Lab: Inheritance, Modifier, Importing

Prerequisites

1. Chrome or Firefox browser.
2. An Internet connection
3. Open Remix with the following Smart Contract:


```
pragma solidity ^0.5.11;

contract InheritanceModifierExample {

    mapping(address => uint) public tokenBalance;

    address owner;

    uint tokenPrice = 1 ether;

    constructor() public {
        owner = msg.sender;
        tokenBalance[owner] = 100;
    }

    function createNewToken() public {
        require(msg.sender == owner, "You are not allowed");
        tokenBalance[owner]++;
    }

    function burnToken() public {
        require(msg.sender == owner, "You are not allowed");
        tokenBalance[owner]--;
    }

    function purchaseToken() public payable {
        require((tokenBalance[owner] * tokenPrice) / msg.value > 0, "not enoug
h tokens");
        tokenBalance[owner] -= msg.value / tokenPrice;
        tokenBalance[msg.sender] += msg.value / tokenPrice;
    }

    function sendToken(address _to, uint _amount) public {
        require(tokenBalance[msg.sender] >= _amount, "Not enough tokens");
        assert(tokenBalance[_to] + _amount >= tokenBalance[_to]);
        assert(tokenBalance[msg.sender] - _amount <= tokenBalance[msg.sender])
;
        tokenBalance[msg.sender] -= _amount;
        tokenBalance[_to] += _amount;
    }

}
```

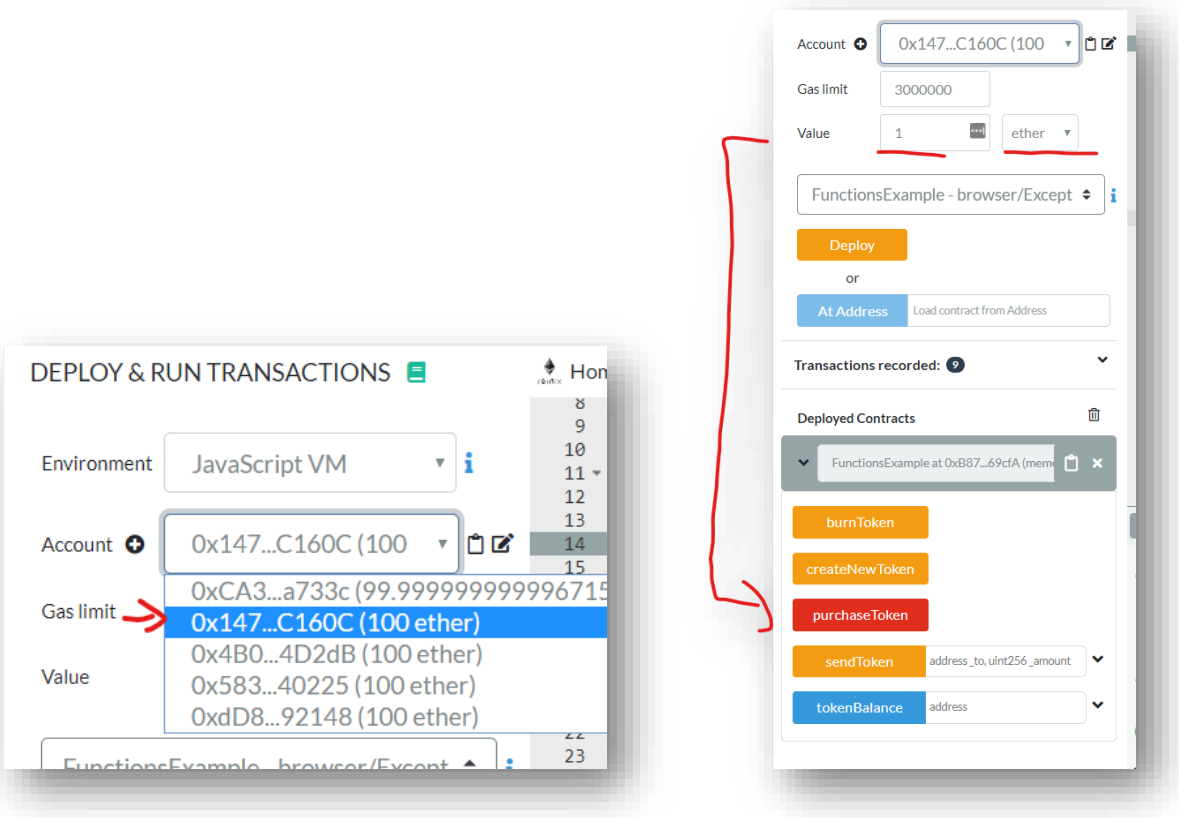

Step by Step Instruction

Deploy the Smart Contract in the JavaScript VM

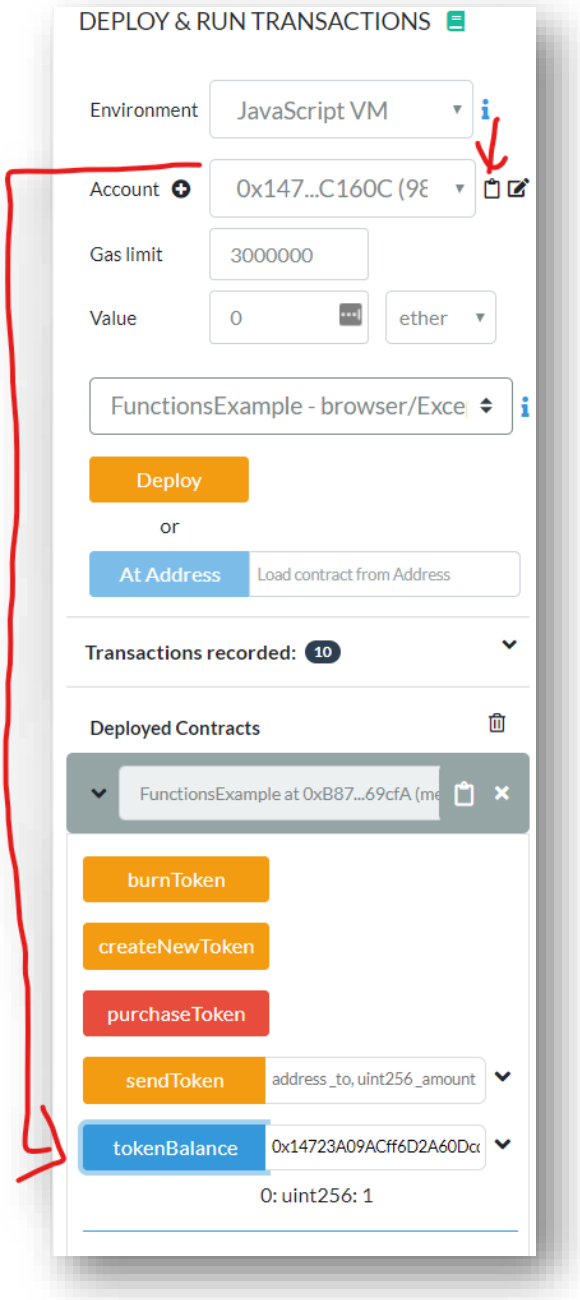
Open the “Deploy and Run Transactions” view in Remix with the smart contract. Deploy the Smart Contract using your Account #1 from the accounts-dropdown

Buy 1 Token

Use Account#2 from your dropdown to Buy one Token from the Owner

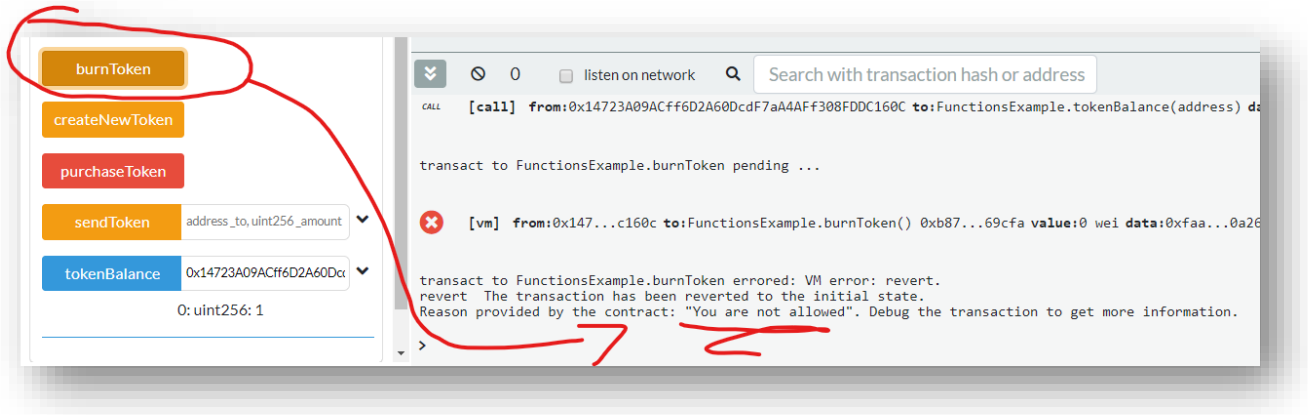


Check the Token Balance



Great! You can buy Tokens. But can you also call the burnToken function from Account#2?

Try to burn a token with Account#2



You cannot, because in the code only the owner of the smart contract can do this. But it is error prone to have “require(msg.sender == owner)” in all functions. We can do better than this!

Add a modifier!

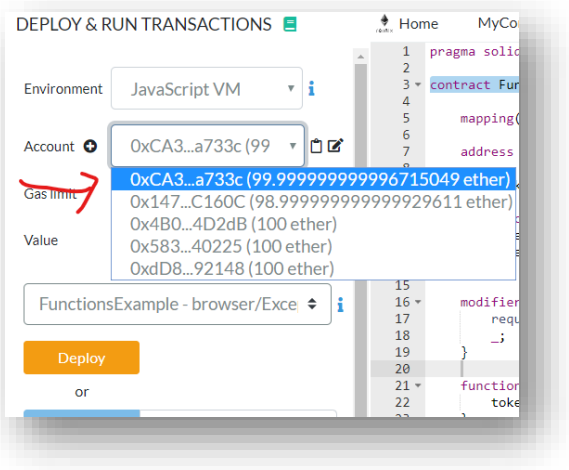
```
//...
    modifier onlyOwner {

        require(msg.sender == owner, "You are not allowed");
        _;
    }
//...
```

Then change the functions burnToken and createNewToken to:

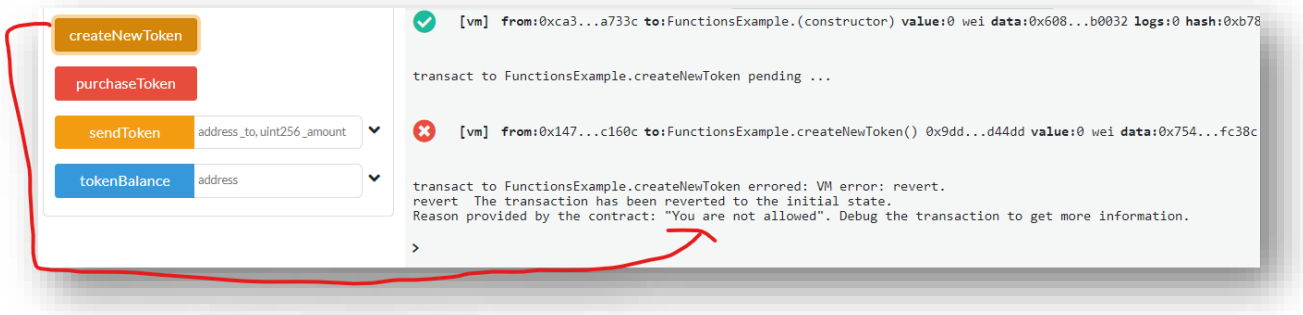
```
//...
    function createNewToken() public onlyOwner {
        tokenBalance[owner]++;
    }

    function burnToken() public onlyOwner {
        tokenBalance[owner]--;
    }
//...
```


Re-Deploy the Smart Contract and Test

Redeploy your smart contract **with account#1** from the accounts-dropdown



Then **switch over to account#2** and try to call createNewToken:



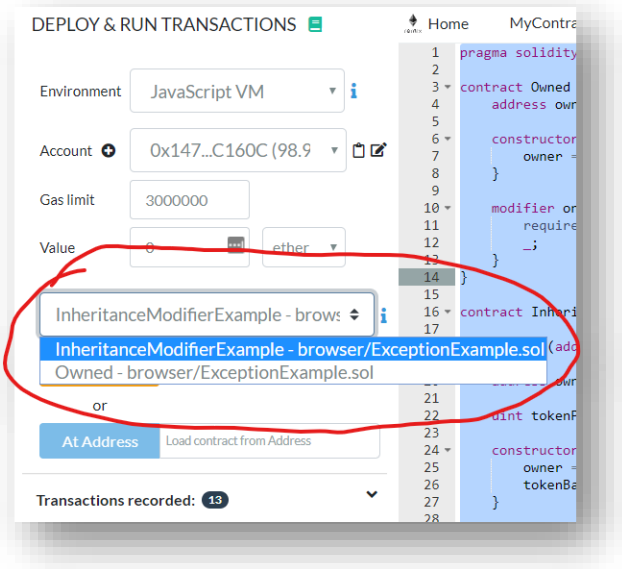
Move the functions to an external Smart Contract

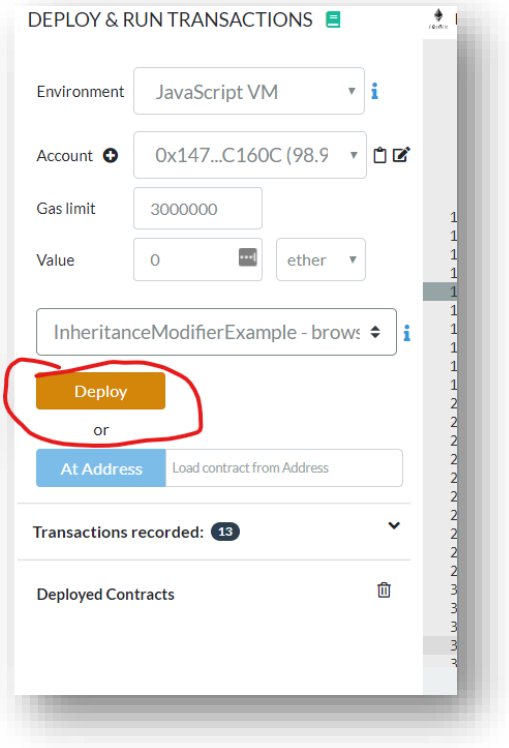
```
pragma solidity ^0.5.11;

contract Owned {
    address owner;

    constructor() public {
        owner = msg.sender;
    }

    modifier onlyOwner {
        require(msg.sender == owner, "You are not allowed");
        _;
    }
}

contract InheritanceModifierExample is Owned {

    mapping(address => uint) public tokenBalance;

    address owner;

    uint tokenPrice = 1 ether;

    constructor() public {
        owner = msg.sender;
        tokenBalance[owner] = 100;
    }

    function createNewToken() public onlyOwner {
        tokenBalance[owner]++;
    }

    //... more code here ...
```


Deploy and Test

Re-Test the whole thing: Deploy with account#1 and test with account#2.

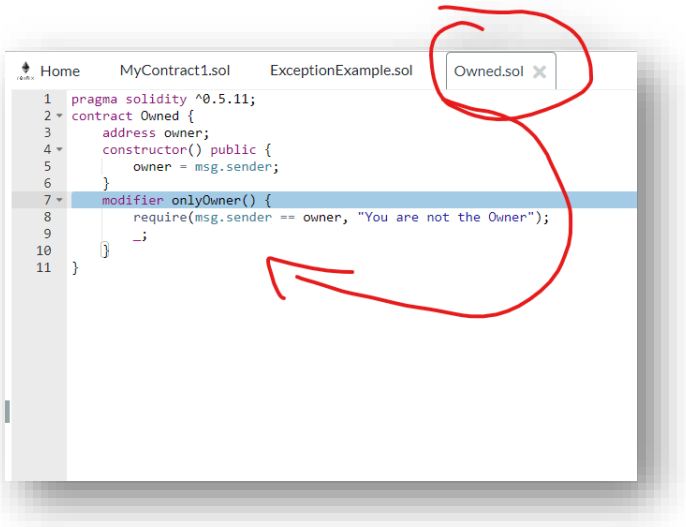
Be aware that there are two contracts now in your contract-dropdown. You just have to deploy the “InheritanceModifierExample” contract, since the “Owned” Smart contract gets compiled into the binary code





Put the "Owned" Contract into its own file

First Create a new file



Then import from owned.sol:

```
pragma solidity ^0.5.11;

import "./Owned.sol";

contract InheritanceModifierExample is Owned {

    mapping(address => uint) public tokenBalance;

    uint tokenPrice = 1 ether;

    constructor() public {
        tokenBalance[owner] = 100;
    }


    function createNewToken() public onlyOwner {
        tokenBalance[owner]++;
    }

    //... more code here ...
```


Congratulations, LAB is completed