Blockchain Project 1 – Phase 3

**Title – Car Rental System using Blockchain**

**Project Members –**

1) Meet Piyushbhai Thosani – meetpiyu@buffalo.edu – 50420076

2) Pranav Moreshwar Sorte – pranavmo@buffalo.edu -- 50413353

## Smart Contract details –

Smart contract name – DeCarentralized

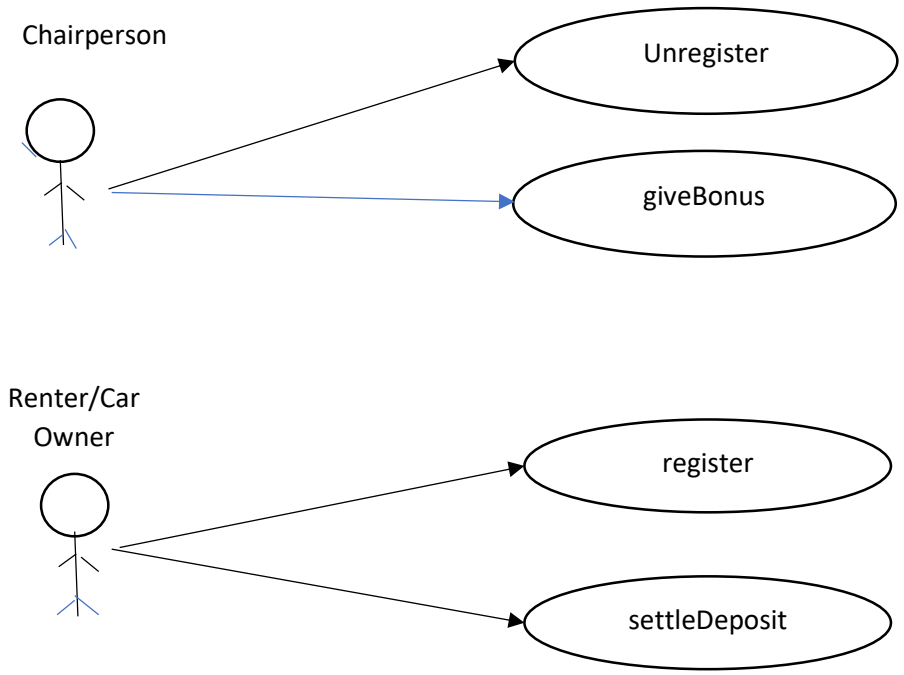
Symbol name – CRS

Symbol Decimal -- 3

## Summary of the Smart Contract –

The car rental market has recently become very popular and is constantly growing as the expenses to buy and maintain a car have increased and it has become more feasible to rent a car for visiting some place than to own a car. However, a traditional car rental market involves maintaining personal information of the customers in a centralized database system. This data can easily be breached by security attacks and can then be leaked to unwanted third party companies, which can lead to customers facing fraud. There are various other issues with this system such as sudden price hikes, hassles of picking up and dropping off the cars back to the rental company from far away locations, etc. The aim of our proposed solution is to use an ERC20 token standard to create a smart contract based application on the Ethereum blockchain, which will provide transparency to the customer by eliminating the centralized system and they wouldn't need to face the various issues involved in dealing with a car rental company. By using our application, the customer can directly borrow the car of a person living nearby who is willing to rent their car on a temporary basis, thus invoking peer-to-peer interaction between them. This would not only allow the customer to have smooth renting experience but also provide some extra income to people who aren't going to use their cars for a few days. In this system, a person A will rent the car of a person B. On approval of their request, person A will transfer ERC20 tokens equivalent to rental amount plus security deposit to person B. After using the car for the requested time period, person A will drop off the car back to person B and then in return they will receive ERC20 tokens worth the security deposit. This peer to peer system will thus allow a much more convenient borrowing and renting process than a traditional system.

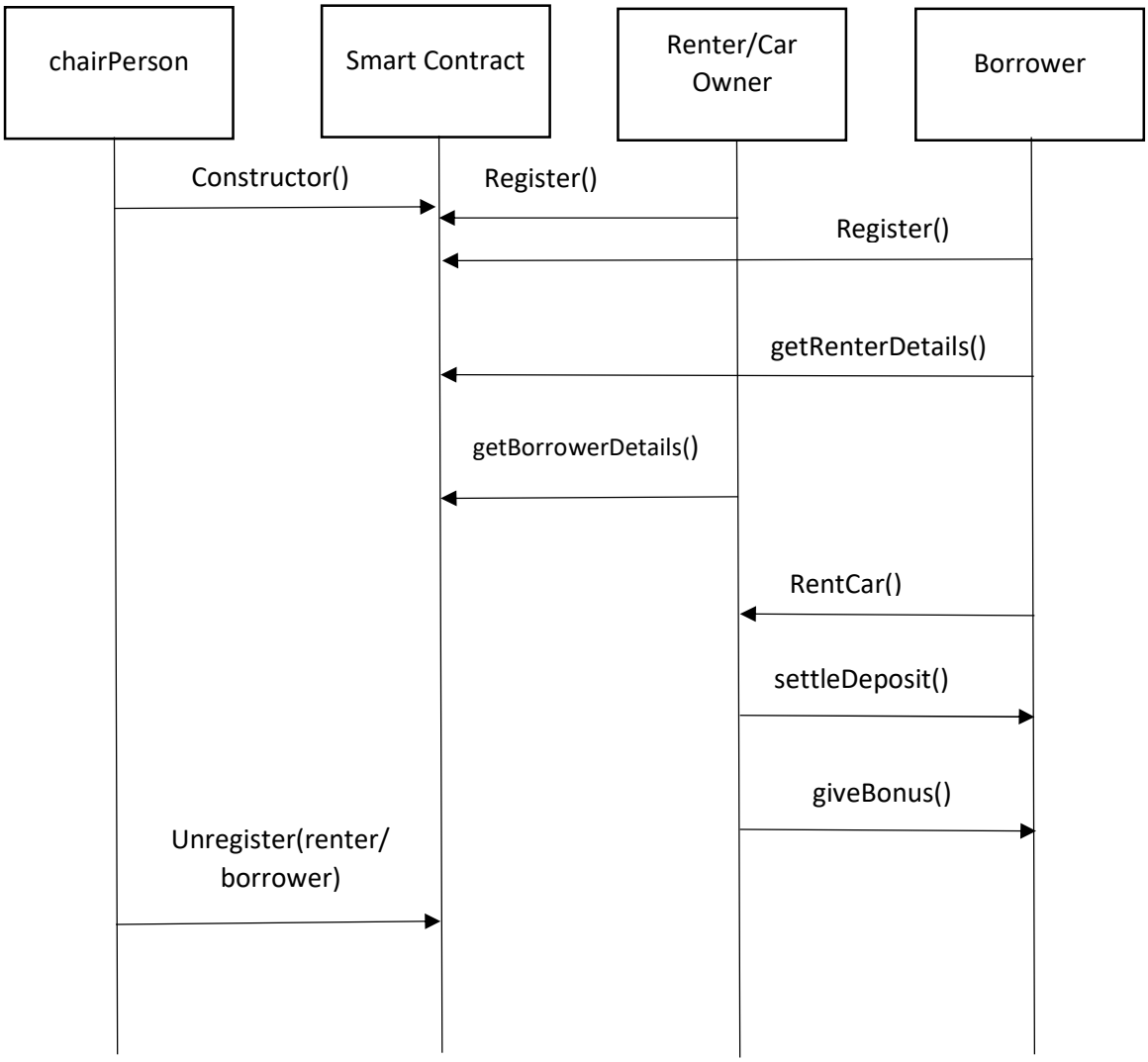
Use Case Diagram –



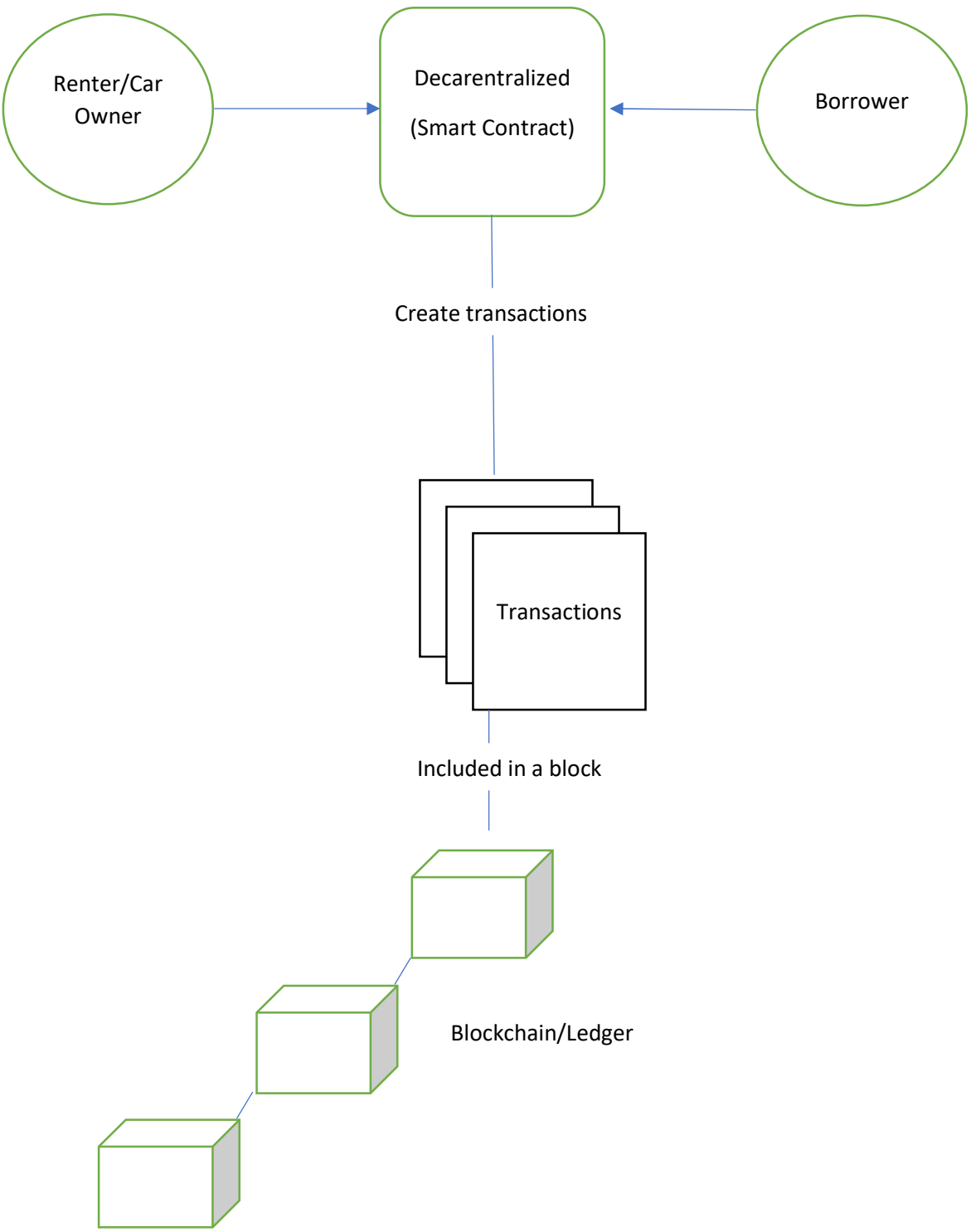
Contract Diagram –

| Decarentralized |
| --- |
| address chairPerson<br>mapping membership<br>struct carOwner<br>struct carBorrower<br>mapping ownerDetails<br>mapping borrowerDetails |
| modifier onlyChairPerson<br>modifier onlyMember |
| unregister(address)<br>constructor(uint256)<br>registerCarOwner(string, uint)<br>registerUser(uint)<br>getRenterDetails(address, uint, string)<br>getBorrowerDetails(uint)<br>rentCar(address, uint)<br>settleDeposit(address, uint)<br>giveBonus(address) |

Sequence Diagram –



Architecture Diagram –



Working of the Smart Contract –

- At first, the car owner and the car borrower will register themselves with this blockchain based car rental system using the registerCarOwner() and registerUser() function.
- The carOwner struct will have all the required details of the owner such as the type of car which he has such as Sedan, SUV, etc., number of days for which his cars is available to be borrowed, amount of ERC tokens in their wallet, car availability status, cost of the car, etc.
- Similarly, the carBorrower struct will have the borrower's details such as his wallet balance, number of bookings he has made, zipcode on which he requires the car, etc
- getRenterDetails(): The person who wants to rent the car can get the details of the owner by calling this function.
- rentCar(): If the requirements of the borrower are satisfied, the rentCar() function will be invoked which will allow the borrower to rent the car of his choice. CRS tokens will be transferred to the carOwner and that amount will be deducted from the borrower's wallet balance. Number of bookings will increase by 1 and the car availability status will change to 0 from 1 which indicates the car is no longer available.
- settleDeposit(): A certain amount of CRS tokens are transferred to the borrower's wallet on returning the car back to the owner, and that amount will be deducted from the owner's wallet. Simultaneously, the car availability status changes back to 1, indicating that the owner's car is again available for renting.
- giveBonus(): If the borrower rents the car from the same owner for more than a specified number of times he will receive some CRS tokens as bonus for using this system frequently.
- Unregister():The chairPerson can unregister a car owner from the system by calling this function. Only he has access for doing this.