IN2210 Object Oriented Analysis and Design

Assignment 1

Blockchain-Based Vehicle Registration and Ownership Management System

Troyrangers

Dissanayake D.M.B.M.	204047J
Herath P.A.U.D.	204074M
Jayathilaka P.H.P.	204087F
Pathirana S.P.S.N.	204150T
Rathnayaka A.M.D.B.	204179N

Faculty of Information Technology

University of Moratuwa

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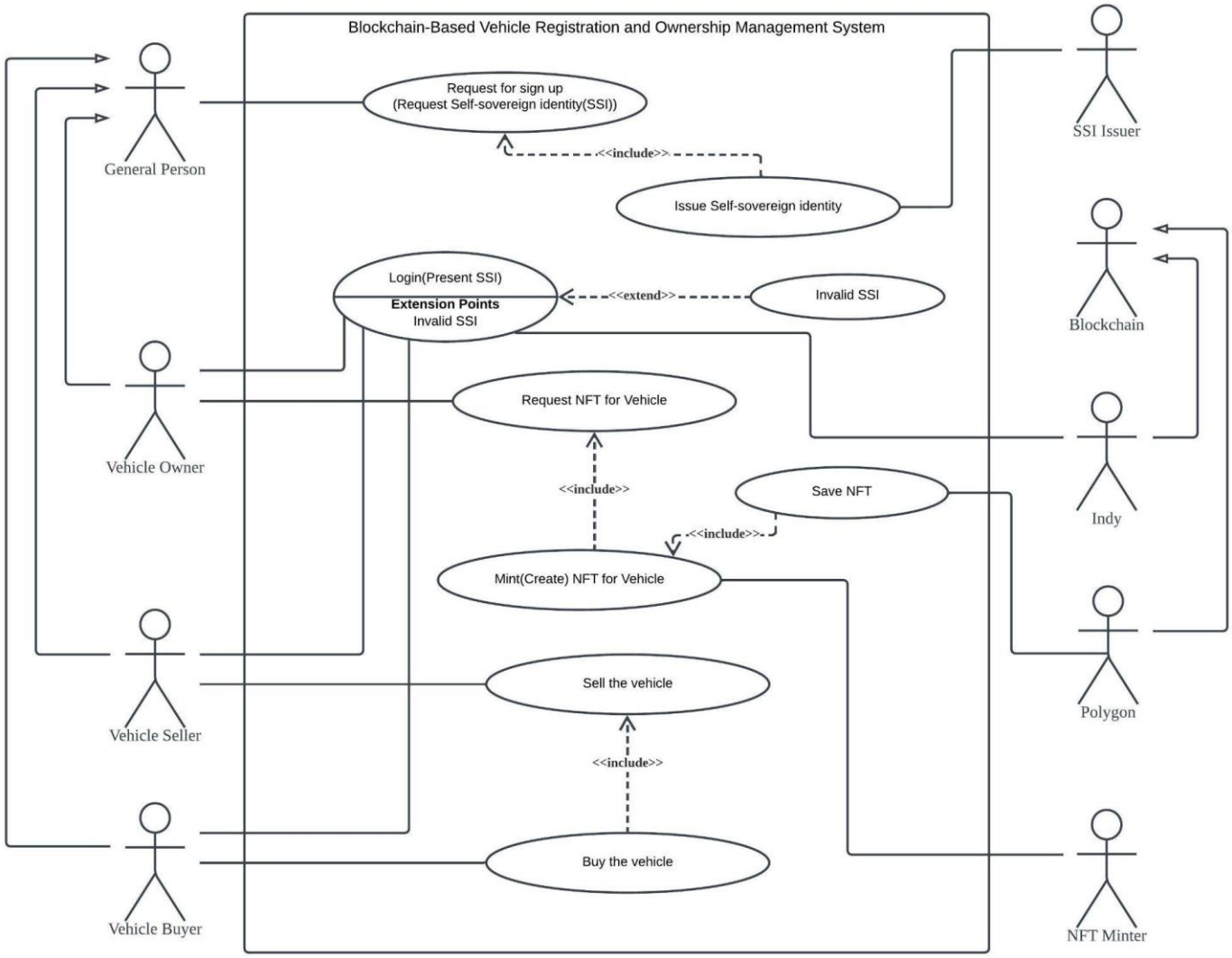
Description of the Project

Our project is **Blockchain Based Vehicle Registration and Ownership Management System**. Our main intention of the project is digitizing the registration and management system of vehicles. We want to implement our system with security and transparency, as the security is the most required factor in these kinds of systems. Therefore, it is not much better to use a centralized database, and therefore as the best way, we use a **blockchain**. The main task of our system is to convert a physical asset into a digital asset. As an example, in our system we convert vehicle asset into a NFT (Non-Fungible Token).

As we talk about the legal side of the vehicle, first we have to register it in government affiliated institution. If we sell or buy registered vehicle we have to transfer the legal owner ship properly. we can track all the important information such as transfer date of the vehicle, the owner after transferring the ownership of the vehicle in a super secure manner with this system. There is a special process that happened in registering the vehicle. When we are registering the vehicle, we can mint (create) NFT with all details of the vehicle. According to that, there can be photographs of the vehicle according to the standards, and also all the information related to the vehicle which are included in the scanned copy of vehicle registration book. Not only that, but also, we create a vehicle marketplace to provide the facility of selling and buying vehicles. In this process, transferring the ownership of the vehicle happens through the NFT. When the life time of the vehicle is over, we have to remove the vehicle of use. In that case we can burn-out related NFT. But the information related to that NFT will remain forever with that blockchain. In the current situation, we have to identify a person legally on the internet. But there is not a proper way to show a person's digital id. That means a person can't be legally identified in internet. Because of that we have to issue a digital verifiable ID for them.

As we can identify the vehicle owner through this digital verifiable ID, we can use this ID to login and logout the digital marketplace. We are introducing a new cryptocurrency to do the transactions in this vehicle marketplace. This is how we can describe our project.

Use Case Diagram



Use Case Specifications

Use case	Request Self-sovereign identity(SSI)
Actor/s	General person
Description	Request a Self-sovereign identity(SSI) for signing up.
Optimistic Flow	A. Accessing the SSI requesting form B. Fill all the requested details of SSI requesting form C. Submit the form
Pragmatic Flow	None

Use case	Issue Self-sovereign identity
Actor/s	SSI Issuer
Description	Issue a self-sovereign identity when requesting it.
Optimistic Flow	A. Validate user information B. Generate SSI C. Send SSI to the user's mobile SSI wallet
Pragmatic Flow	Condition: A1: If user information is wrong then enter the user information again to continue the request. A2: If user information are valid then continue with the process B

Use case	Login (Present SSI)
Actor/s	Vehicle Owner, Vehicle seller, Vehicle buyer, Indy blockchain
Description	When login the system verify the credential(SSI) in the mobile SSI wallet with the Indy blockchain
Optimistic Flow	A. Pass the credential in the mobile SSI wallet to the system B. Validate credential with the Indy blockchain
Pragmatic Flow	Condition: B1: If the credentials cannot be validated then it will recognized as invalid SSI. B2: If the credentials can be validated then the login is

	happened

Use case	Invalid SSI
Actor/s	None
Description	If credentials can't be verified then SSI is invalid and terminates that task.
Optimistic Flow	None
Pragmatic Flow	None

Use case	Request NFT for Vehicle
Actor/s	Vehicle owner
Description	When the user wants to register a vehicle in the system then the user should request a NFT for the vehicle.
Optimistic Flow	A. Accessing the NFT requesting form B. Fill all the requested details related to the vehicle of NFT requesting form C. Submit the form
Pragmatic Flow	None

Use case	Mint(Create) NFT for Vehicle
Actor/s	NFT Minter
Description	Generate a NFT for the vehicle according to the user's request and change the ownership to that user.
Optimistic Flow	A. Validate information of the vehicle. B. Generate a NFT for that vehicle. C. Change the NFT's ownership to that user
Pragmatic Flow	Condition: A1: If vehicle information is wrong then enter the vehicle information again to continue the request. A2: If vehicle information are valid then continue with the process B

Use case	Sell the vehicle
Actor/s	Vehicle seller
Description	Sell the registered vehicle in the system's marketplace.
Optimistic Flow	A. Add vehicle to the system's marketplace.
Pragmatic Flow	None

Use case	Buy the vehicle
Actor/s	Vehicle buyer
Description	Buy the vehicle via cryptocurrency and transfer the ownership to the buyer.
Optimistic Flow	A. Pay the value of the vehicle via cryptocurrency B. Transfer the ownership to the buyer
Pragmatic Flow	Condition: check the paid amount A1: Transaction successful - If the amount is sufficient A2: If the paid amount is in-sufficient perform A

Use case	Save NFT
Actor/s	Polygon Blockchain
Description	NFT will be saved to the Polygon blockchain.
Optimistic Flow	A. Save NFT
Pragmatic Flow	None