



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

Experiment No.6
To design a smart contract implementing the concepts of wallet and transaction using solidity
Date of Performance: 14/09/2023
Date of Submission: 14/09/2023

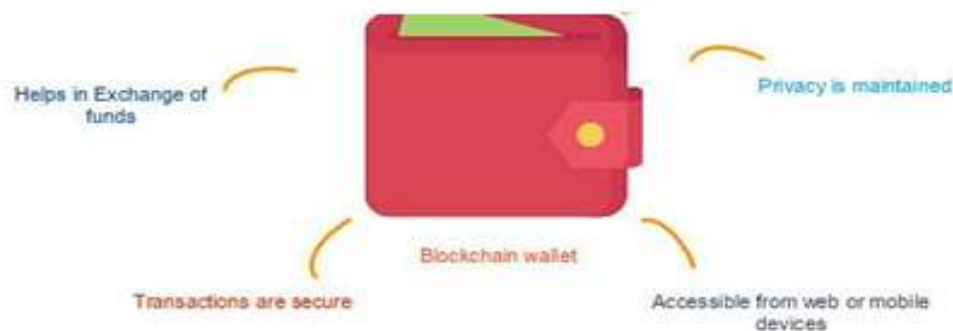


AIM: To design a smart contract implementing the concept of wallet and transaction using solidity

Objective: To develop a program using solidity to create a demonstration of wallet and perform transaction on the wallet

Theory:

A blockchain wallet is a cryptocurrency wallet that allows users to manage different kinds of cryptocurrencies—for example, Bitcoin or Ethereum. A blockchain wallet helps someone exchange funds easily. Transactions are secure, as they are cryptographically signed. The wallet is accessible from web devices, including mobile ones, and the privacy and identity of the user are maintained. So a blockchain wallet provides all the features that are necessary for safe and secure transfers and exchanges of funds between different parties.



Fig, 6.1. Illustrative view of Wallet

Blockchain Wallet Types

There are two types of blockchain wallets based on private keys: hot wallets and cold wallets. Hot wallets are like normal wallets that we carry for day-to-day transactions, and these wallets are user-friendly. Cold wallets are similar to a vault; they store cryptocurrencies with a high level of security.

Hot Wallets and Cold Wallets

Hot wallets are online wallets through which cryptocurrencies can be transferred quickly. They are available online. Examples are Coinbase and Blockchain.info. Cold wallets are digital offline wallets where the transactions are signed offline and then disclosed online.



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

They are not maintained in the cloud on the internet; they are maintained offline to have high security. Examples of cold wallets are Trezor and Ledger.

With hot wallets, private keys are stored in the cloud for faster transfer. With cold wallets, private keys are stored in separate hardware that is not connected to the internet or the cloud, or they are stored on a paper document. Hot wallets are easy to access online 24/7 and can be accessed via a desktop or mobile device, but there is the risk of unrecoverable theft if hacked. With cold wallets, the method of the transaction helps in protecting the wallet from unauthorized access (hacking and other online vulnerabilities).

Process:

- Step 1. Open Remix **IDE** by typing URL <https://remix.ethereum.org/>.
- Step 2. In Remix IDE select 'Solidity' plugins
- Step 3. Click on File Explorer
- Step 4. In the default workspace click on 'create new file'
- Step 5. Give suitable name to the *file* with extension .sol
- Step 6. Type the (Wallet and transaction) code in the editor section of the Remix IDE for newly created file (.sol)
- Step 7. After typing the code for the smart contract in the newly creates .sol file, click on the compiler option available and then compile the file
- Step 8. If no error, then click on the 'Deploy and Run' to execute the smart contract

Code:

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract Transactions {
    address private owner;
    uint256 transactionCounts;
    mapping (address => uint) balanceOf;

    event Transfer(address indexed sender, address indexed receiver, uint256 amount, string
remark, uint256 timestamp);
```



```
struct TransferStruct {
    address sender;
    address receiver;
    uint256 amount;
    string remark;
    uint256 timestamp;
}

TransferStruct[] transactions;

constructor() {
    owner = msg.sender;
    balanceOf[tx.origin] = msg.sender.balance;
}

function getOwner() public view returns (address) {
    return owner;
}

function sendMoney(address payable receiver, uint256 amount, string memory remark)
public returns(bool success) {
    if (balanceOf[owner] < amount) return false;
    balanceOf[owner] -= amount;
    balanceOf[receiver] += amount;

    transactionCounts += 1;
    transactions.push(
        TransferStruct(
            owner,
            receiver,
            amount,
            remark,
            block.timestamp
        )
    )
}
```

CSDL7022: Blockchain Lab



```
)  
);  
  
    emit Transfer(msg.sender, receiver, amount, remark, block.timestamp);  
    return true;  
}  
  
function getBalance(address addr) public view returns(uint) {  
    return balanceOf[addr];  
}  
  
function getAllTransactions() public view returns(TransferStruct[] memory) {  
    return transactions;  
}  
  
function getTransactionsCount() public view returns(uint256) {  
    return transactionCounts;  
}  
}
```



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

Output:

The screenshot shows the Remix IDE interface. On the left, the 'DEPLOY & RUN TRANSACTIONS' panel is active. It shows the 'transaction.sol' file selected. The 'Deploy' button is highlighted. Below it, the 'Transactions recorded' section shows 1 transaction. The 'Deployed Contracts' section shows the 'TRANSACTIONS AT 0xD91...39138' contract. The 'Balance: 0 ETH' is displayed. The 'sendMoney' function is visible with input fields for 'receiver' (0x5830da701c568545dcf803fc8875f56bedd4), 'amount' (200), and 'remark' (Deposited). The 'transaction.sol' code is visible in the main editor, showing the contract definition and the 'sendMoney' function.

The screenshot shows the Remix IDE interface after the 'sendMoney' function has been executed. The 'DEPLOY & RUN TRANSACTIONS' panel is still active. The 'Transactions recorded' section now shows 2 transactions. The 'Deployed Contracts' section shows the 'TRANSACTIONS AT 0xD91...39138' contract. The 'Balance: 0 ETH' is displayed. The 'sendMoney' function is visible with input fields for 'receiver' (0x5830da701c568545dcf803fc8875f56bedd4), 'amount' (200), and 'remark' (Deposited). The 'transaction.sol' code is visible in the main editor. The bottom console shows a successful transaction: '[vm] from: 0x583...edc4 to: Transactions.sendMoney(address,uint256,string) 0xd91...39138 value: 0 wei data: 0x125...00000 logs: 1 hash: 0x0ff...28471'.



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

The screenshot shows the Remix IDE interface. On the left, the 'DEPLOY & RUN TRANSACTIONS' panel is active, displaying a list of transactions. The 'sendMoney' function is selected, and the 'transaction' button is highlighted. The 'getBalance' function is also visible. The main editor shows the Solidity code for the 'Transactions' contract. The code includes a constructor, a 'getOwner' function, and a 'sendMoney' function. The 'sendMoney' function is highlighted in blue. The bottom panel shows the 'CALL DATA' section with a call from '0x58380d6a701c568545dcfc803fc8875f56beddc4' to 'Transactions.getBalance(address)' with data '0xf8b0....eddc4'.

The screenshot shows the Remix IDE interface. On the left, the 'DEPLOY & RUN TRANSACTIONS' panel is active, displaying a list of transactions. The 'sendMoney' function is selected, and the 'transaction' button is highlighted. The 'getBalance' function is also visible. The main editor shows the Solidity code for the 'Transactions' contract. The code includes a constructor, a 'getOwner' function, and a 'sendMoney' function. The 'sendMoney' function is highlighted in blue. The bottom panel shows the 'CALL DATA' section with a call from '0x58380d6a701c568545dcfc803fc8875f56beddc4' to 'Transactions.getTransactionsCount()' with data '0x578....c0bf9'.



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

Conclusion: In Solidity, the use of features like "modifiers" and "events" plays a crucial role in enhancing the functionality and transparency of transactions on the Ethereum blockchain. Modifiers allow developers to apply conditions or checks before executing a transaction, ensuring that specific requirements are met before proceeding. Events, on the other hand, enable the emission of transaction-related information to the blockchain's event log, making it accessible to external parties and decentralized apps, thus providing transparency and auditability to the transaction process. These features, among others in Solidity, enable developers to build secure and efficient smart contracts for various blockchain applications.