ELECTRIC VEHICLE CHARGING MANAGEMENT SYSTEM

GROUP NAME :TEAM 23

TEAM MEMBERS:

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Team and Contribution

Dou Jin: Contractor Data Structure and User Interface

Shaohang Hu: Company Data Structure and User Interface

Runan Zhou: EVDriver and Investor Data Structure and User Interface

Introduction

Background

Electric vehicle marketing is on the rise globally. To protect the environment and reduce carbon emissions, the government even subsidizes customers for buying an electric car. For customers, the quiet driving experience, powerful acceleration capabilities, and intelligent interactive system have produced a strong attraction. But the only downside is that "Mileage Anxiety" has become a common problem. For people living in cities, most of them don't have a private garage, they need to charge at public charging stations. In the current shortage of charging stations, Mileage Anxiety will be amplified.

PROJECT VISION

Problem

As there are more and more electric vehicles on the road, current charging station capacity is no longer meet the requirement of the users. It is possible that people wait to be charged for more than half an hour or they are not able to drive to the nearest charging station before they run out of the battery. This is called "Mileage Anxiety".

"Mileage Anxiety" worries some of the potential customers and some of them will not give electrics car a try until it has been resolved.

Strategy

Our Approach

We are aim to build an entire ecosystem which include driver, investor, manufacturer and our company ChargingPoint. Our advantage is the request-driven system. Once there is a shortage of charging station reported, our analysis will query all the charging station's usage around that region. Once the shortage confirmed, our tenderee will invite tenders for building a charging station at a reasonable location. Investors are able to buy stocks from our company and we use this money to pay the manufacturer. Drivers can browse the charging station map and get a clear idea of how many charging stations are in their range. What's more, they even can get the information of whether the charging station is available or not.

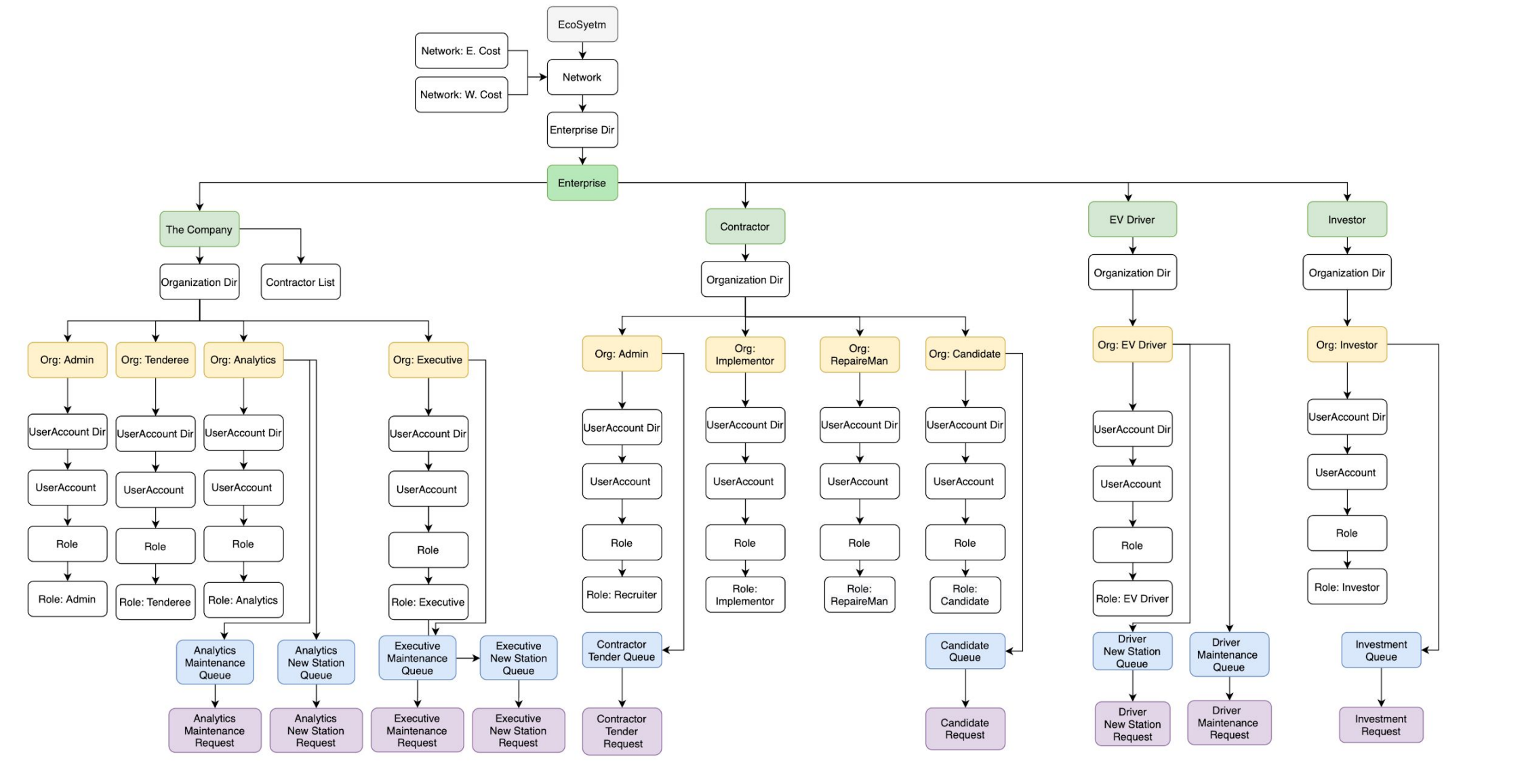


Fig. Whole Structure Diagram

SYSTEM DESIGN

System-Network-Enterprise-Organization Structure.

The EcoSystem was consists of multiple networks.

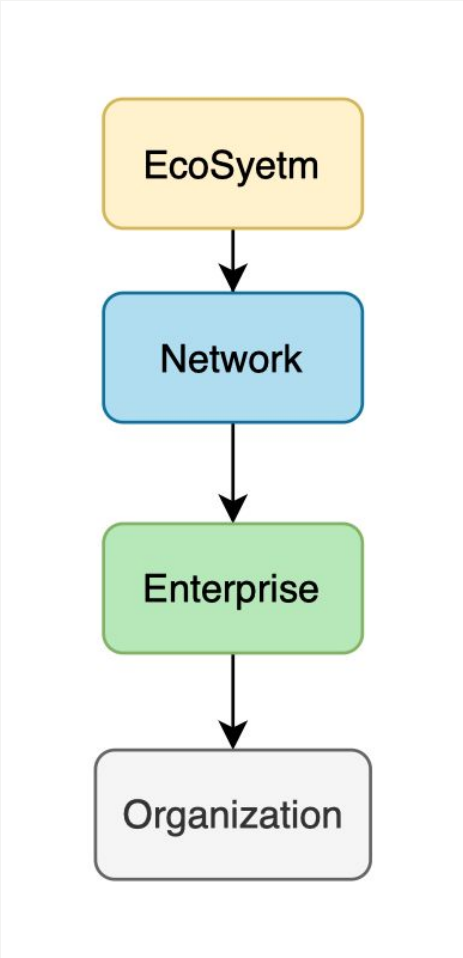


Fig. Structure Diagram-Skeleton

SYSTEM DESIGN

Each Network has 4 types of Enterprises.

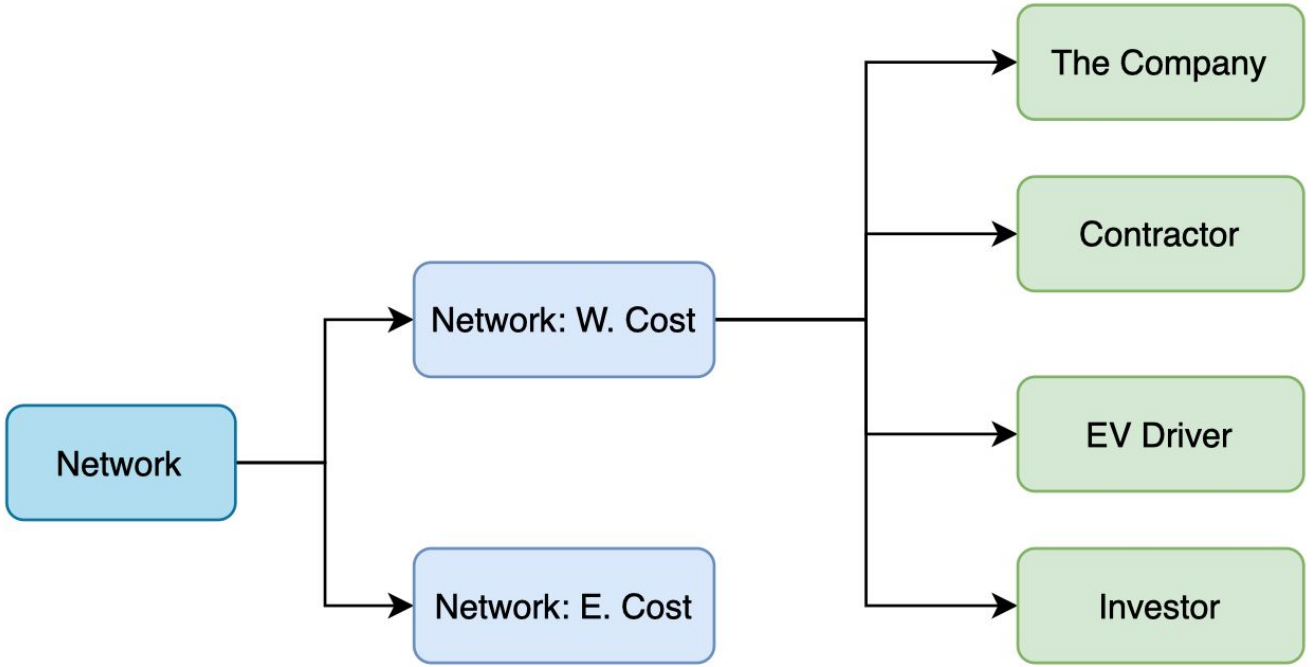


Fig. Structure Diagram-Network

SYSTEM DESIGN

Each Enterprise has multiple organizations. Each organization has their own user account directory.

Work Queue will also be stored under certain organization.

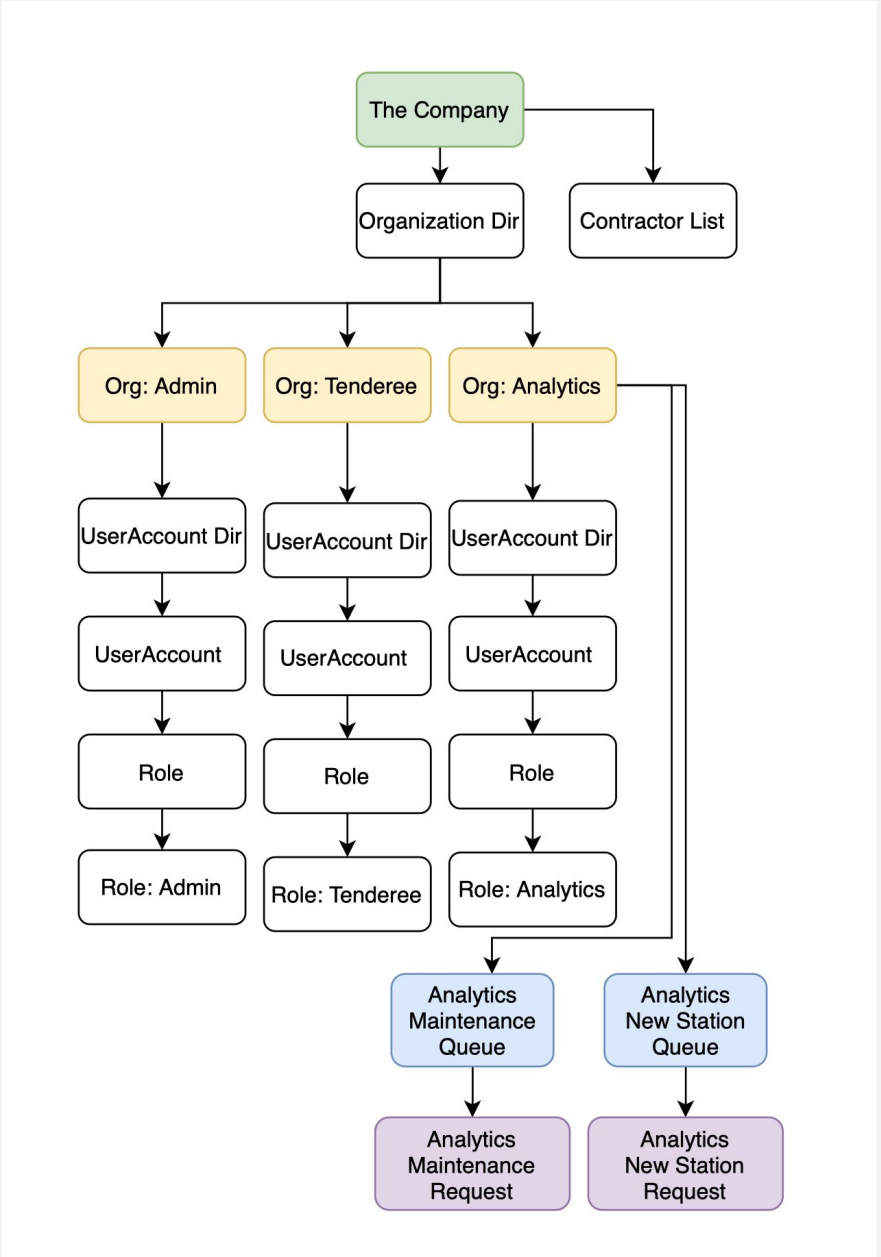


Fig. Structure Diagram-Enterprise

KEY FUNCTIONALITIES

- User registration(Candidate, Driver, Investor)
- Candidates can apply for jobs and receive results
  - create an account automatically if the candidate was hired
- Drivers can find nearest charging pile
  - user can see the pin in the google map
- Drivers can report a broken/shortage of charging piles
- Investors can invest for a company and have some stocks.

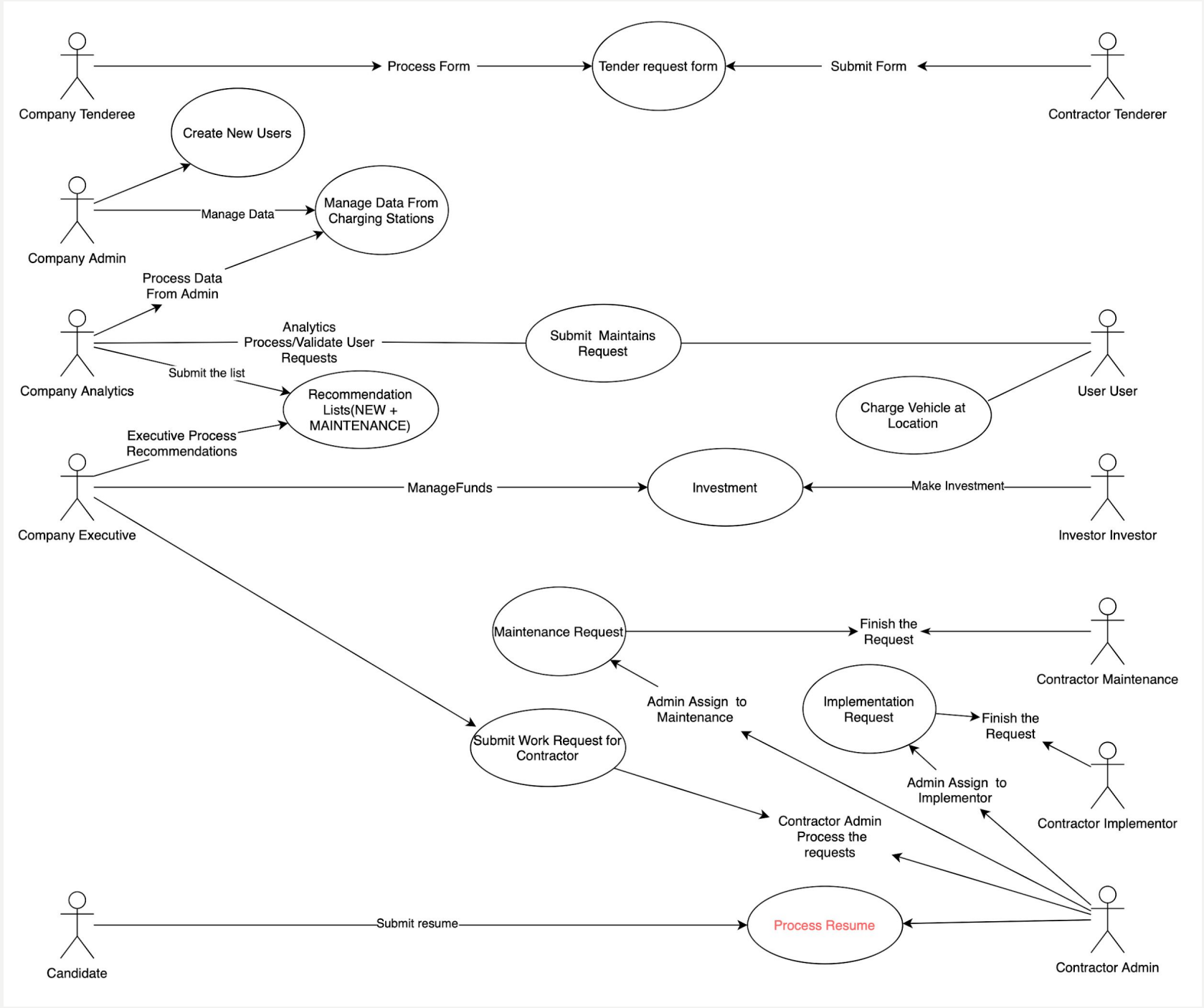


Fig. Use Case Diagram

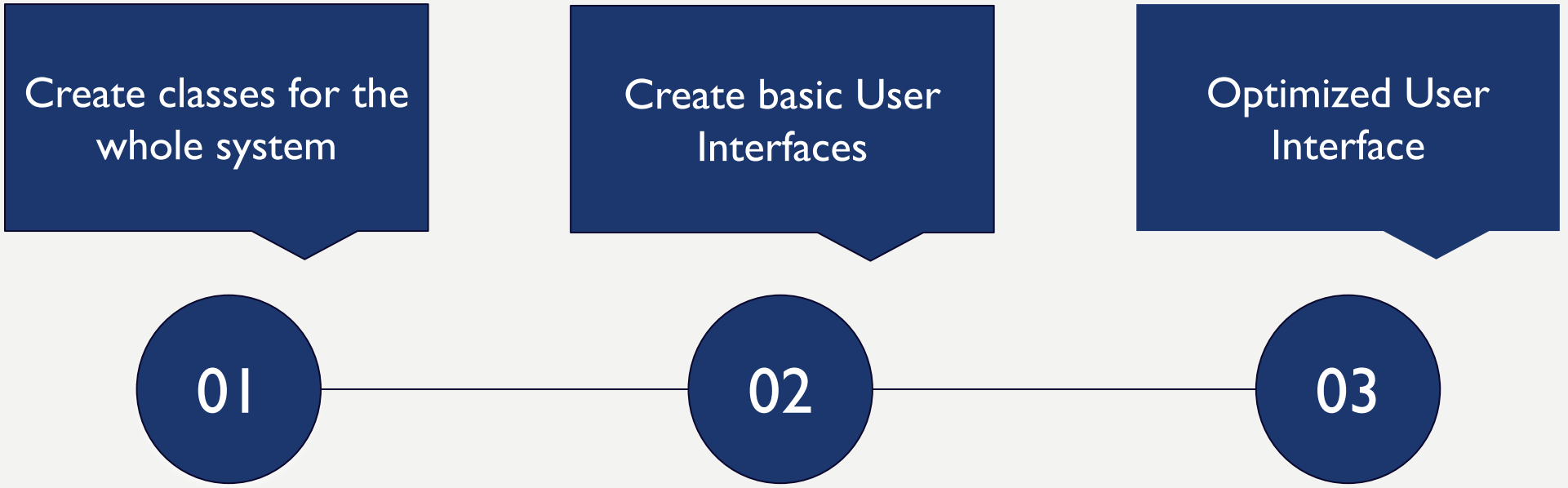
KEY FUNCTIONALITIES

- Create the whole process of tendering
  - Contractors send tender
  - If our company approved the tender, we become cooperative company.
- Verification of reported shortage or broken pile for preventing mendacious reporting which can avoid wasting resources and help to improve the efficiency and user satisfaction.
- Generate reports and graphs by analysts in our company, then send requirements to the their cooperative contractors.

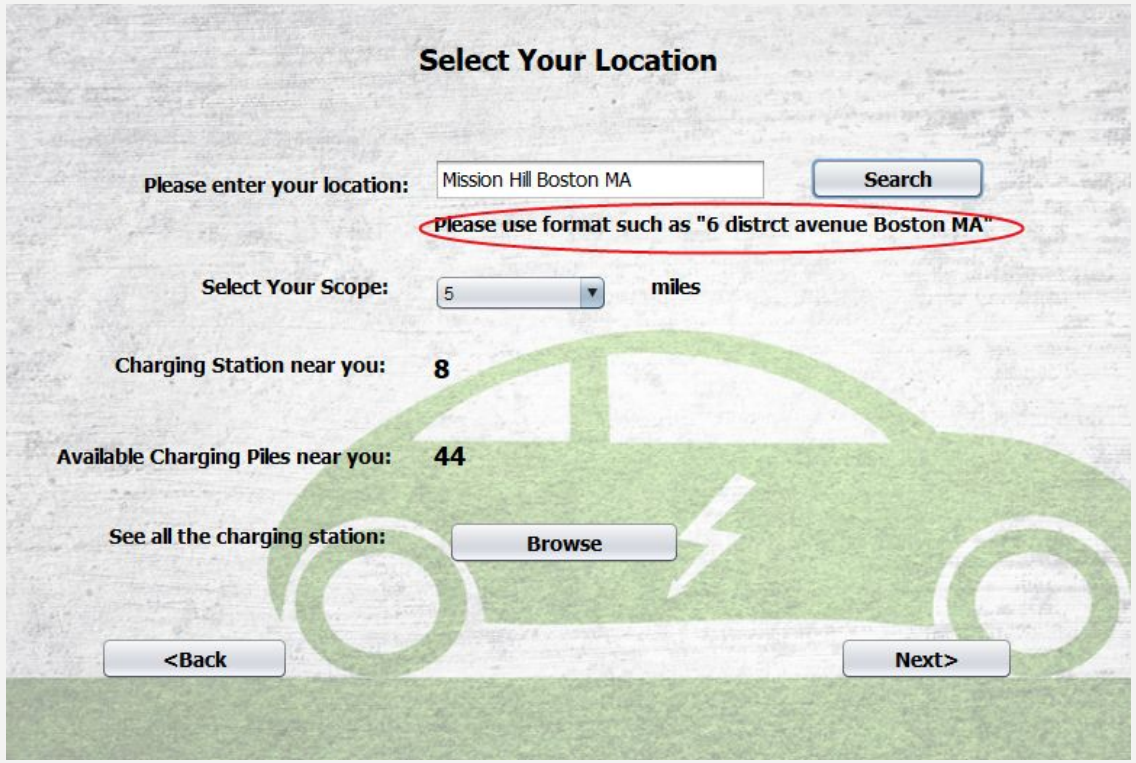
KEY FUNCTIONALITIES

- Receive projects from company, approve the project by contractor's administration.
- Assign project to an implementor or a repair man. Once the project has been done. The usage and availability of the pile will be updated.
  - Company Administrator can see the status of each charging station
- One implementor or repair man cannot work on two projects.
- Hire new employees for each contractor

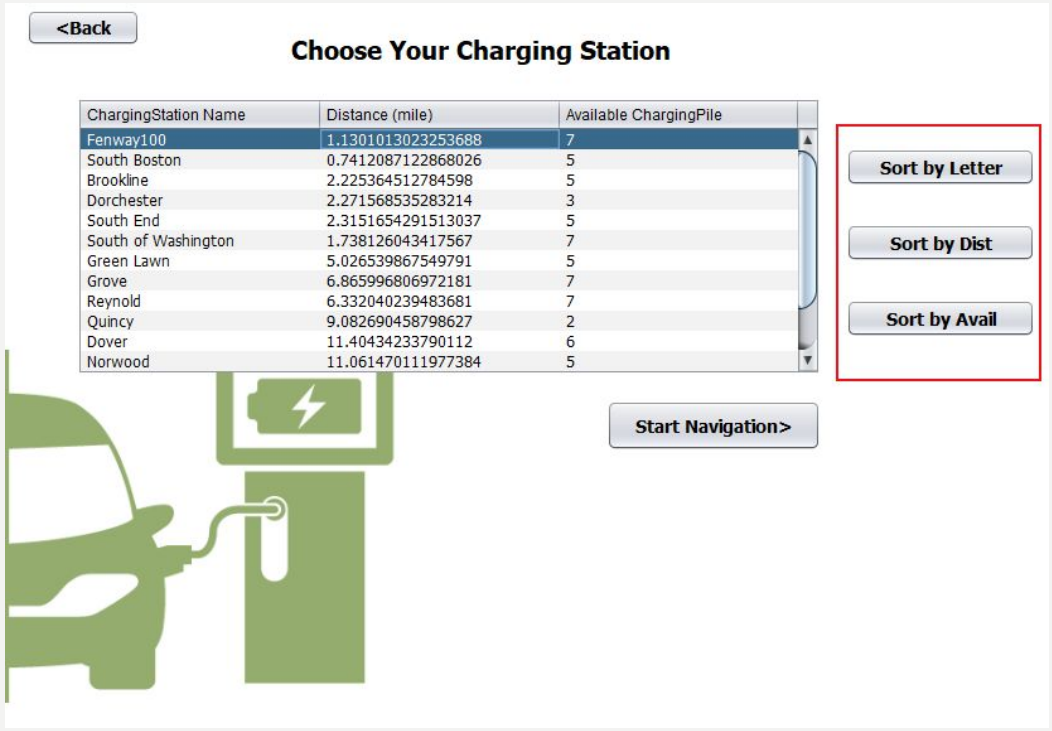
PROTOTYPE IMPLEMENTATION



USAGE/GUIDANCE



Clear guidance to let user easily use the application

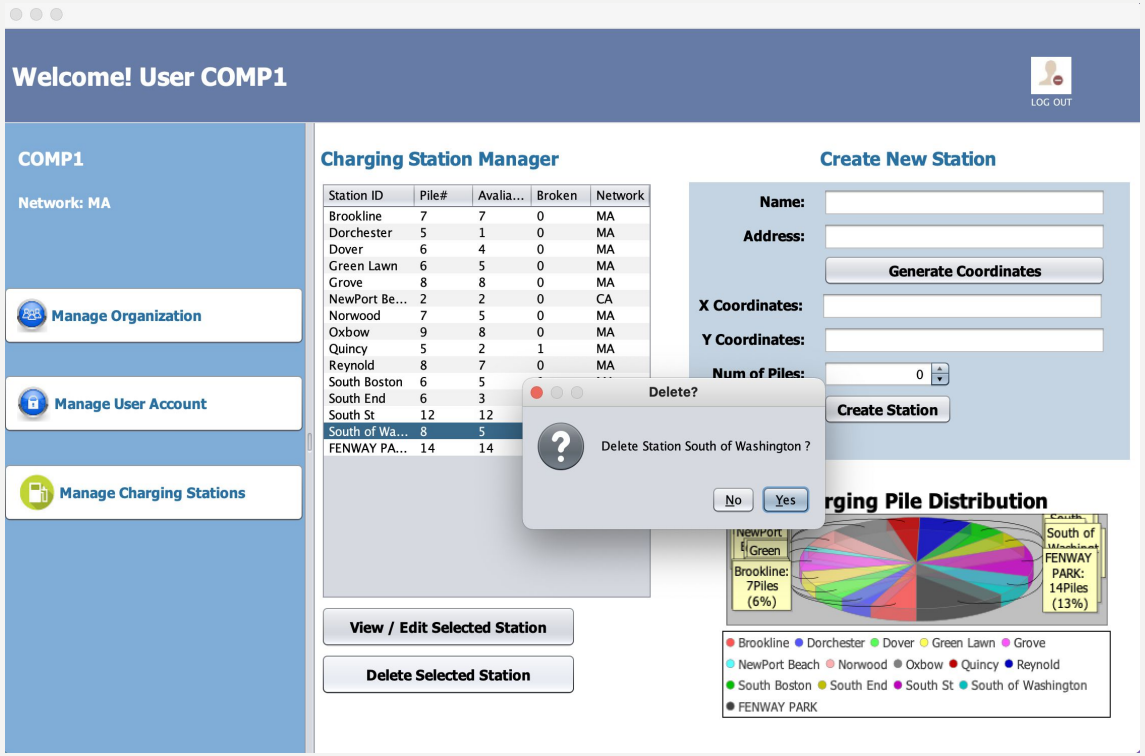


Designed with sort functions to let user search charging stations by letter, distance, and availability.

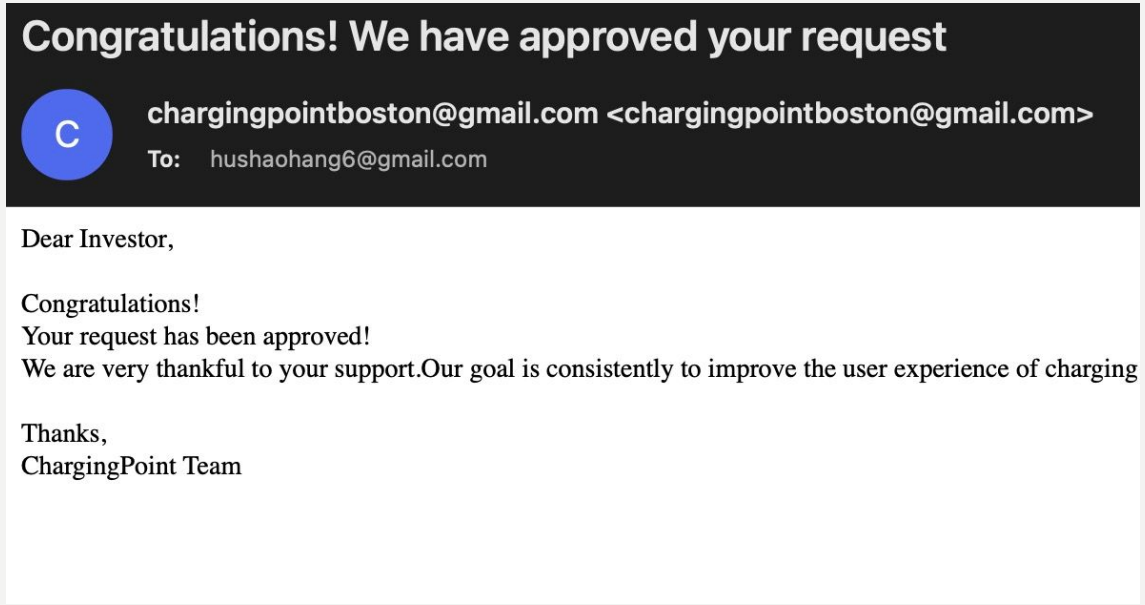
USAGE/GUIDANCE

When the user name has been already used, it will notice the user to change to another username

Clear notice to ensure user will not delete any information by accident

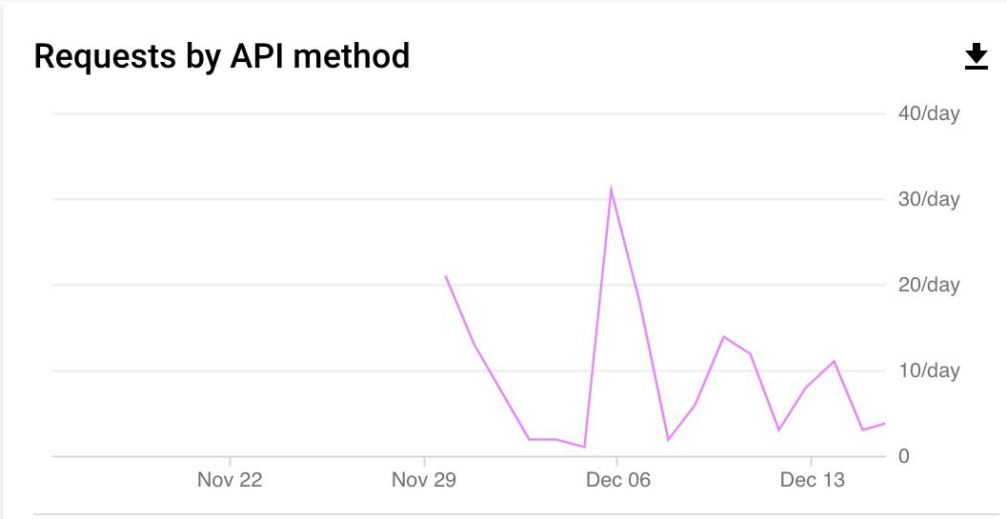


EXTRA FEATURES



- Java swing chromium based browser
- Google map direction api
- Google map geocoding api

- Java statistics library
- Java mail library



PROJECT SCHEDULE

Task Name	Start Date	Finish Date	Est. Hrs.
Project Planning			
Brainstorming	Nov 8	Nov 10	4
Project decision	Nov 10	Nov 11	1
Final Proposal	Nov11	Nov 13	2
System Designing			
Data Structure Design	Nov 13	Nov 13	2
Data Structure Diagram	Nov 14	Nov 14	4
Use Case Design	Nov 15	Nov 15	3
Use Case Diagram	Nov 16	Nov 16	4

Task Name	Start Date	Finish Date	Est. Hrs.
Project Implementation			
Data Structure	Nov 16	Nov 19	12
UI Phase 1	Nov 19	Dec 01	80
Mid Review	Dec 03	Dec 03	1
UI Phase 2	Dec03	Dec09	85
Testing			
Use Case	Dec 06	Dec 10	10
UI	Dec 08	Dec 11	8
Error Handle	Dec 09	Dec 12	8
Presentation			
Slides	Dec 09	Dec 12	4

PROJECT PLAN : RISK MITIGATION

- Work Remotely:
  - TickTick for Project Management
  - Github for Version Control
  - Zoom for communicating

Limitation

- Limitations
  - Station and charging pile doesn't have monitoring mechanism. Charging pile failures depend on user report.
  - Lack of support for mobile devices, which is not the best for our EV Drivers.

Demo