Vehicle Requisition Service Automation, will enjoy the following benefits:

- Easy to keep track of start and end of a journey
- The availability of all drivers can be easily seen in one place
- This will eliminate all kinds of paperwork

2.5 Modules of Application

The proposed system primarily consists of 4 modules: *(UI snapshots of these modules will be attached in the UX/UI Snapshots section)*

2.5.1 Module 1: Authentication Module

If a user wants to use the software, he first has to authenticate their identity. He can do that by logging into the software by entering his credentials. Entering the wrong credentials stops someone from signing in. If he does not have an account, he can first create an account to sign up for the software. But to authenticate himself, he'll also have to select user type i.e teacher, transport section, and drivers.

So this authentication module has 3 sub-modules:

1. Signing into the software
2. Creating an account
3. Choosing user type

2.5.2 Module 2: Teacher Module

The teacher module is specifically for teachers only. Teachers can choose the Teacher type while logging in and enter valid credentials to enter the software. Then the teacher can do the following tasks:

1. Submit a vehicle requisition form by entering the date, time, and reason
2. View an already submitted requisition form, and cancel it if he wants

3. View his schedule, and how much time is remaining to start a trip
4. View the history of his previously made reservation requests

2.5.3 Module 3: Transport Section Module

The transport section module is specifically for transport section staff only. Transport section staff can choose their respective user type while logging in and enter valid credentials to enter the software. Then they can do the following tasks:

1. View all pending requisition
2. Switch between grid view and tabular view
3. View a specific requisition form
4. Select and assign a driver to accept the request, or reject it
5. View all granted requisitions
6. View all rejected requisitions
7. View all completed requisitions
8. View a particular driver's schedule

2.5.4 Module 4: Driver Module

The driver module is specifically for drivers only. Drivers can choose their respective user type while logging in and enter valid credentials to enter the software. Then they can do the following tasks:

1. View the schedule to see upcoming trips
2. View all previously completed requisitions

2.6 Non-Functional Requirements

1. The software must be created in a way that is compatible with the present IT landscape.
2. It must be secure in order to be acceptable.
3. The software must load swiftly and smoothly to provide for quicker access. Network and web server speeds have an impact on how well a software performs. Because it is web-based, internet speed also plays a role.
4. The website should have a highly pleasing appearance and feel.
5. To make the user's experience easier, suitable assistance should be given on how to use this software more effectively.
6. For security and privacy reasons, each user is given a different password and login. No user personal data or highly sensitive information will be kept on the website.
7. The software will be open for further modifications and improvement to meet users' acceptance.
8. Server-side logging should be implemented for easy debugging and maintainable software.

3 Use Case Diagram

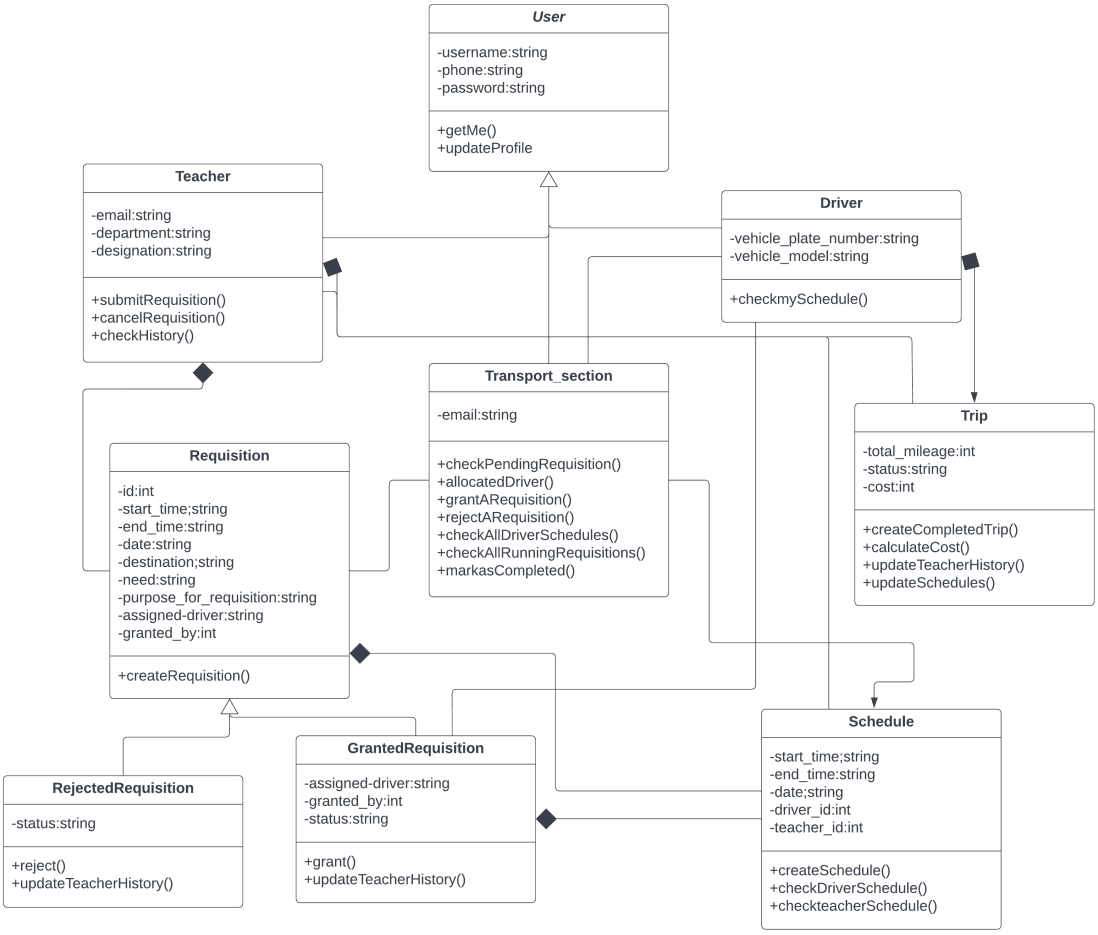

Figure 1: Use Case Diagram

4 Data Flow Diagram

- Level 0 Data Flow Diagram

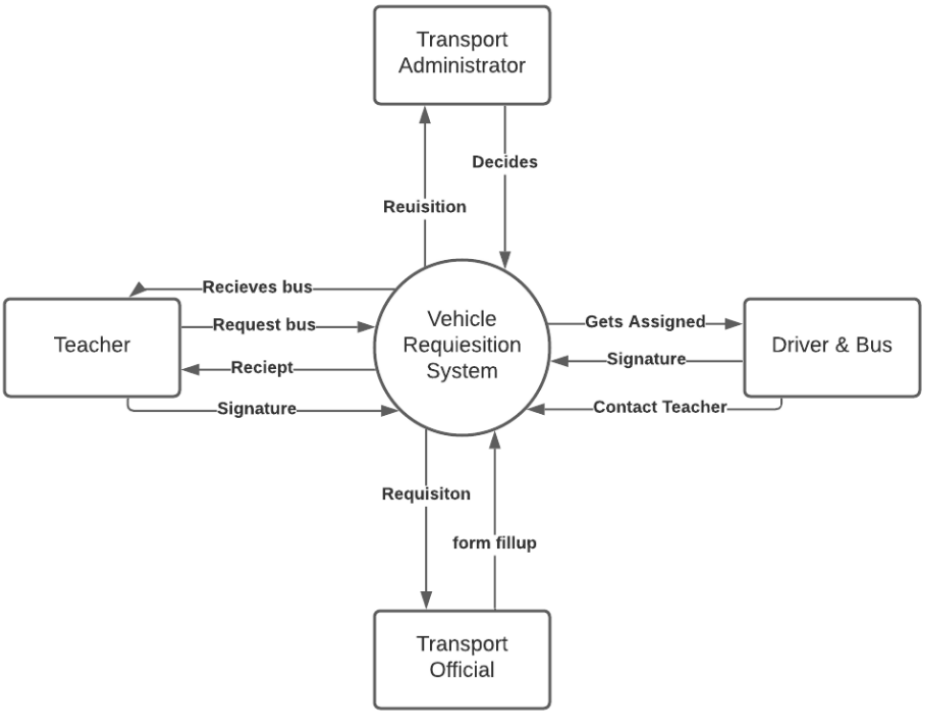

Figure 2: Level 0 DFD for the Vehicle Requisition process

- Level 1 Data Flow Diagram

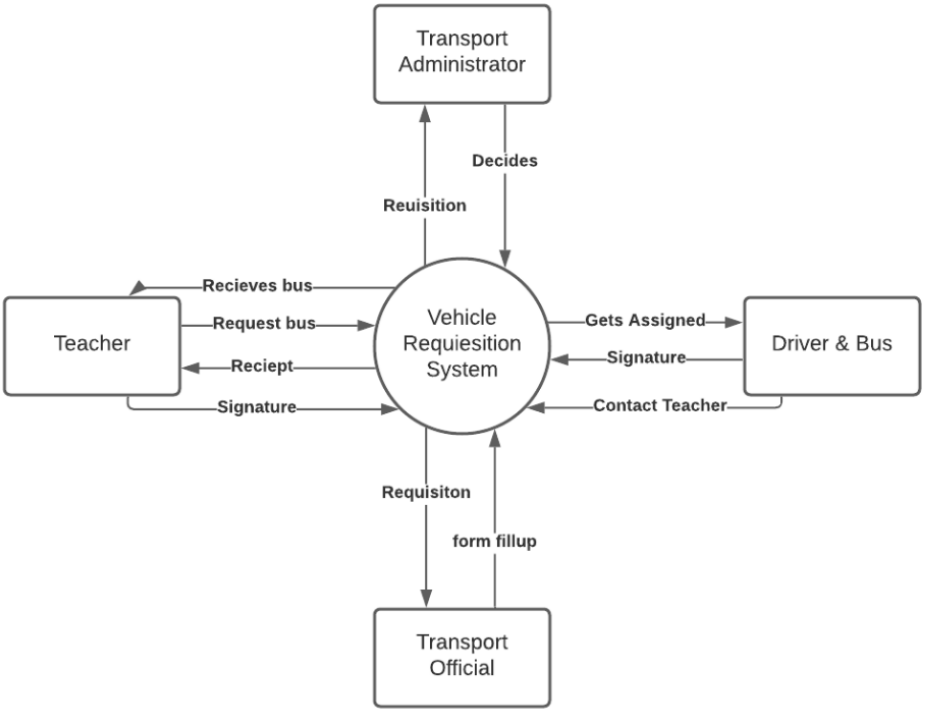

Figure 3: Level 1 DFD for the Vehicle Requisition process

5 E-R Diagram

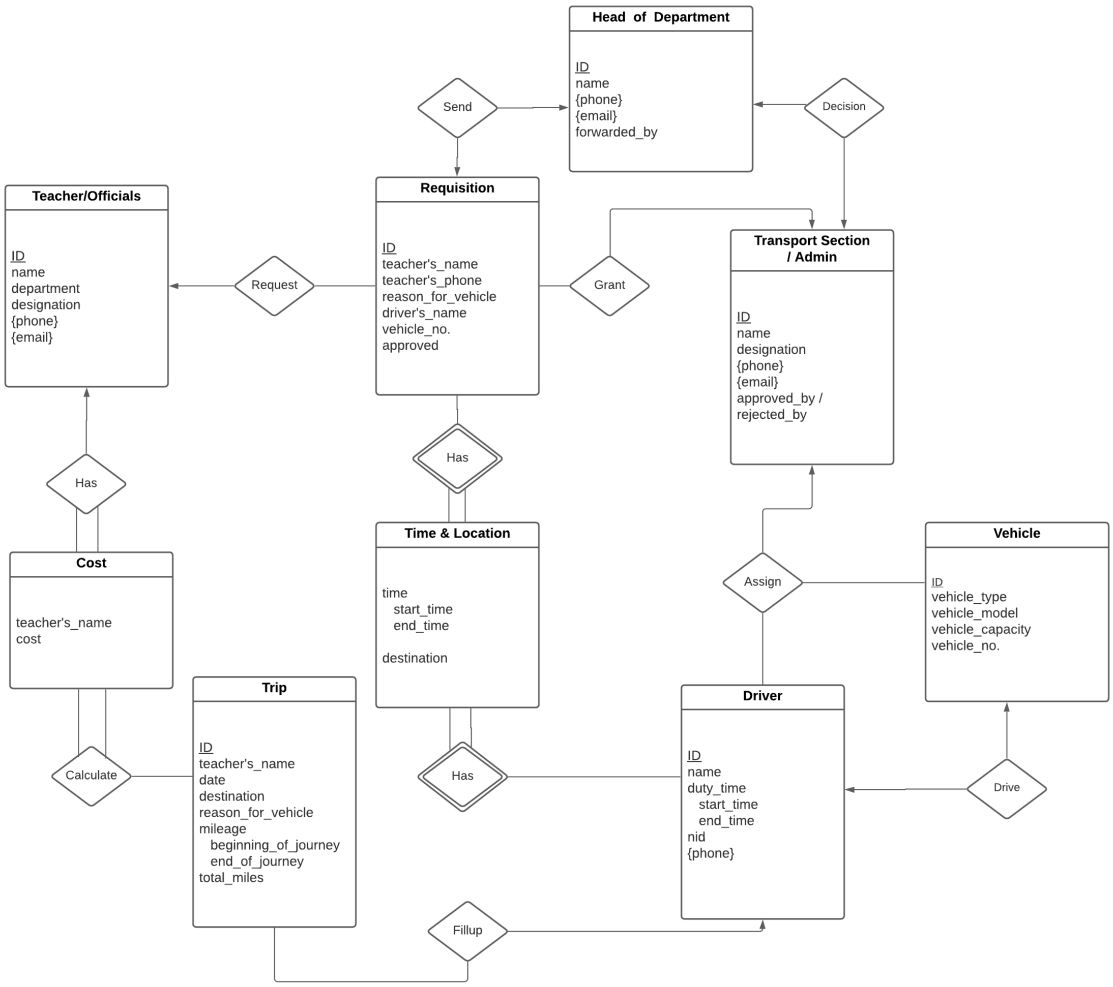

Figure 4: Entity Relationship Diagram

6 Database Diagram

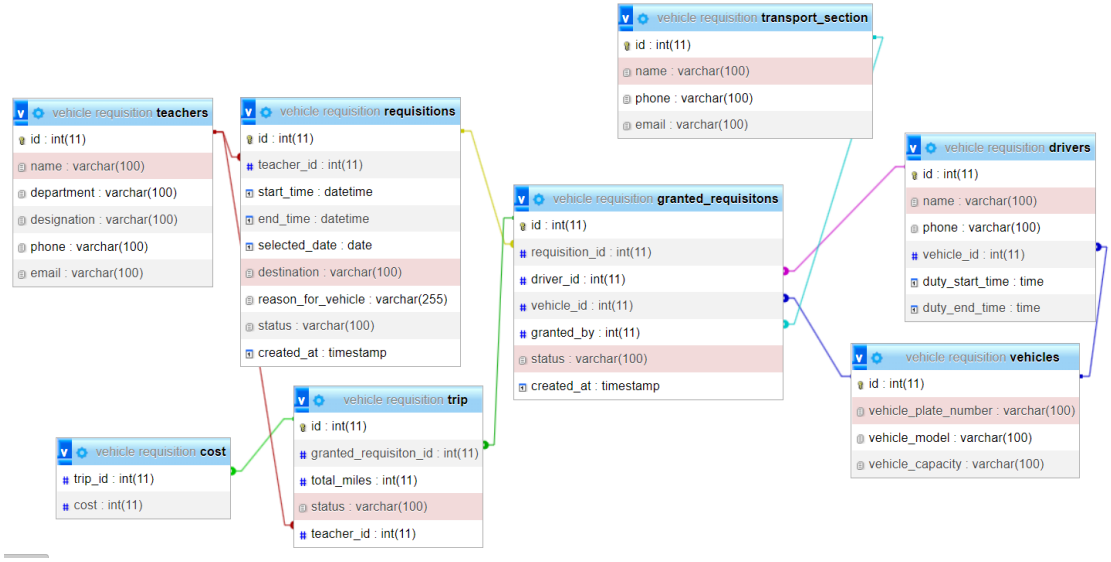

Figure 5: Database Diagram

7 Testing

Testing is the process of running a system with the intention of finding errors. By identifying design flaws and system problems, testing improves the integrity of a system. The goal of testing is to find problem areas. This aids in a system's ability to avoid errors. Testing enhances the value of the product by ensuring that it complies with user requirements. Testing's primary objective is to identify defects and vulnerable areas of a system. The testing process must be precise and well-planned. Utilizing a system that hasn't been tested at all is as dangerous. A poorly developed and untested system is also very expensive.

7.1 Validation

The following validations have been used in our software:

1. Wrong credentials (username, password, user type) don't let a user in the software. To log in, s/he has to enter all the correct information.
2. While submitting requisition forms, previous dates are unavailable. Meaning, a teacher cannot book a date that has already passed.
3. During form submission, a teacher can only choose a time between 8 AM - 8 PM. The rest of the time is disabled.
4. A teacher can only request a car for a maximum of three hours.
5. Submitting multiple forms at the same time is not possible.

6. When assigning a driver to a requisition, only the drivers that are available at that time of the day show up on the list. If a driver is unavailable at that time (if the driver is on an off-day or is already occupied with another requisition at that time), his name does not appear on the list of available drivers.

8 Training, Maintenance, & Security

8.1 Training

When planning about training the users, things like age group, occupation, literacy, especially tech literacy should be taken into consideration. In our case, we have three different types of users who may fall under totally different groups in terms of tech literacy and other factors. While designing the software, user experience and group strata was already taken into consideration, and we've tried to make an intuitive UI that conforms with conventional UI flows. Onboarding the teachers on this software should be fairly easy since they are already in loop with the current tech affairs of the world. Nonetheless, all teachers will be provided with manuals on how to use this software. As for the transport office staff and the drivers, they'll be given hands-on demonstration where they can learn to use the software with their own hands. During the initial phase after the software goes live, regular sessions can also be arranged to educate every users about this software. Over the time, the need for hand-holding will diminish as more and more users learn to use the software. Future users will have the advantage of having colleagues who're already well-versed on how to use the software.

8.2 Maintenance

In order to address any issues users may have, the platform will be available to improvements in the future. To guarantee the users receive high-quality service, the system should undergo routine maintenance. A user review system is planned to be implemented in future to enhance the maintenance process.

8.3 Security

The platform ensures the security of user data. How likely it is that the system can withstand an unintentional or deliberate infiltration determines the software's security. All user data entered into the website's forms and maintained in its database will be secured by a system that encrypts sensitive data using the bcrypt algorithm. Our website employs the essential precautions to protect the information of our users. Information about the accounts is stored on a secure server.

9 UX/UI Snapshots

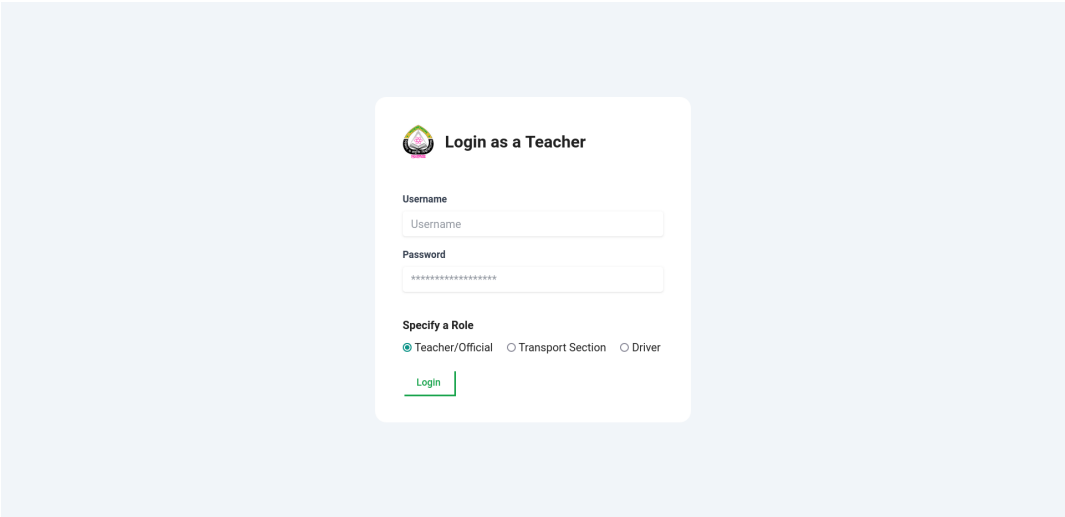

Figure 6: Authentication: Teacher Login

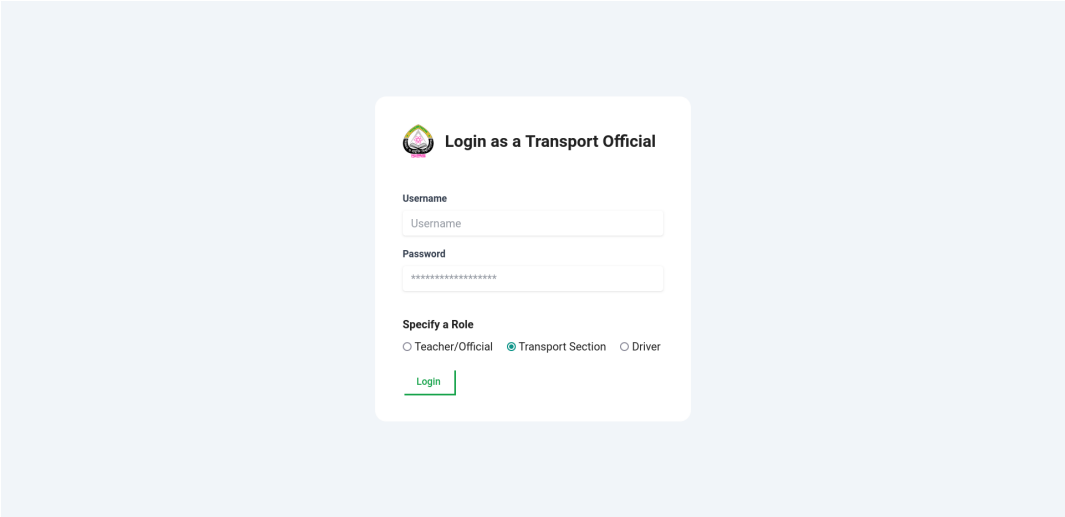

Figure 7: Authentication: Transport Section Login

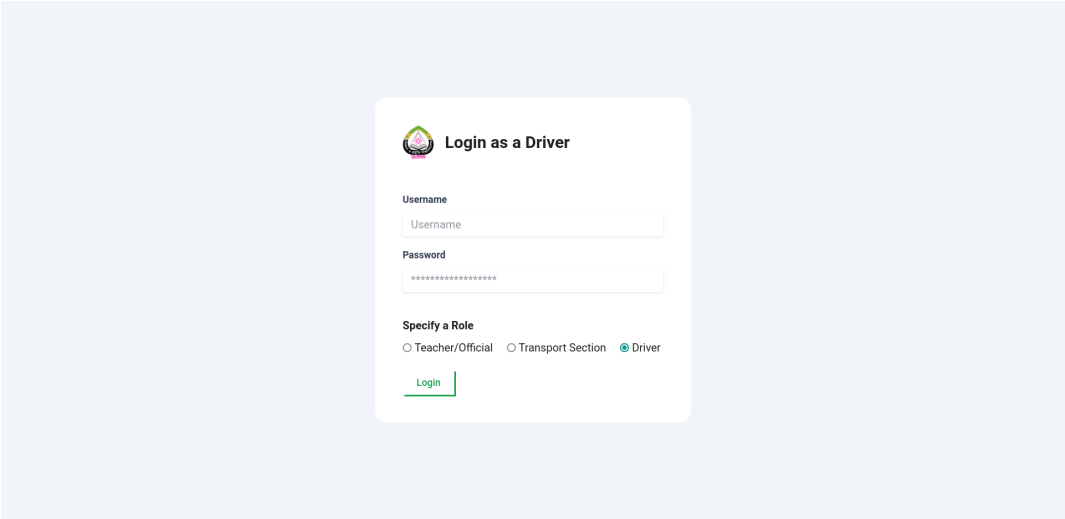

Figure 8: Authentication: Driver Login

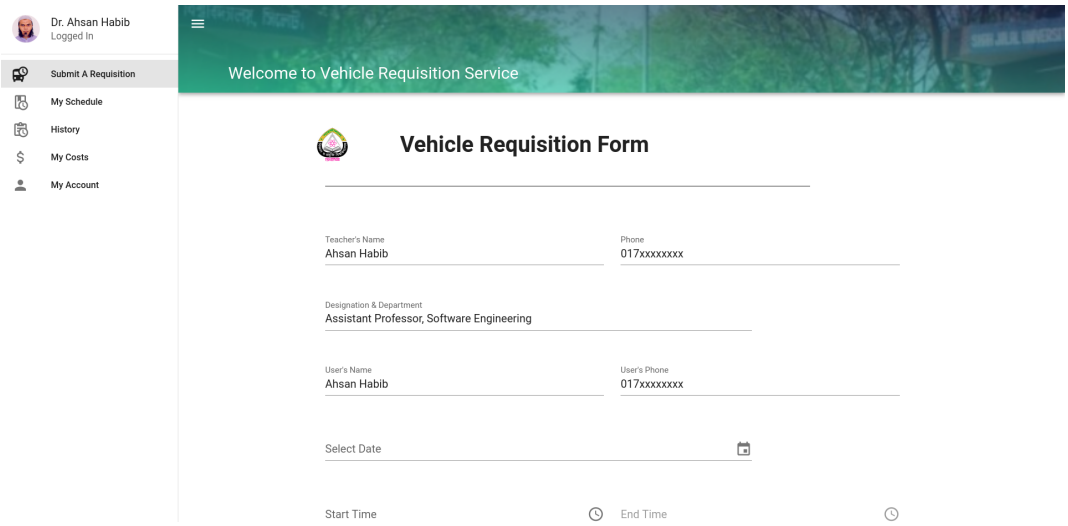

Figure 9: Teacher: Vehicle Requisition Form

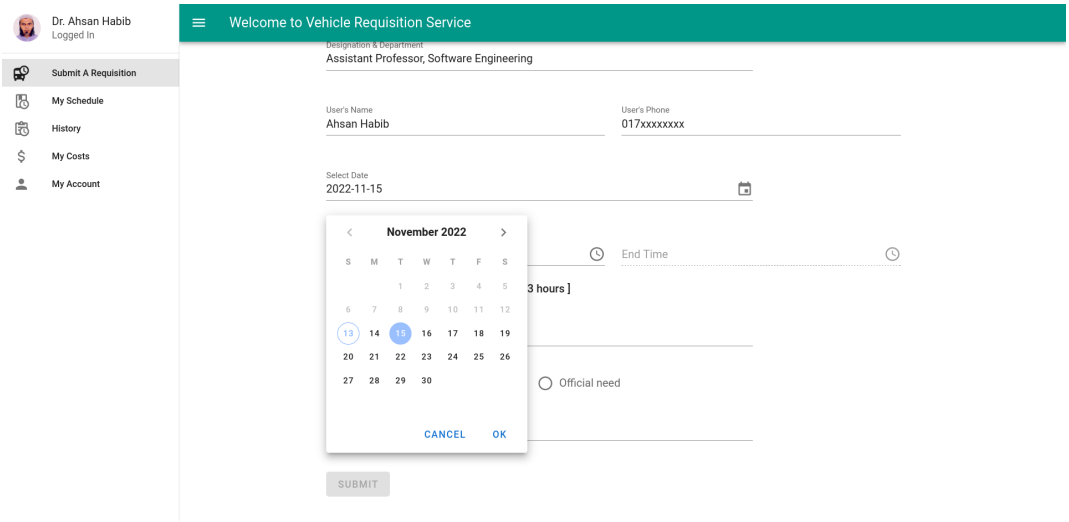

Figure 10: Teacher: Selects date

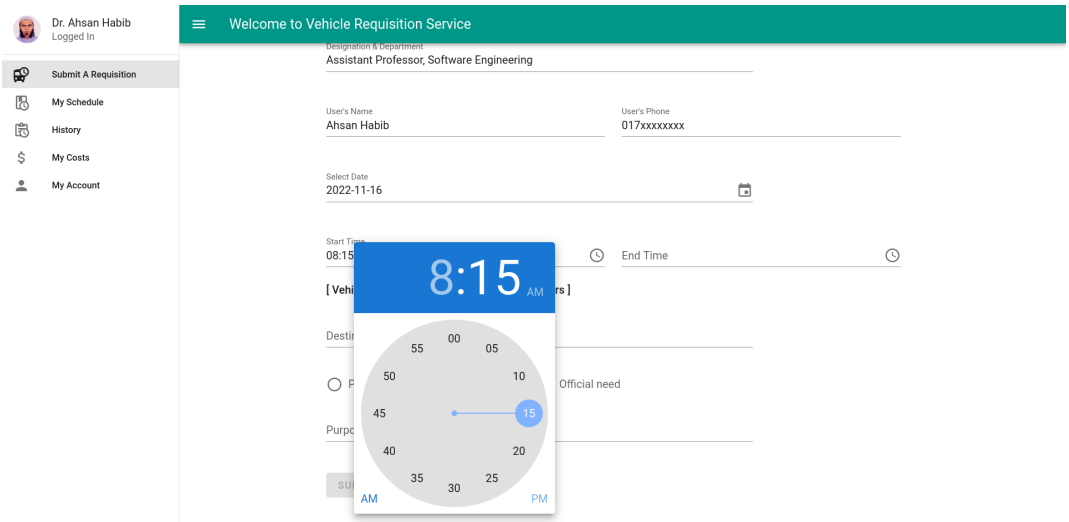

Figure 11: Teacher: Selects time

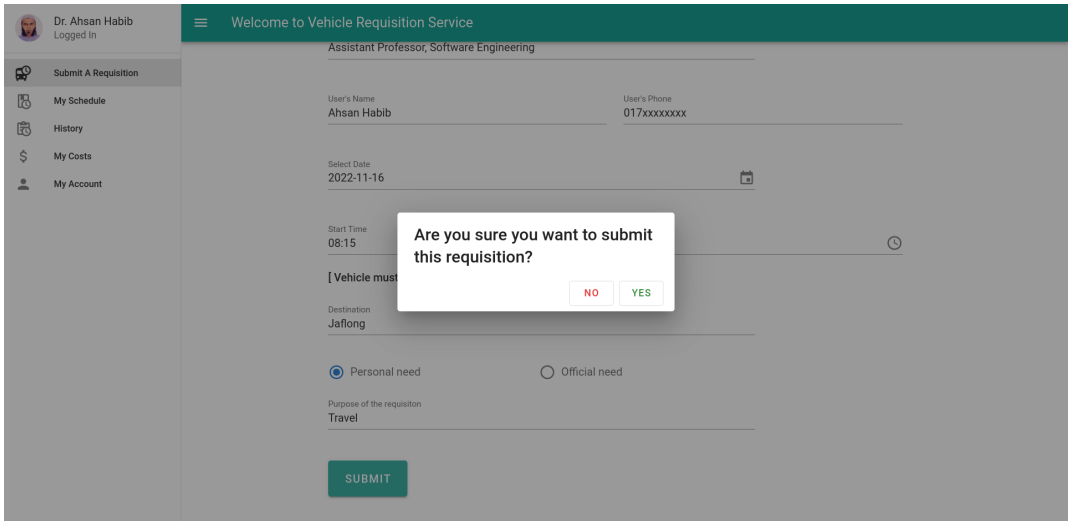

Figure 12: Teacher: Confirms requisition

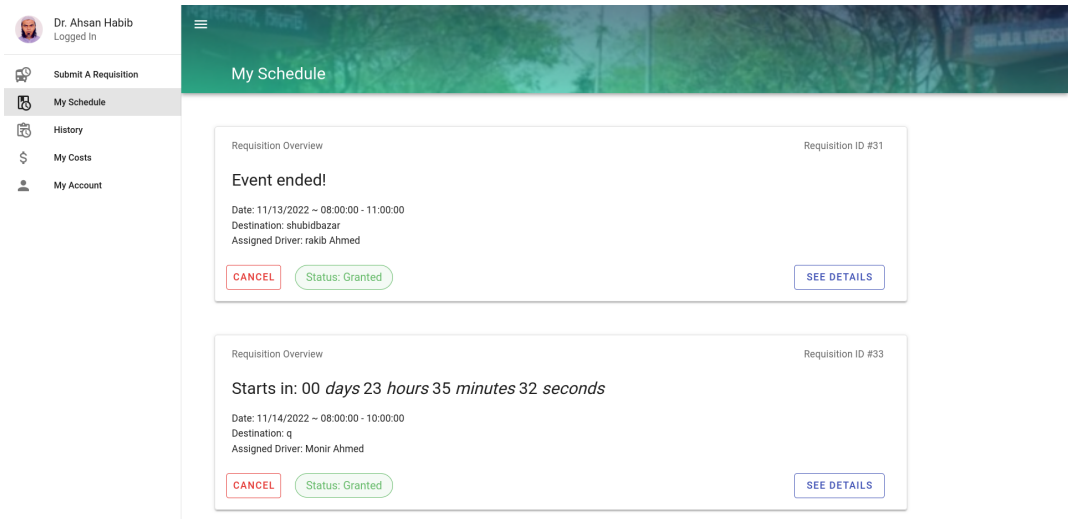

Figure 13: Teacher: View his schedule

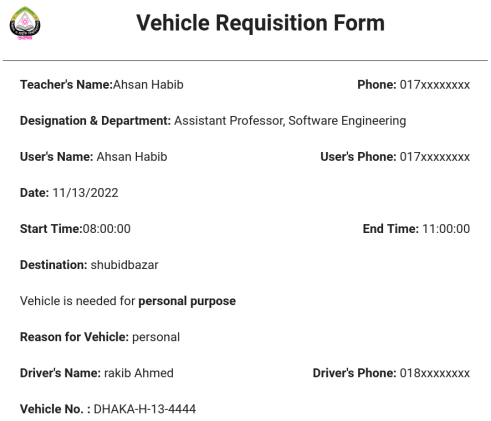

Figure 14: Teacher: A specific requisition form

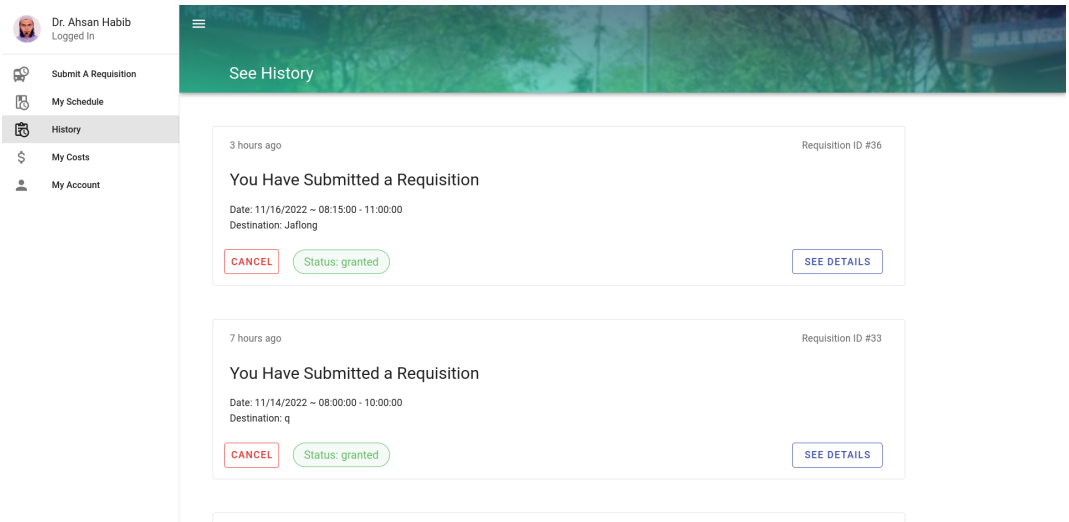

Figure 15: Teacher: Past history of Teacher's requisitions

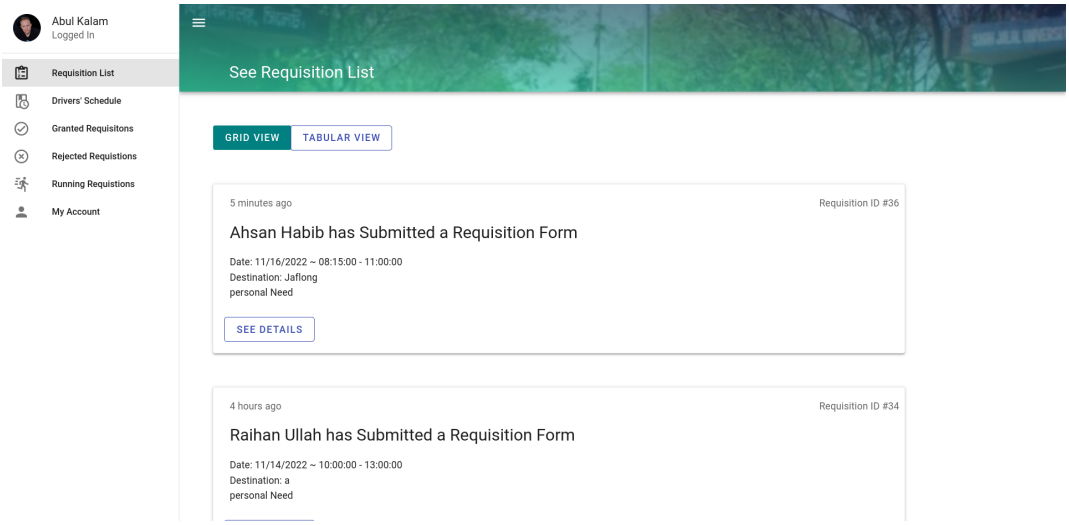

Figure 16: Transport Section: View all pending requisitions

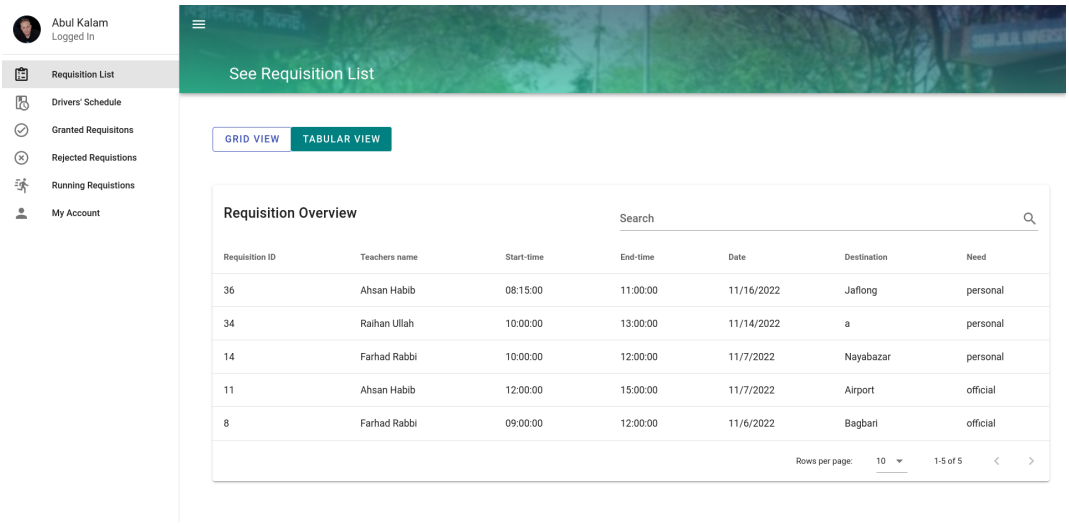

Figure 17: Transport Section: View in Grid View or Tabular View

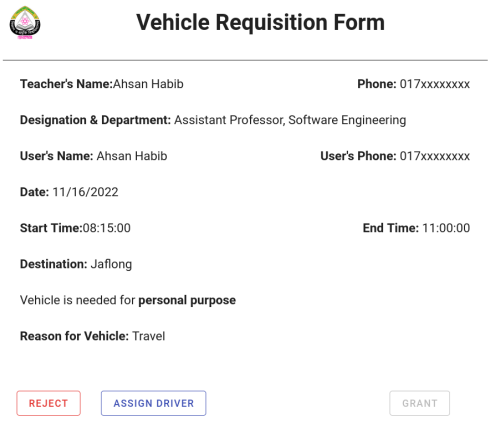

Figure 18: Transport Section: View Requisition Form

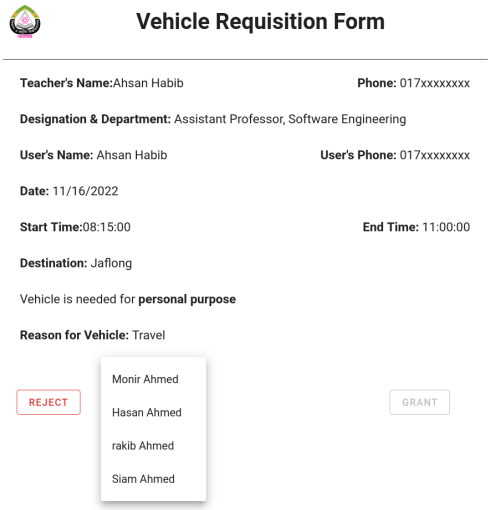

Figure 19: Transport Section: View available drivers

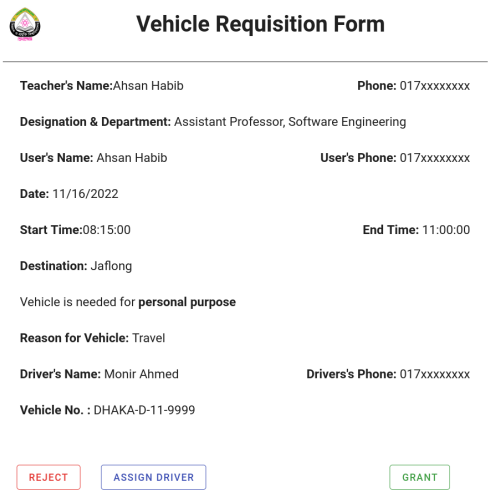

Figure 20: Transport Section: Assign Driver

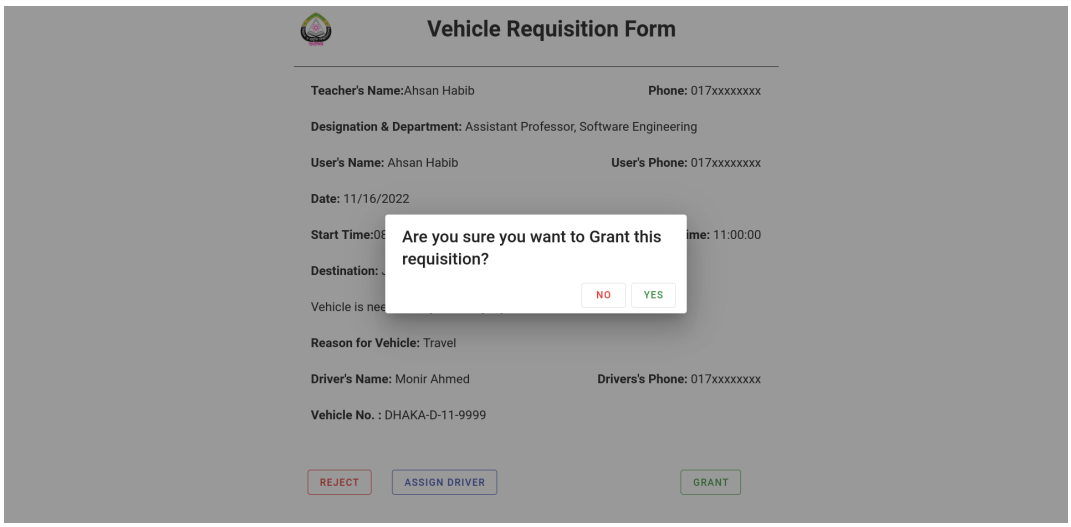

Figure 21: Transport Section: Grant Requisition

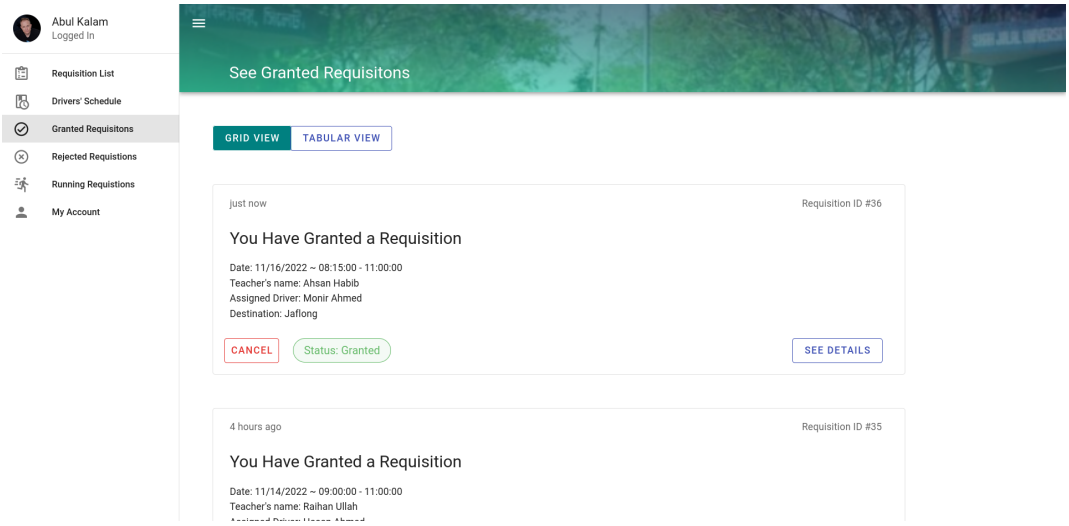

Figure 22: Transport Section: View all granted requisitions

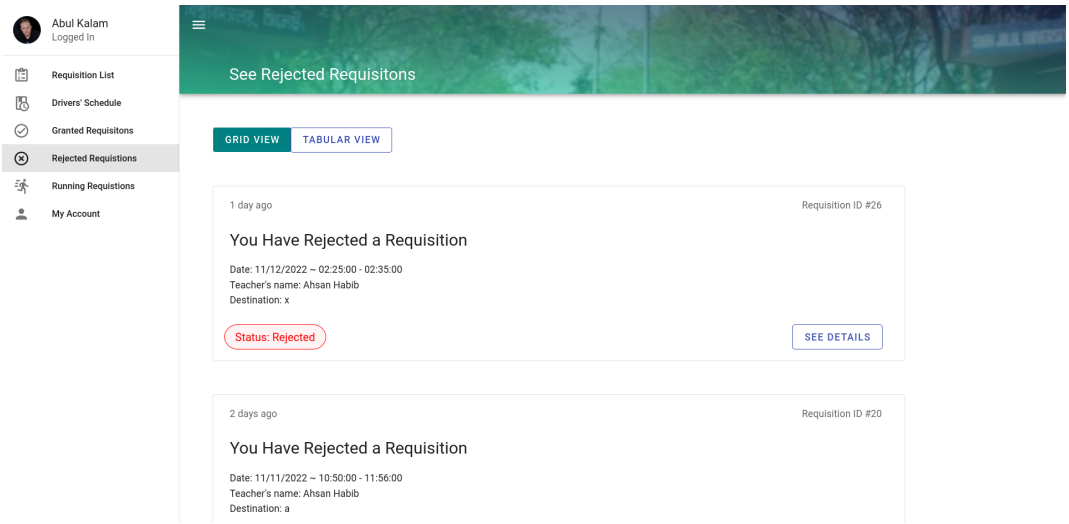

Figure 23: Transport Section: View all rejected requisitions

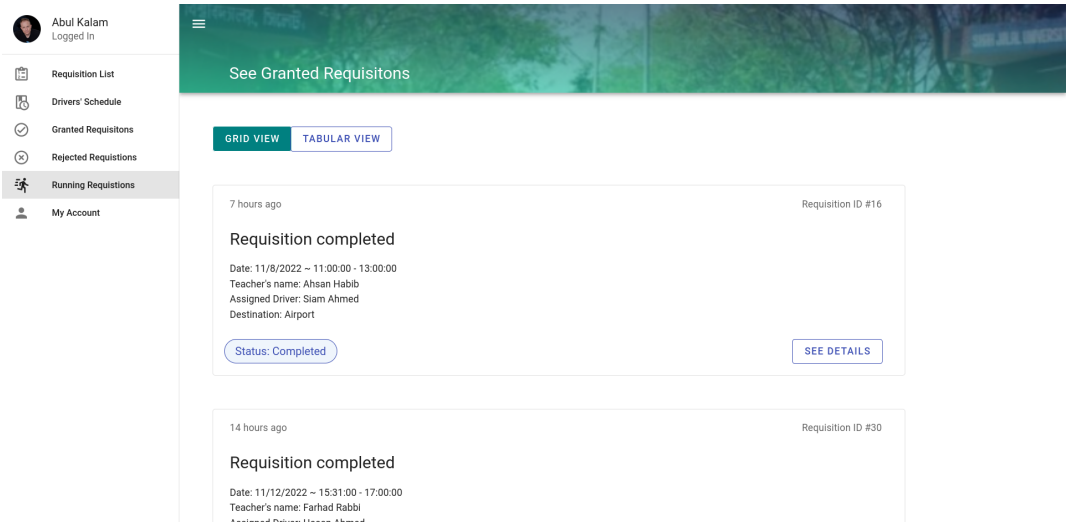

Figure 24: Transport Section: View all running requisitions

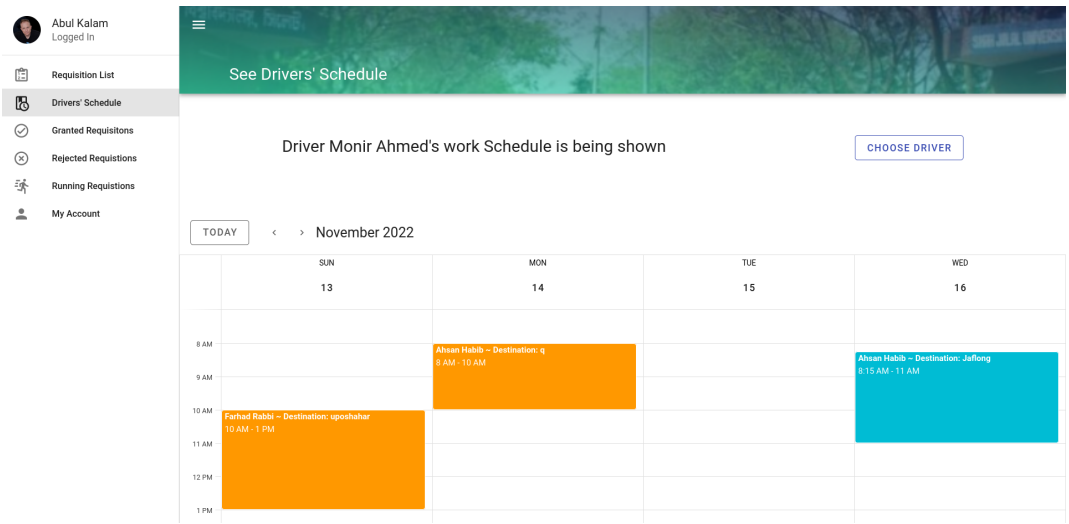

Figure 25: Transport Section: Driver's Schedule Section

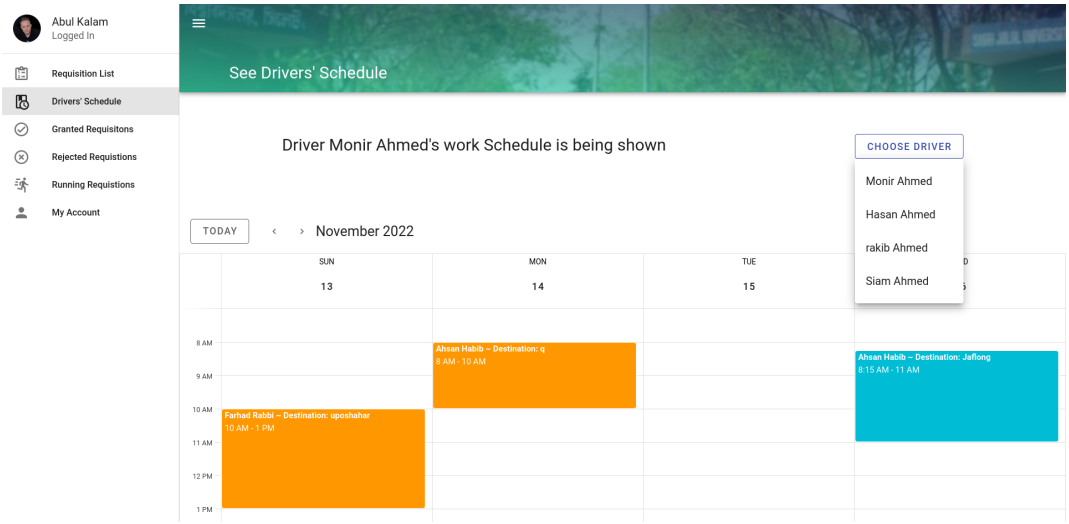

Figure 26: Transport Section: Select driver to view his availability

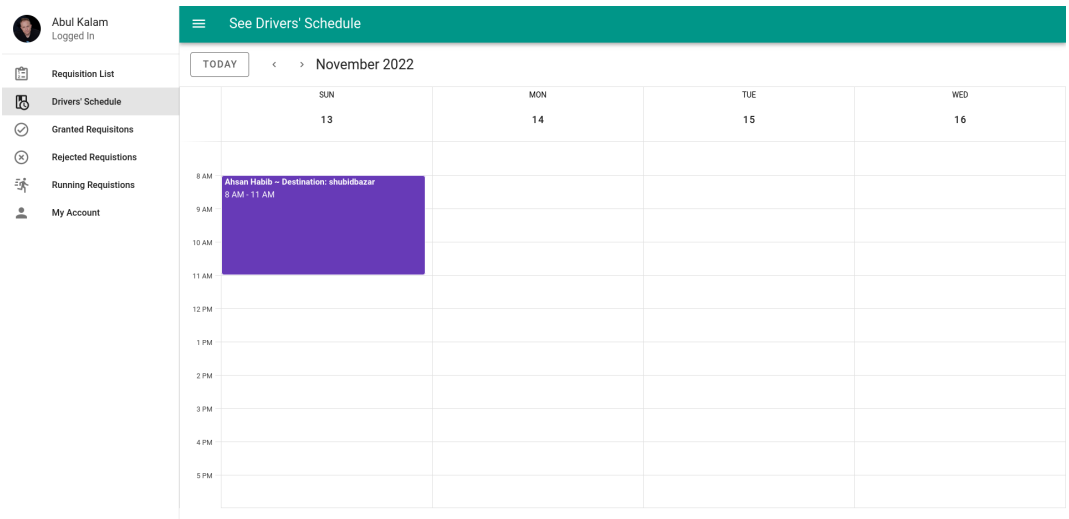

Figure 27: Transport Section: View driver's schedule

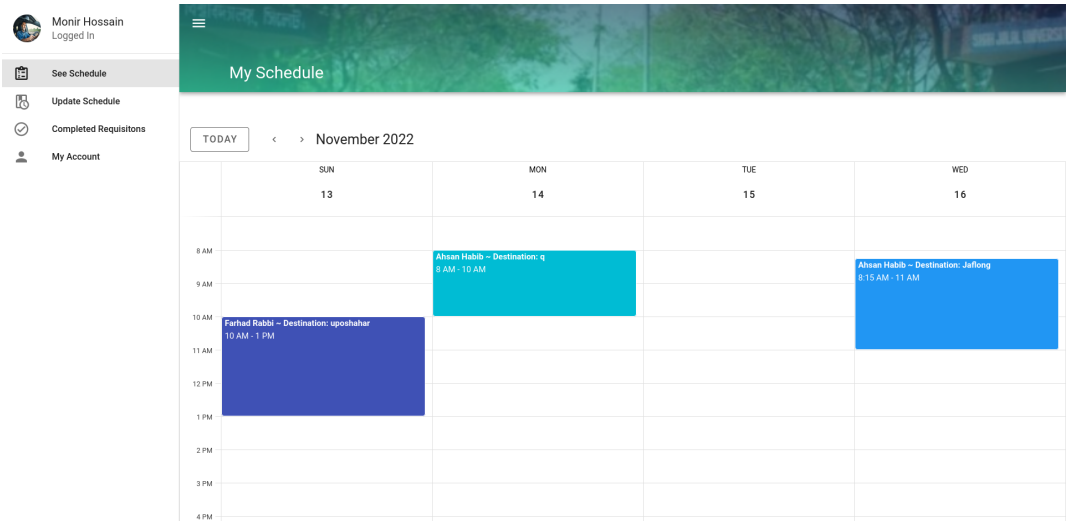

Figure 28: Driver: View driver's schedule

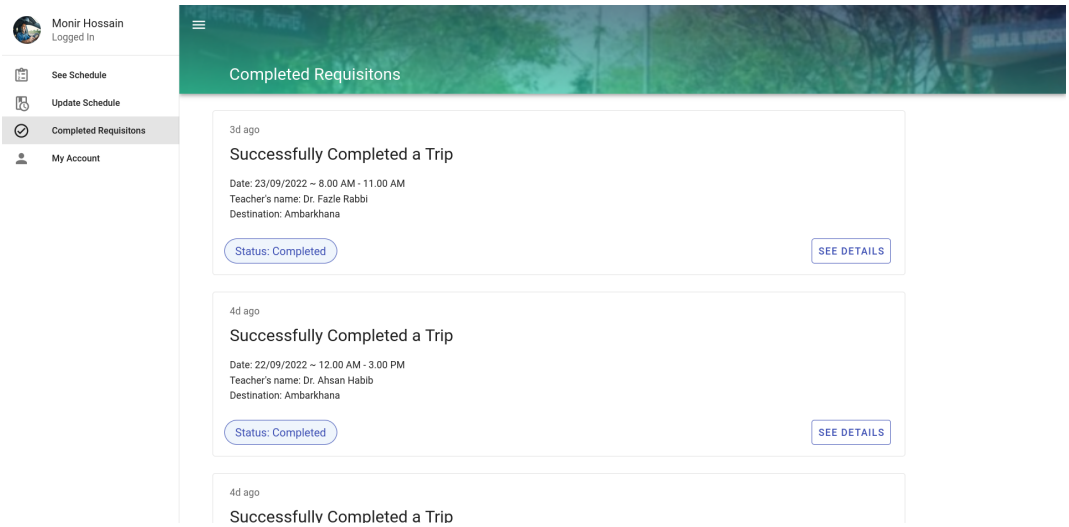

Figure 29: Driver: View driver's completed requisitions