

Aristotle University of Thessaloniki

Data & Web Science MSc Program

Decentralized Technologies Course

Assignment 2, 2024 - Ethereum

For this assignment you will need to implement a smart contract in Solidity, using the Ethereum blockchain.

The local government has launched an initiative to promote eco-friendly transportation in the city. They want to create a smart contract that rewards citizens for using environmentally friendly vehicles.

Write a smart contract that allows users to register their eco-friendly vehicles and earn rewards points for using them. The contract should have the following features:

- Allow vehicle owners to register their vehicles, providing the owner's ID number, the vehicle's make and model, as well as the vehicle's emission level (electric, hybrid, or low-emission).
- Create three reward tiers based on the emission level of the vehicle:
 - Tier 1: Electric vehicles (8 reward points per km driven)
 - Tier 2: Hybrid vehicles (4 reward points per km driven)
 - Tier 3: Low-emission vehicles (1 reward point per km driven)
- Allow users to report their mileage and earn reward points based on the tier they are registered in.
- Keep track of the total reward points earned by each user and provide a leaderboard that shows the top 10 users with the most reward points.
- Allow local businesses to register by providing their business name and a unique identifier.
- Allow users to redeem their reward points for discounts at local businesses that partner with the government's initiative.
- Redeeming points should be initiated by the users, providing the businesses unique identifier and the amount of points to redeem.

- Redeeming should be possible only after the user has gathered at least 1000 points.
- Provide an event that is emitted whenever a user earns reward points, including the number of reward points earned, and the vehicle's make and model.
- The contract should have a function to pause or unpause the rewarding system in case of maintenance or updates.
- Only the contract deployer should be able to pause or unpause the system.
- The contract should have a self-destruct mechanism that can be triggered by the deployer, rendering the contract unusable.

Notes:

- Use modifiers to restrict access to functionality.
- Your submissions should include only the .sol file with the smart contract.
- Comment your code detailing your design choices.
- Submit only the .sol source code file inside a compressed archive (.zip, .tar.gz etc)