Practical 03

Problem Statement:

Write a smart contract on a test network, for Bank account of a customer for following operations:

- Deposit money
- Withdraw Money
- Show balance

Objective:

Understand and explore the working of Blockchain technology and its applications.

Course Outcome:

CO6: Interpret the basic concepts in Blockchain technology and its applications.

Description:

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met.

A smart contract is just a digital contract with the security coding of the blockchain.

- It has details and permissions written in code that require an exact sequence of events to take place to trigger the agreement of the terms mentioned in the smart contract.
- It can also include the time constraints that can introduce deadlines in the contract.
- Every smart contract has its address in the blockchain. The contract can be interacted with by using its address presuming the contract has been broadcasted on the network.

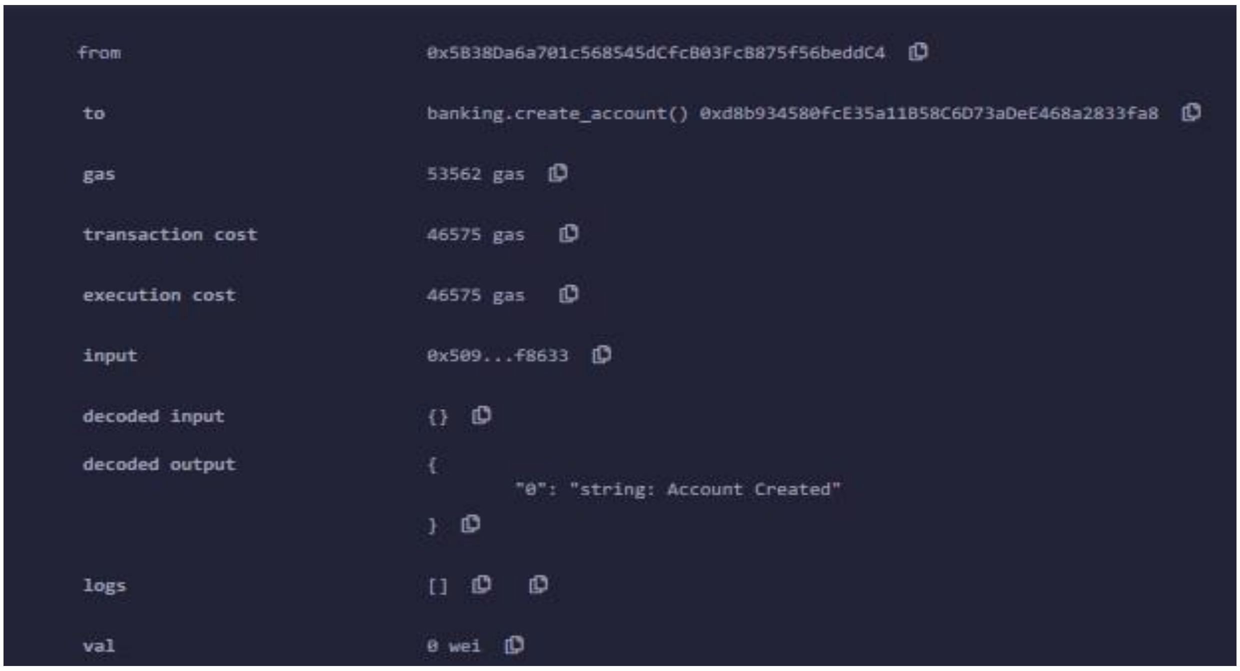
The idea behind smart contracts is pretty simple. They are executed on a basis of simple logic, IF-THEN for example:

- **IF** you send object A, **THEN** the sum (of money, in cryptocurrency) will be transferred to you.
- **IF** you transfer a certain amount of digital assets (cryptocurrency, for example, ether, bitcoin), **THEN** the A object will be transferred to you.
- **IF** I finish the work, **THEN** the digital assets mentioned in the contract will be transferred to me.

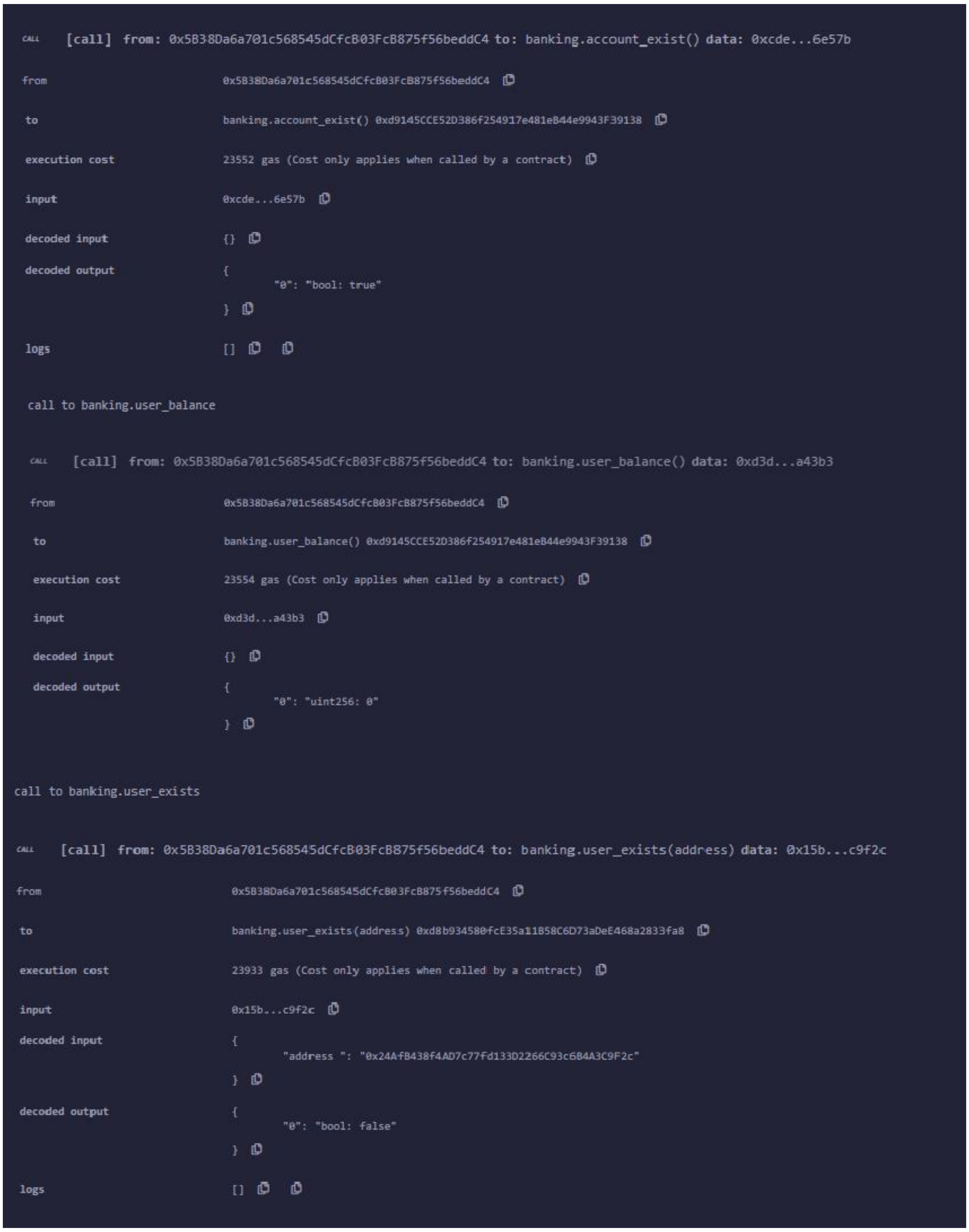
<u>Code:</u>

```
//SPDX-License-Identifier: MIT
pragma solidity ^0.6;

contract banking{
    mapping(address=>uint) public user_account;
    mapping(address=>bool) public user_exists;

    function create_account() public payable returns(string memory)
    {
        require(user_exists[msg.sender]==false,'Account already created');
        if(msg.value==0)
        {
            user_account[msg.sender]=0;
            user_exists[msg.sender]=true;
            return "Account Created";
        }
        require(user_exists[msg.sender]==false,"Account Already Created");
         user_account[msg.sender]=msg.value;
        user_exists[msg.sender]=true;
        return "Account Created";
    }
    function deposit() public payable returns(string memory)
    {
        require(user_exists[msg.sender]==true,"Account not Created");
        require(msg.value>0,"Value for deposit is zero");
        user_account[msg.sender]=user_account[msg.sender]+msg.value;
        return "Deposited Successfully";
    }
    function withdraw(uint amount) public payable returns(string memory)
    {
        require(user_account[msg.sender]>amount,"Insufficient balance");
        require(user_exists[msg.sender]==true,"Account not created");
        require(amount>0,"Amount should be more than zero");
        user_account[msg.sender]=user_account[msg.sender]-amount;
        msg.sender.transfer(amount);
        return "Withdraw Successful";
    }

    function transfer(address payable userAddress,uint amount) public returns(string memory)
    {
        require(user_account[msg.sender]>amount,"Insufficient balance in bank account");
        require(user_exists[msg.sender]==true, "Account is not created");
        require(user_exists[userAddress]==true,"Transefer account does not exist");
        require(amount>0,"Amount should be more than zero");
        user_account[msg.sender]=user_account[msg.sender]-amount;
        user_account[userAddress]=user_account[userAddress]+amount;
        return "Transfer successful";
    }

    function send_amt(address payable toAddress,uint56 amount) public payable returns(string memory)
    {
        require(user_account[msg.sender]>amount,"Insufficient balance in bank account");
        require(user_exists[msg.sender]==true,"Account is not created");
        require(amount>0,"Amoun should be more than zero");
        user_account[msg.sender]=user_account[msg.sender]-amount;
        toAddress.transfer(amount);
        return "Transfer success";
    }

    function user_balance() public view returns(uint)
    {
        return user_account[msg.sender];
    }
    function account_exist() public view returns(bool)
    {
        return user_exists[msg.sender];
    }

}
```

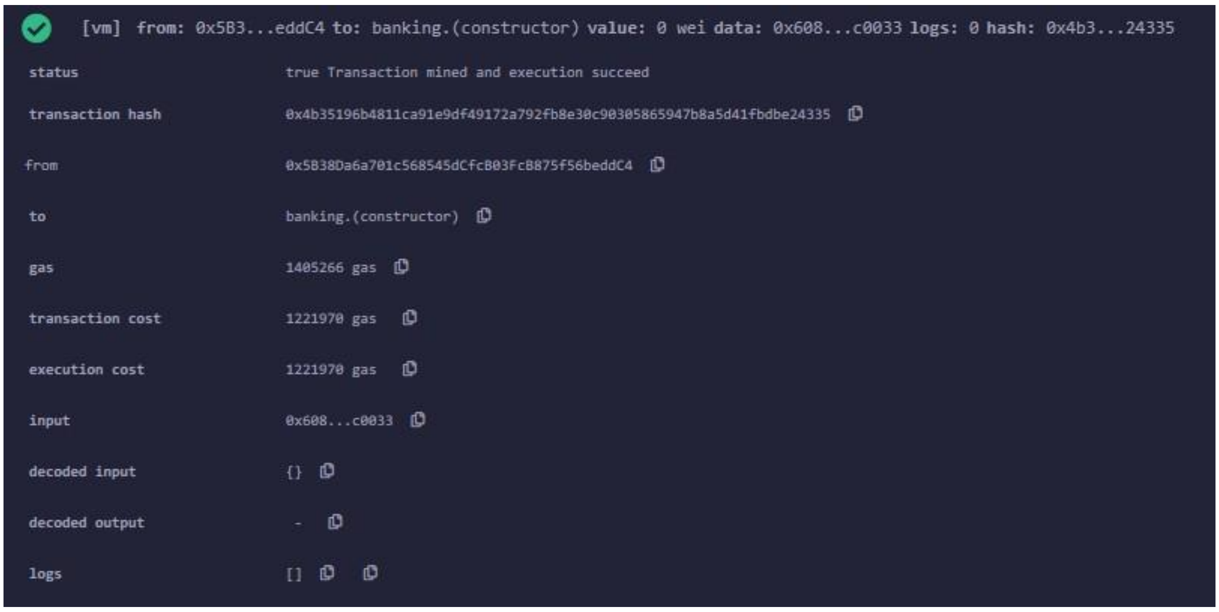
OUTPUT:



```
from                 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                   banking.create_account() 0xd8b934580fcE35a11B58C6D73aDeE468a2833fa8
gas                  53562 gas
transaction cost     46575 gas
execution cost       46575 gas
input                0x509...f8633
decoded input        {}
decoded output       {
                            "0": "string: Account Created"
                     }
logs                 []
val                  0 wei
```



```
CALL    [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: banking.account_exist() data: 0xcde...6e57b

from                    0x5B38Da6a701c568545dCfcB03FcB875f56beddC4

to                      banking.account_exist() 0xd9145CCE52D386f254917e481eB44e9943F39138

execution cost          23552 gas (Cost only applies when called by a contract)

input                   0xcde...6e57b

decoded input           {}

decoded output          {
                                "0": "bool: true"
                        }

logs                    []

call to banking.user_balance

CALL    [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: banking.user_balance() data: 0xd3d...a43b3

from                    0x5B38Da6a701c568545dCfcB03FcB875f56beddC4

to                      banking.user_balance() 0xd9145CCE52D386f254917e481eB44e9943F39138

execution cost          23554 gas (Cost only applies when called by a contract)

input                   0xd3d...a43b3

decoded input           {}

decoded output          {
                                "0": "uint256: 0"
                        }

call to banking.user_exists

CALL    [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: banking.user_exists(address) data: 0x15b...c9f2c

from                    0x5B38Da6a701c568545dCfcB03FcB875f56beddC4

to                      banking.user_exists(address) 0xd8b934580fcE35a11B58C6D73aDeE468a2833fa8

execution cost          23933 gas (Cost only applies when called by a contract)

input                   0x15b...c9f2c

decoded input           {
                                "address ": "0x24AfB438f4AD7c77Fd133D2266C93c6B4A3C9F2c"
                        }

decoded output          {
                                "0": "bool: false"
                        }

logs                    []
```



```
[vm]  from: 0x5B3...eddC4 to: banking.(constructor) value: 0 wei data: 0x608...c0033 logs: 0 hash: 0x4b3...24335
status                      true Transaction mined and execution succeed
transaction hash            0x4b35196b4811ca91e9df49172a792fb8e30c90305865947b8a5d41fbdbe24335
from                        0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                          banking.(constructor)
gas                         1405266 gas
transaction cost            1221970 gas
execution cost              1221970 gas
input                       0x608...c0033
decoded input               {}
decoded output               -
logs                        []
```

Conclusion:

I studied about smart contract and how to write and execute it using remix ide.