Vehicle Tracking System

The following project is recommended for the students to demonstrate their ability to architect, design and implement a web application with concepts of IoT. Project expects students to apply the technologies and concepts learnt in the subject including Microservices.

1) Context

This Project would enable Students to apply the Architectural, design and technological components in to a practical problem. Expectation is to use the IoT concepts as well to start a vehicle (Say a scooter) and track its journey. Web modules developed using any web framework (ReactJS / Angular etc as front end) should enable users to keep inventory of vehicles, customer onboarding and billing. To simplify, Payment need not use any payment gateway rather it can credit and debit dummy cash points with a project database. Students can decide the DB of their choice whereas the recommendation is to try any graphical database that they learnt in the course. Given the amount of effort needed to solve this problem, it is recommended to have a relatively bigger project team (size of 4 to 5).

2) Problem Description

A new start-up is planning to get into bike rentals business which would allow any customer to use the bikes for the transport which includes the last mile connectivity. Architect, design and implement the IT solution for the company. Following modules are expected to be designed and developed.

- **Database:**
  Design and implement a DB (relational / graphical / NoSQL) to maintain
  a. Inventory of vehicles and associated device
  b. Customers
  c. Payment Points bank
  d. Usage and history
  e. Payment history

- **Web Application:**
  Design and implement a web application that can be used by the backend staff of the company to maintain the vehicle inventory. Use REST API based microservices developed on any technology (recommendation is Springboots) for CRUD operations for vehicle and associated device.

- **Customer App:**
  Design and implement a web application or a mobile application that can be used by the customers for the following
    a. Onboarding / Signup
       Simple webform with details and Driving License upload, connectivity to DB through Microservice
    b. Payment Points credit
       Microservice and simple webform to add points to dummy bank without actual payment gateway.
    c. Vehicle activation
       Use IoT concepts on customer device activation based on security auth tokens
    d. End of journey notification
       Interface to notify end of journey
    e. Payment points deduction notification
       Notification via app / SMS to customer on points deducted

3) Setup

- Create a Git repository. Check-in your code and send us your repo URL.
- Create separate projects for both Microservices.
- Write a README.md with all the instructions to install, test and run your code.

4) Expectations and Relaxation

- You can use Java or NodeJs or any coding language of your choice
- Any NoSQL database of your choice
- Implement using microservice architecture in cloud
- Light weight frontend is good enough (Web and/or mobile)
- Avoid creating to many application level layers, few expected Layers: Controller, Service and Model.
- Code with security standards as per module 5
- Try following agile methodology and possible DevOps tools and practices

5) Unit Testing

Write unit test case using any of the tool of your choice. The tests should pass without any internet connection. Additional points/marks for creating proper test cases.

6) Documentation
A high-level project report containing:
- Architecture diagram
- Design specifications
- Product Backlog
- README for the application