DHL Supply Chain

Web Based Ramp Appointment System for Logistics Facilities

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ABSTRACT

The trucks that arrive in warehouses without an appointment can have severe effects. For instance, long waiting queues, an unbalanced workload and labor loss. The aim of this project is to produce a new planning algorithm and develop a web application to facilitate the operation in DHL warehouses and increase the output.

OBJECTIVES

It had been developed a web-based booking system for making appointments to unload the shipments into DC. Therefore, the system prevent unsystematic arrivals to the DHL warehouse. Besides the carrier firm, the web application also includes other user types with specific roles.

- **Client:** The company which wants to store its products in DHL warehouses. The system shows the previous shipments and the appointment of the new carrier firms.
- **Admin:** The user has control over most of the operations, such as assigning new ramps or creating new user accounts.
- **DHL Operation:** In charge of warehouse operations, he/she has similar roles as admin. In addition, he/she can choose the time interval that the carrier can make an appointment, the parameters necessary for appointments and confirm appointments. He/she can see the program of the day in a timetable.
- **DHL Security:** The security of the DHL warehouse, waiting at the gate. His objective is to check the validity of inbound truck (by checking necessary parameters such as truck's late, documents, etc.) and approve or reject the truck. He can see the program of the day in a timetable.
- **Carrier:** Carrier firm chosen by the client. They enter the necessary parameters and choose a time interval for their truck's arrival time.

By developing this platform, DHL Logistics will arrange their warehouse and shipment planning more effectively.

PROJECT DETAILS

Project had three major development parts; Data analysis for finding distributions of unloading times, frontend and backend part for the web-based system. Also, there is a sub project that gives a suggestion to merge the trucks. The final product is the combination of four.

Arena Simulation

Arena Simulation had the inputs from the data provided from the 2018 DHL warehouse. The unloading times and the interarrival times of the simulation had been calculated from there.

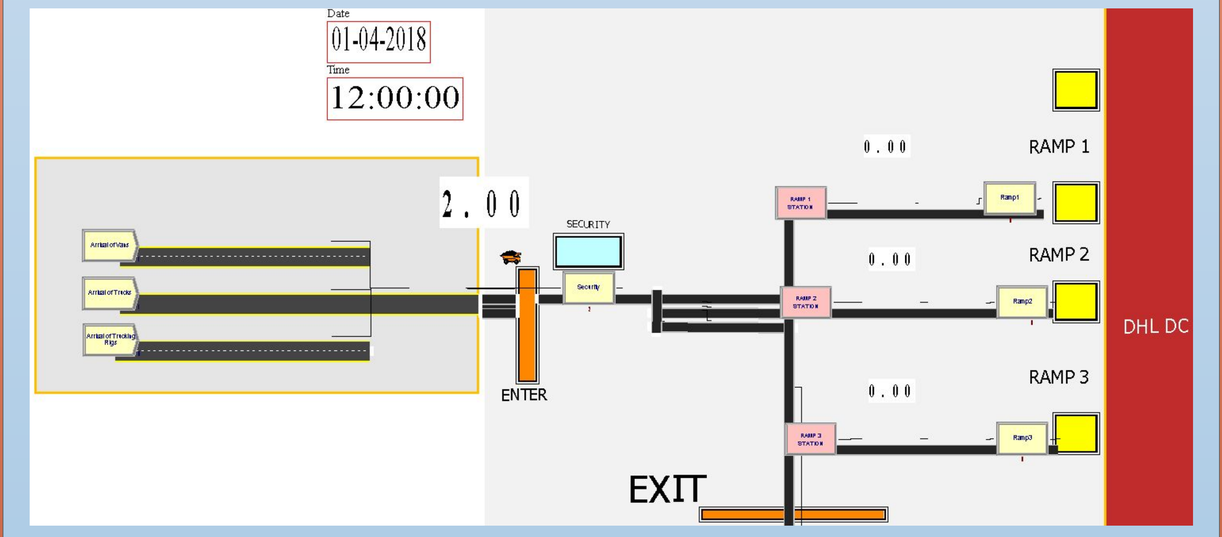

Figure1: Arena Simulation Model

Data Analysis

It had been analyzed in the Minitab program and concluded that the inputs are not acceptable. The reason is, the inputs not entered sensitively. Hence, it does not provide the reality. Therefore, the suggestions provided from the simulation are not reliable.

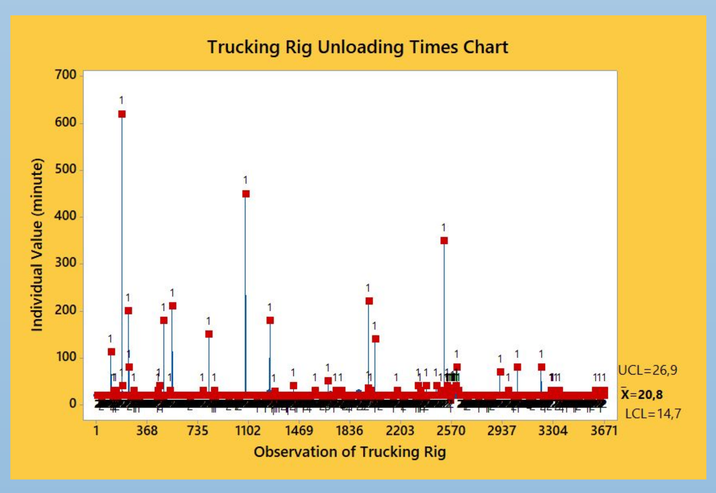

Figure2: Trucking Rig Data Analysis

Frontend

The frontend (UI/UX) part of the project is developed a framework used React Js, developed by Facebook. The flexibility it offers and allowing us to make responsive modern web application confortable was the reason behind we choose this framework. Also, changing something if needed is easier compared to traditional web applications. In addition, other helper libraries such as Redux and Thunk is used, to store the data and communicate with server easier.
This application is intended to be responsive, dynamic and modern. Its achieved by modern designing patterns.

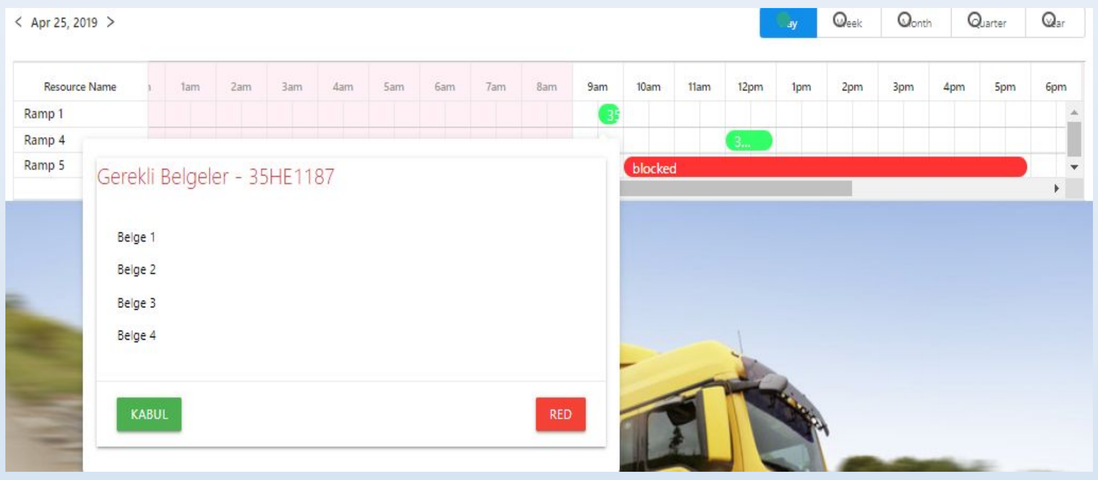

Figure 3: Example from timetable, security screen. Security can see the day's program on table, and can accept or reject the entrance of the truck according to parameters.

Backend

Back-end development is done mainly using NodeJS as language, Express for the web framework, Sequelize for the ORM, Tedious for the Database driver, Microsoft SQL Server for the database, and JWT for the authentication.
It's a Rest-like API as in the calls are stateless, the routes are implementing HTTP methodologies, and URIs referring to the models.

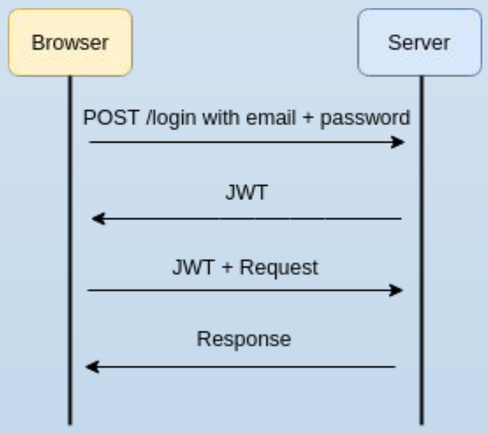

Figure 4: Authentication

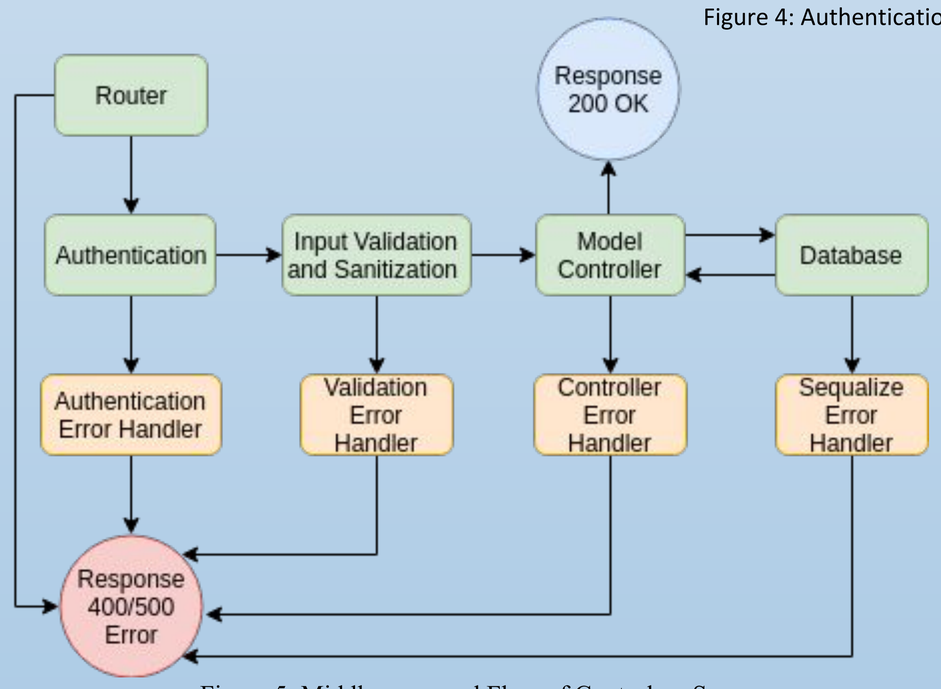

Figure 5: Middlewares and Flow of Control on Server

Subproject

As a subproject, analyzation was done to the previous years' data which consisted of arrival, unloading and leaving times. The objective of this analysis was to observe the number of times where the trucks brought smaller amounts of loads, but came more frequently. In Python, code was written which will be implemented to the appointment system. In the code, after writing the date of the appointment it checked the data as it pretends it is the previous taken appointments and gives advice to merge the loads and send a bigger truck and come once rather than twice.

CONCLUSIONS

The Arena program helped to see and understand the current queueing problem more clearly with simulation. By analyzing the data, the distributions of arrival, unloading and leaving times were seen and this gave a better understanding of the wasted time while waiting in queue. The appointment system will hopefully prevent the queues and the suggestions of merges given by the system will help to decrease the frequencies of excess arrivals.

REFERENCES

- https://support.minitab.com/en-us/minitab-express/1/help-and-how-to/control-charts/how-to/individuals-data/i-mr-chart/interpret-the-results/all-statistics-and-graphs/