Task 3 Hermann Anguiga

Algorithm election

Bully algorithm for the election of the platoon's leader

The major criteria for choosing the leader is based on the robustness and flexibility of the insurance terms between the insurance company and the vehicle owner. Thus, the stronger the truck insurance, the more likely his election will be.

Truck drivers of the same platoon will be identified by a tag number corresponding to the wellness of their insurance contract.

Leader election scenarios [1]

- Leadership change due to Leader Leave Maneuver:
- Leadership change due to termination of duties of existing leader
- Leadership change due to technical issues in existing leader
- Leadership change during merging of two platoons

An election of a new leader will be made if any of the above scenarios arise

The algorithm for electing a new platoon leader is established on the following assumption [2]:

- The platoon is a synchronous system and it uses timeout mechanism to keep track of coordinator failure detection
- Each truck has a unique ID number to distinguish it.
- Every truck knows the truck ID number of all other truck.
- truck do not know which trucks are currently up and which trucks are currently down
- In the election, a truck with the highest ID number is elected as a coordinator which is agreed by other alive trucks
- A truck that had technical issue can rejoin the system after repair

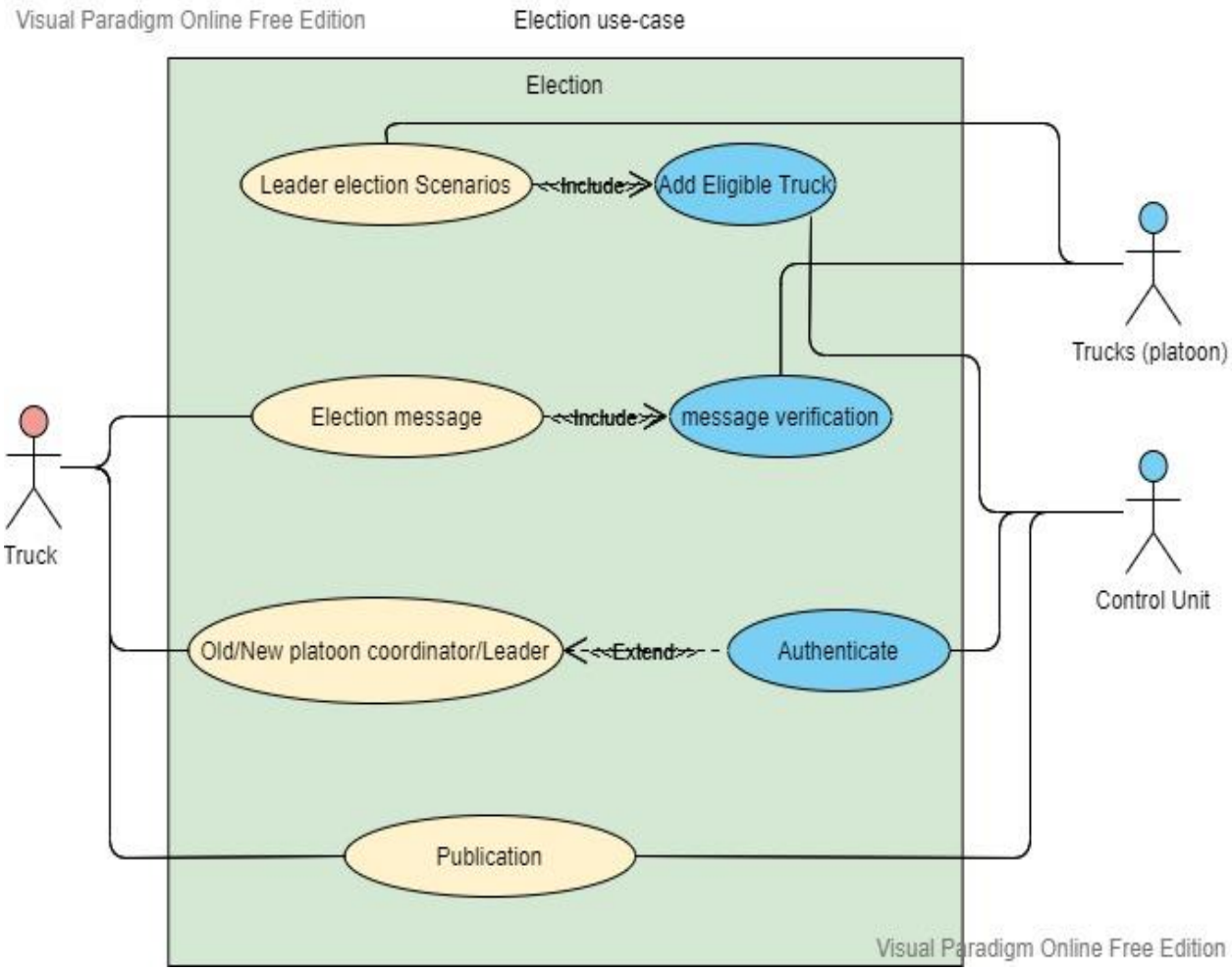
Bully algorithm for the platoon‘s leader [2]

When truck T determines that the current coordinator (Leader) is in one of the previously mentioned Leader election scenarios, it executes bully election algorithm using the following sequence of actions.

- Truck T sends an election message to trucks with higher ID number present in the platoon (if there are any). If T receives a response, it stops sending messages. Higher ID number will send back and forth election messages between them till the highest ID number wins the election. The winner will send a later message to notify all other that it is the new coordinator (leader).
- If truck T sends an election message to truck with higher ID number present in the platoon and gets no answer. It then sends an election message to truck with lower ID number to inform them of its new role in the platoon: the coordinator
- Immediately after returning in one of the changes mentioned in Leader election scenarios section, the bully algorithm runs

User-case

Election



Technologies

Framework (proposition)

- ReactJS

For this project, we shall use the Reactjs platform as our software development framework.

ReactJS features:

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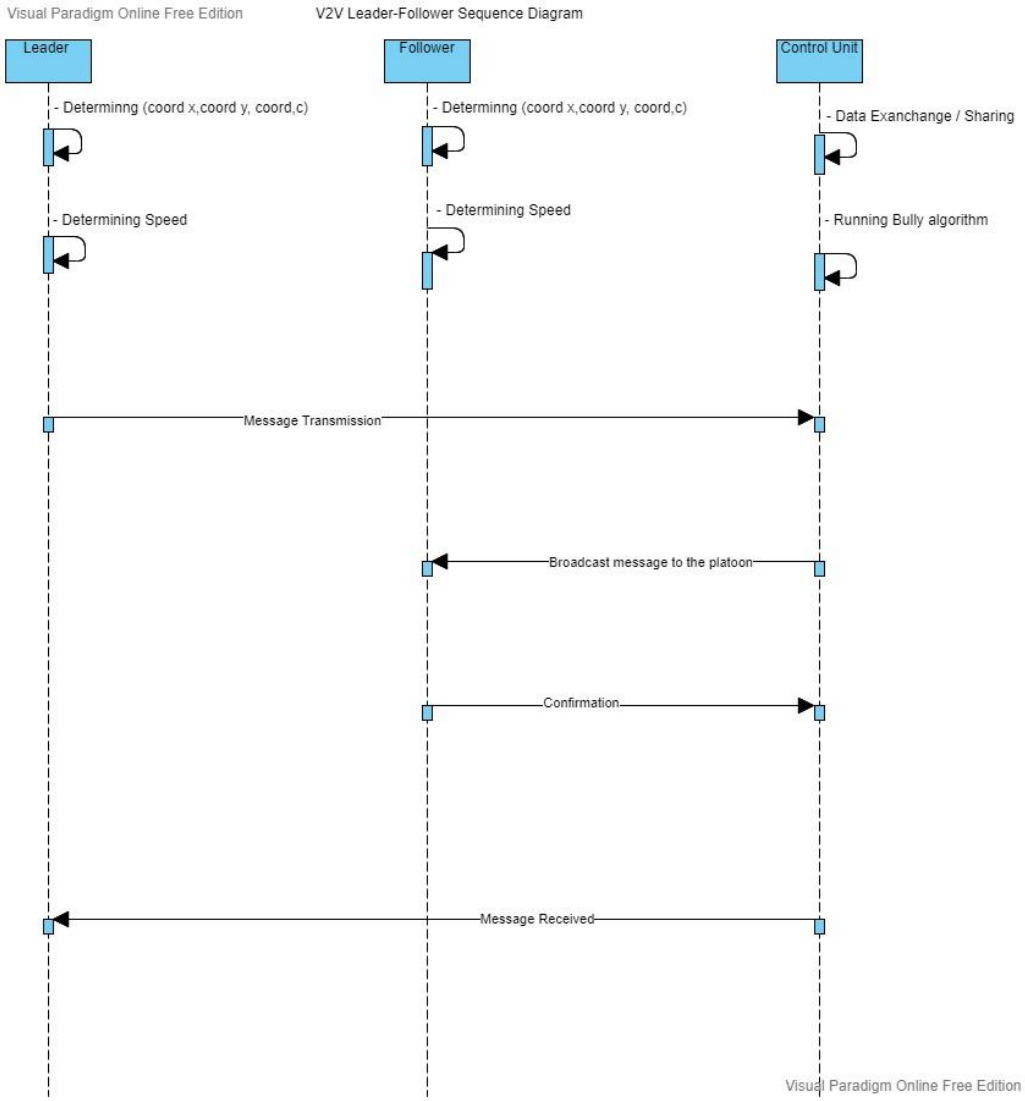
Webservices (Nodejs and expressjs)

Microservice framework : C++ Microservice

V2V flow Sequence diagram

Leader-Follower sequence diagram



Structure of the Software

References

[1] Pravav k and Sahil S, Leader Election in Cooperative Adaptive Cruise Control Based Platooning, C3VP'18, October 29, 2018, New Delhi, India.

[2] Muhammad Mahbubur Rahman, Afroza Nahar, Modified Bully Algorithm using Election Commission