Free University of Bolzano Bozen – Faculty of Economics and Management

Big Data and Blockchain exam

# Rules

* + No communication with other people or among students is allowed. Phones and every other means of communication must be turned off. Opening any communication program on the computer is not allowed and is considered cheating.
  + You are responsible for the correct copy of your files.

## Exercise Smart Contracts

## Idea

Your task is to build a contract for bus tickets. The contract lets any person buy a ticket with a set duration and keeps a credit in case the user pays more. Any user can check how many remaining seconds of validity his ticket has and the controller can check whether the user’s ticket is still valid or not.

## Bus ticket

Write Solidity contract **busticket**.

## Suggested data structures

    mapping (address => uint) public trip\_start;

    mapping (address => uint) public credit;

    address public controller;

    uint public ticket\_price;

    uint public duration;

## Step 1

Build a **constructor** which sets who is the controller, the ticket’s price and the ticket’s duration in seconds.

## Step 2

Add a function **buy\_ticket** which checks whether enough money has been paid and sets the start of the trip for that address. In case the user has paid more than necessary, credit for that user is increased. The function returns the amount of credit the user has.

## Step 3

Add a view **remaining\_time**, which lets the user get to know how many seconds of validity his last ticket has.

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## Step 4

Add a view **check**, which lets the controller checking whether an address has a valid ticket. The function returns a bool.

## Step 5

Add a function **get\_credit**, which lets any user get back his credit. Do not forget to zero the credit.

## Step 6

Deploy the contract on Sepolia’s blockchain and test buy\_ticket and get\_credit.

## Step 7

Add a function **buy\_ticket2**, similar to buy\_ticket but which lets the user pay and at the same time use his credit for the ticket. For example, if the ticket costs 10 wei and the user has 3 wei as credit, he can pay only 8 wei and get the ticket and 1 wei as credit.

## Save and return:

* a text file **bus.txt** containing the Solidity source code that you have built and your Sepolia’s contract’s address