LAB -4 BLOCKCHAIN AND CRYPTOCURRENCIES

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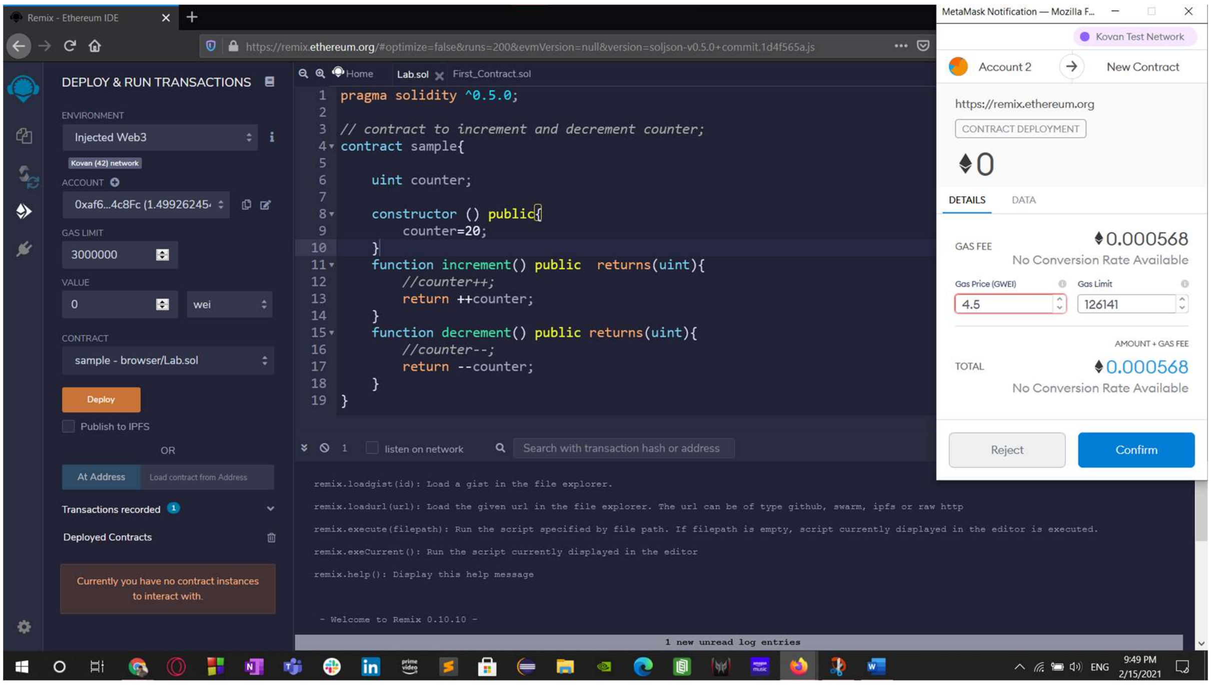
E18CSE206

TASK 1:

Write a smart contract using solidity programming to increment and decrement the counter variable. Compile the smart contract using Remix IDE and deploy the compiled contract into the Ethereum public blockchain network (test networks) through injected web3 using MetaMask.


Remix - Ethereum IDE
https://remix.ethereum.org/#optimize=false&runs=200&evmVersion=null&version=soljson-v0.5.0+commit.1d4f565a.js
DEPLOY & RUN TRANSACTIONS
Home
Lab.sol
First_Contract.sol
Deploy
Publish to IPFS
OR
At Address
Load contract from Address
Transactions recorded 1
Deployed Contracts
listen on network
Search with transaction hash or address
MetaMask Notification — Mozilla F...
DETAILS
DATA
Reject
Confirm
ENG
9:49 PM
2/15/2021

ENVIRONMENT: Injected Web3

Kovan (42) network

ACCOUNT: 0xaf6...4c8Fc (1.49926245

GAS LIMIT: 3000000

VALUE: 0 wei

CONTRACT: sample - browser/Lab.sol

Currently you have no contract instances to interact with.

```
pragma solidity ^0.5.0;

// contract to increment and decrement counter;
contract sample{

    uint counter;

    constructor () public{
        counter=20;
    }
    function increment() public  returns(uint){
        //counter++;
        return ++counter;
    }
    function decrement() public returns(uint){
        //counter--;
        return --counter;
    }
}
```

```
remix.loadgist(id): Load a gist in the file explorer.

remix.loadurl(url): Load the given url in the file explorer. The url can be of type github, swarm, ipfs or raw http

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remix.exeCurrent(): Run the script currently displayed in the editor

remix.help(): Display this help message


 - Welcome to Remix 0.10.10 -

1 new unread log entries
```

Kovan Test Network

Account 2 → New Contract

https://remix.ethereum.org

CONTRACT DEPLOYMENT

♦0

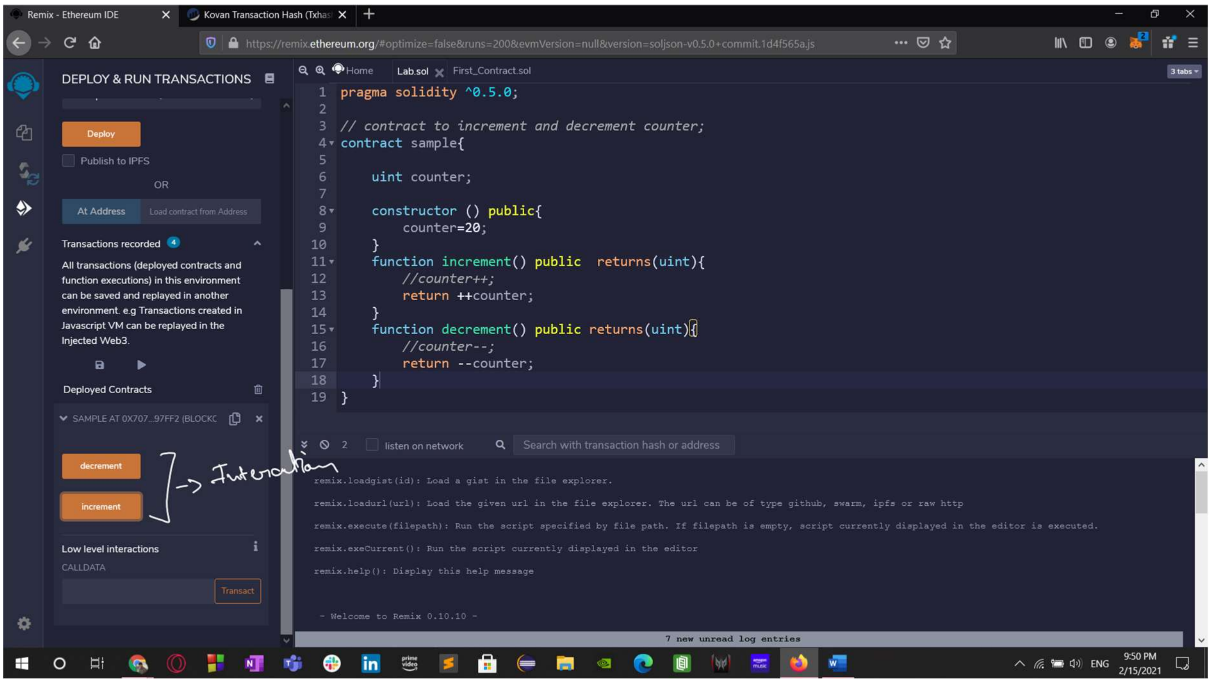
GAS FEE ♦0.000568
No Conversion Rate Available

Gas Price (GWEI): 4.5
Gas Limit: 126141

AMOUNT + GAS FEE

TOTAL ♦0.000568
No Conversion Rate Available

A-> Interact with the deployed contract


Remix - Ethereum IDE
Kovan Transaction Hash (Txhas
https://remix.ethereum.org/#optimize=false&runs=200&evmVersion=null&version=soljson-v0.5.0+commit.1d4f565a.js
DEPLOY & RUN TRANSACTIONS
Deploy
Publish to IPFS
OR
At Address
Load contract from Address
Transactions recorded 4
Deployed Contracts
SAMPLE AT 0X707...97FF2 (BLOCKC
decrement
increment
-> Interaction
Low level interactions
CALLDATA
Transact
Home
Lab.sol
First_Contract.sol
3 tabs
2
listen on network
Search with transaction hash or address
9:50 PM
2/15/2021

All transactions (deployed contracts and function executions) in this environment can be saved and replayed in another environment. e.g Transactions created in Javascript VM can be replayed in the Injected Web3.

```
pragma solidity ^0.5.0;

// contract to increment and decrement counter;
contract sample{

    uint counter;

    constructor () public{
        counter=20;
    }
    function increment() public  returns(uint){
        //counter++;
        return ++counter;
    }
    function decrement() public returns(uint){
        //counter--;
        return --counter;
    }
}
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remix.help(): Display this help message


 - Welcome to Remix 0.10.10 -
```
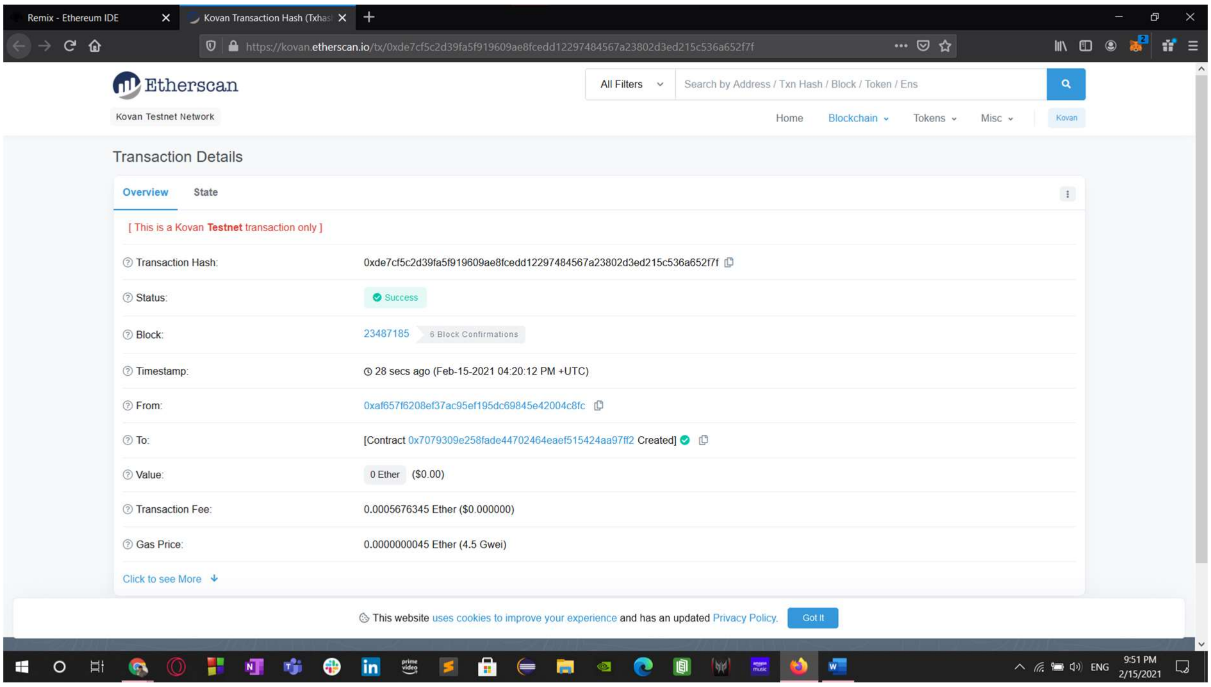

7 new unread log entries

B-> View the Block details using Etherscan


Remix - Ethereum IDE
Kovan Transaction Hash (Txhas
https://kovan.etherscan.io/tx/0xde7cf5c2d39fa5f919609ae8fcedd12297484567a23802d3ed215c536a652f7f
Etherscan
Kovan Testnet Network
All Filters
Search by Address / Txn Hash / Block / Token / Ens
Home
Blockchain
Tokens
Misc
Kovan
Overview
State
Click to see More
Got it
9:51 PM
2/15/2021

Transaction Details

[This is a Kovan **Testnet** transaction only]

Transaction Hash:	0xde7cf5c2d39fa5f919609ae8fcedd12297484567a23802d3ed215c536a652f7f
Status:	Success
Block:	23487185 6 Block Confirmations
Timestamp:	28 secs ago (Feb-15-2021 04:20:12 PM +UTC)
From:	0xaf657f6208ef37ac95ef195dc69845e42004c8fc
To:	[Contract 0x7079309e258fade44702464eaef515424aa97ff2 Created]
Value:	0 Ether ($0.00)
Transaction Fee:	0.0005676345 Ether ($0.000000)
Gas Price:	0.0000000045 Ether (4.5 Gwei)

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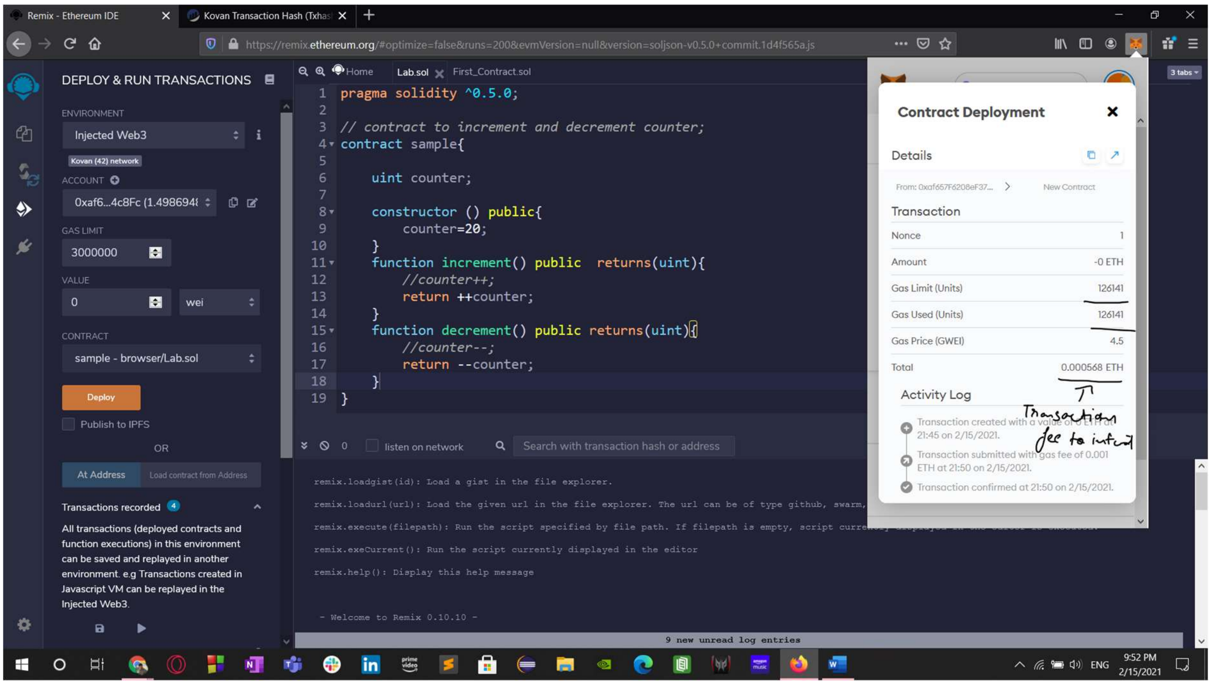
C-> • Check the transaction fee applicable for contract deployment.



DEPLOY & RUN TRANSACTIONS

ENVIRONMENT: Injected Web3 (Kovan (42) network)

ACCOUNT: 0xaf6...4c8Fc (1.498694

GAS LIMIT: 3000000

VALUE: 0 wei

CONTRACT: sample - browser/Lab.sol

Transactions recorded 4

All transactions (deployed contracts and function executions) in this environment can be saved and replayed in another environment. e.g Transactions created in Javascript VM can be replayed in the Injected Web3.

```
pragma solidity ^0.5.0;

// contract to increment and decrement counter;
contract sample{

    uint counter;

    constructor () public{
        counter=20;
    }
    function increment() public  returns(uint){
        //counter++;
        return ++counter;
    }
    function decrement() public returns(uint){
        //counter--;
        return --counter;
    }
}
```

```
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remix.exeCurrent(): Run the script currently displayed in the editor
remix.help(): Display this help message

 - Welcome to Remix 0.10.10 -
9 new unread log entries
```

Contract Deployment

Details

From: 0xaf657F6208eF37... > New Contract

Transaction

Nonce	1
Amount	-0 ETH
Gas Limit (Units)	126141
Gas Used (Units)	126141
Gas Price (GWEI)	4.5
Total	0.000568 ETH

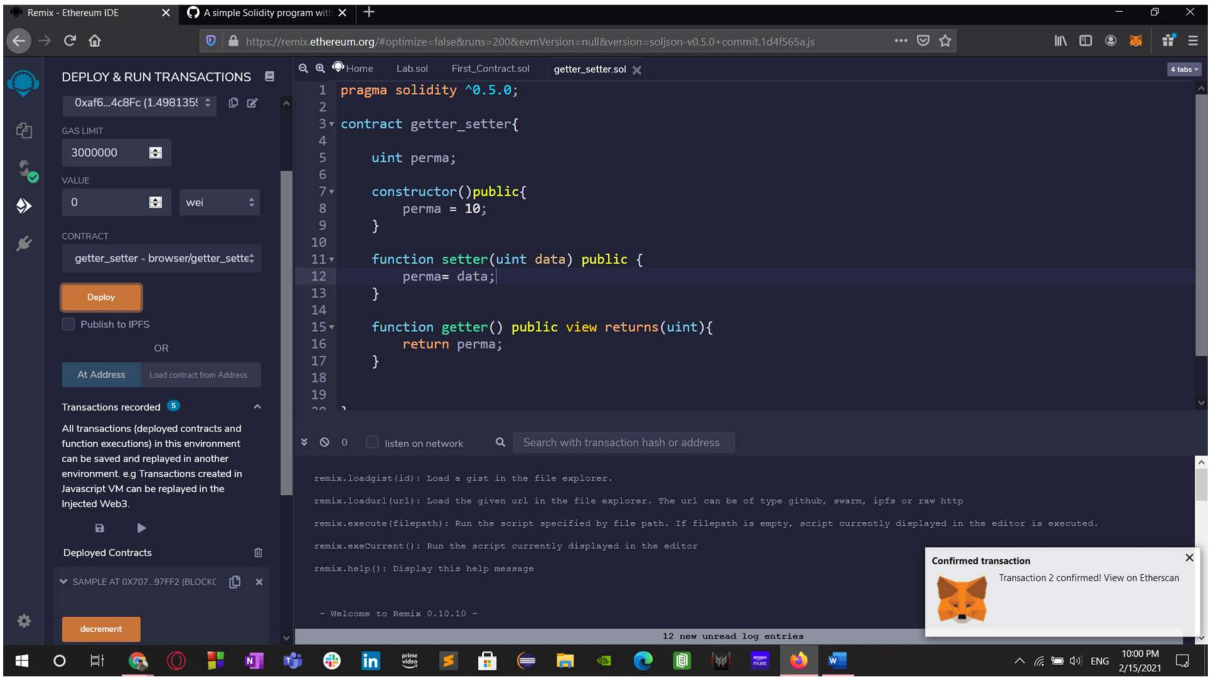
Transaction fee to infura

Activity Log

- Transaction created with a value of 0 ETH at 21:45 on 2/15/2021.
- Transaction submitted with gas fee of 0.001 ETH at 21:50 on 2/15/2021.
- Transaction confirmed at 21:50 on 2/15/2021.

TASK 2:

Write a solidity smart contract to set and get the value of a state variable using functions.



DEPLOY & RUN TRANSACTIONS

0xaf6...4c8Fc (1.498135

GAS LIMIT: 3000000

VALUE: 0 wei

CONTRACT: getter_setter - browser/getter_sette

Transactions recorded 5

All transactions (deployed contracts and function executions) in this environment can be saved and replayed in another environment. e.g Transactions created in Javascript VM can be replayed in the Injected Web3.

Deployed Contracts

SAMPLE AT 0X707...97FF2 (BLOCKC

```
pragma solidity ^0.5.0;

contract getter_setter{

    uint perma;

    constructor()public{
        perma = 10;
    }

    function setter(uint data) public {
        perma= data;
    }

    function getter() public view returns(uint){
        return perma;
    }
```

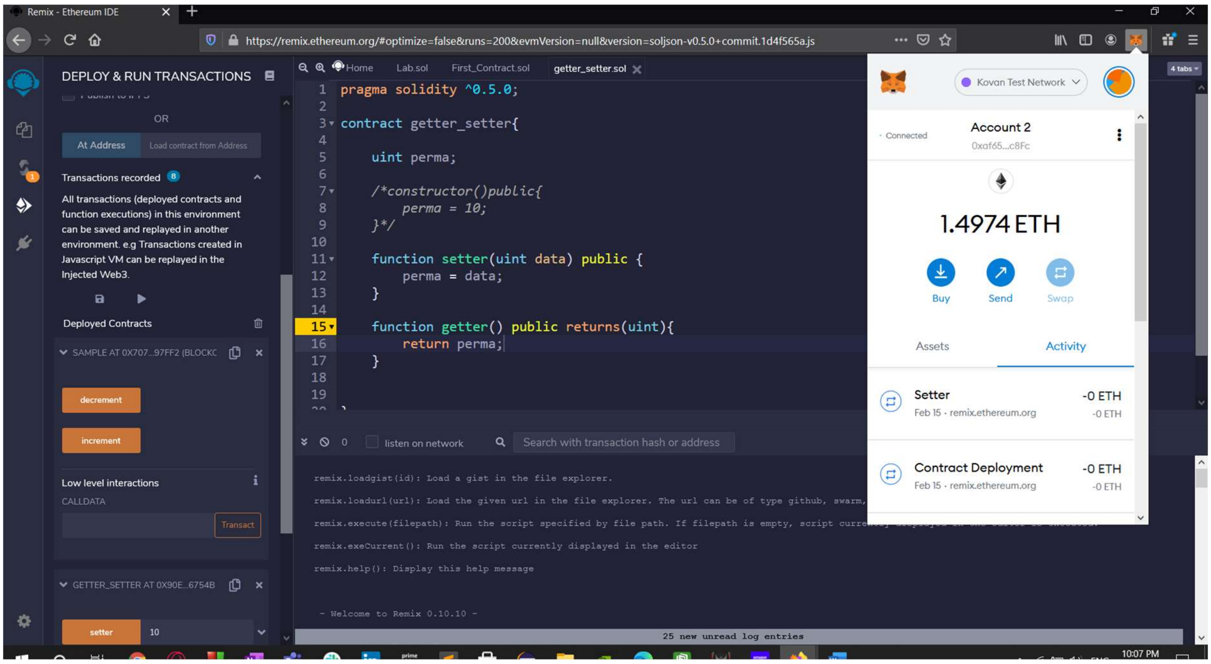
```
remix.loadgist(id): Load a gist in the file explorer.
remix.loadurl(url): Load the given url in the file explorer. The url can be of type github, swarm, ipfs or raw http
remix.execute(filepath): Run the script specified by file path. If filepath is empty, script currently displayed in the editor is executed.
remix.exeCurrent(): Run the script currently displayed in the editor
remix.help(): Display this help message

 - Welcome to Remix 0.10.10 -
12 new unread log entries
```

Confirmed transaction

Transaction 2 confirmed! View on Etherscan

- Interact with the contract



https://remix.ethereum.org/#optimize=false&runs=200&evmVersion=null&version=soljson-v0.5.0+commit.1d4f565a.js

DEPLOY & RUN TRANSACTIONS

Transactions recorded 8

All transactions (deployed contracts and function executions) in this environment can be saved and replayed in another environment. e.g Transactions created in Javascript VM can be replayed in the Injected Web3.

Deployed Contracts

SAMPLE AT 0X707...97FF2 (BLOCKC

GETTER_SETTER AT 0X90E...6754B

setter 10

```
pragma solidity ^0.5.0;

contract getter_setter{

    uint perma;

    /*constructor()public{
        perma = 10;
    }*/

    function setter(uint data) public {
        perma = data;
    }

    function getter() public returns(uint){
        return perma;
    }
```

```
remix.loadgist(id): Load a gist in the file explorer.
remix.loadurl(url): Load the given url in the file explorer. The url can be of type github, swarm,
remix.execute(filepath): Run the script specified by file path. If filepath is empty, script curre
remix.exeCurrent(): Run the script currently displayed in the editor
remix.help(): Display this help message

 - Welcome to Remix 0.10.10 -
```

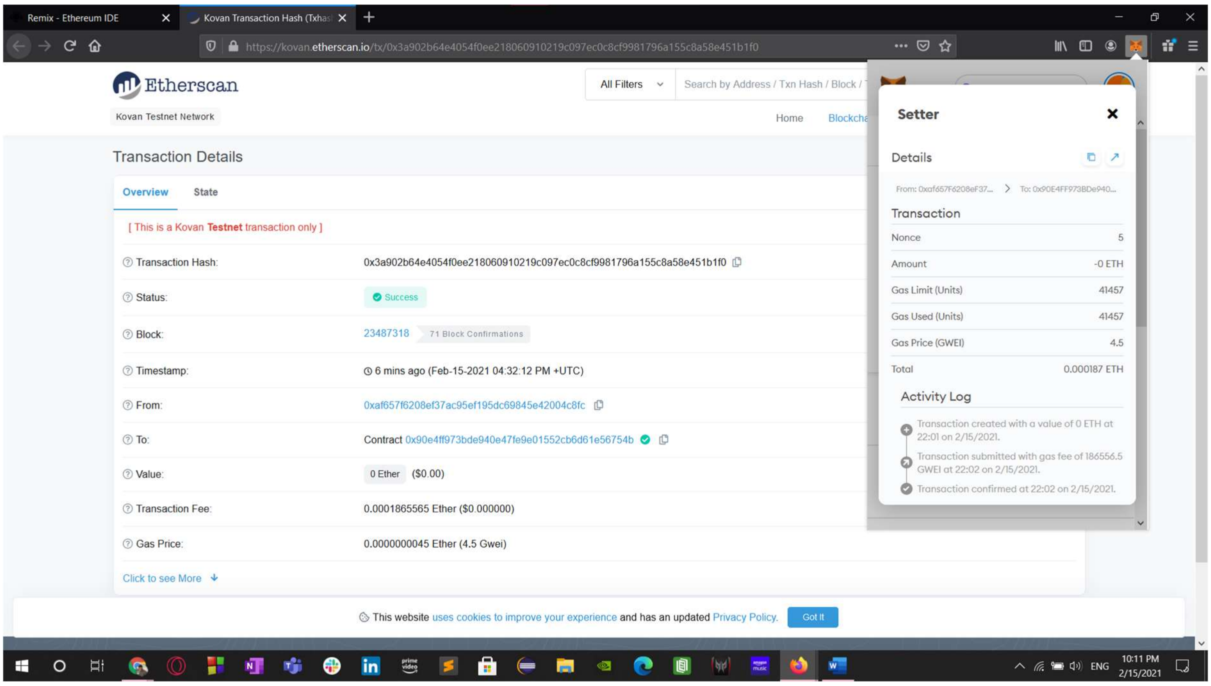
Kovan Test Network

Account 2
0xaf65...c8Fc

1.4974 ETH

Setter	Feb 15 · remix.ethereum.org	-0 ETH
Contract Deployment	Feb 15 · remix.ethereum.org	-0 ETH

• View the Block details using Etherscan :



https://kovan.etherscan.io/tx/0x3a902b64e4054f0ee218060910219c097ec0c8cf9981796a155c8a58e451b1f0

Etherscan
Kovan Testnet Network

Transaction Details

[This is a Kovan **Testnet** transaction only]

Transaction Hash:	0x3a902b64e4054f0ee218060910219c097ec0c8cf9981796a155c8a58e451b1f0
Status:	Success
Block:	23487318 71 Block Confirmations
Timestamp:	6 mins ago (Feb-15-2021 04:32:12 PM +UTC)
From:	0xaf657f6208ef37ac95ef195dc69845e42004c8fc
To:	Contract 0x90e4ff973bde940e47fe9e01552cb6d61e56754b
Value:	0 Ether ($0.00)
Transaction Fee:	0.0001865565 Ether ($0.000000)
Gas Price:	0.0000000045 Ether (4.5 Gwei)

Setter

Details

From: 0xaf657F6208eF37... > To: 0x90E4FF973BDe940...

Transaction

Nonce	5
Amount	-0 ETH
Gas Limit (Units)	41457
Gas Used (Units)	41457
Gas Price (GWEI)	4.5
Total	0.000187 ETH

Activity Log

Transaction created with a value of 0 ETH at 22:01 on 2/15/2021.

Transaction submitted with gas fee of 186556.5 GWEI at 22:02 on 2/15/2021.

Transaction confirmed at 22:02 on 2/15/2021.

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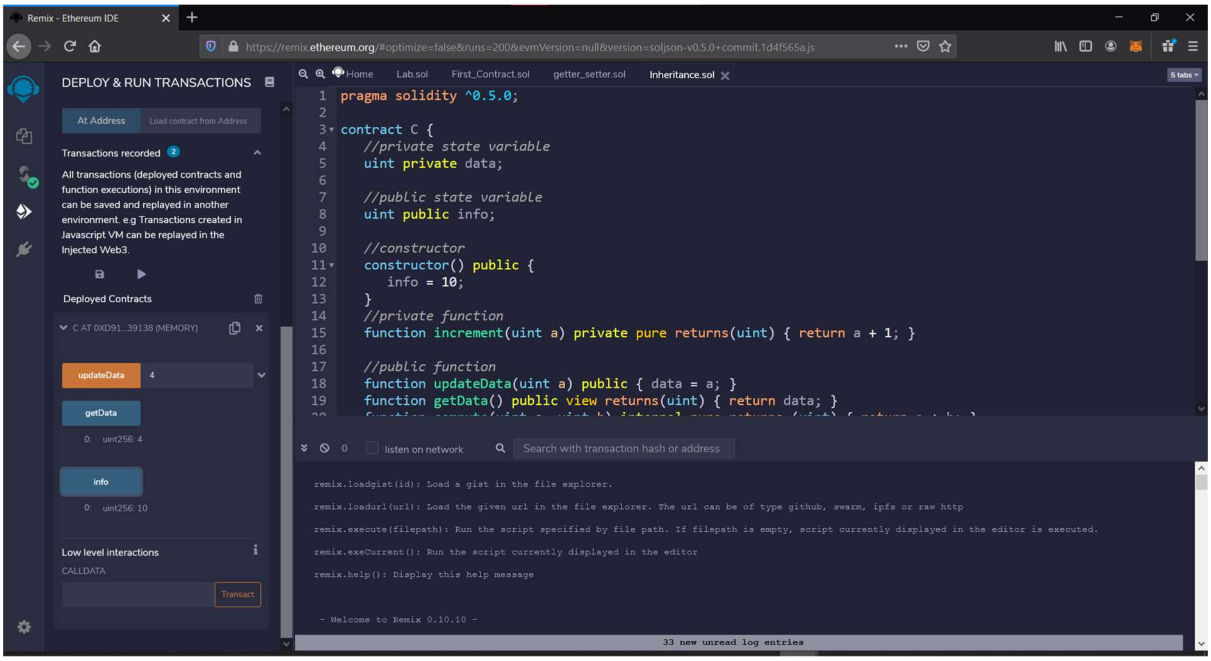
TASK 3:

Write a smart contract to demonstrate inheritance in solidity programming. Make use of public and internal keywords to illustrate variable scope in the contract. Compile and deploy the contract into Ethereum test network using MetaMask.



Remix - Ethereum IDE
https://remix.ethereum.org/#optimize=false&runs=200&evmVersion=null&version=soljson-v0.5.0+commit.1d4f565a.js
Home
Lab.sol
First_Contract.sol
getter_setter.sol
Inheritance.sol
5 tabs

DEPLOY & RUN TRANSACTIONS

At Address
Load contract from Address

Transactions recorded 2

All transactions (deployed contracts and function executions) in this environment can be saved and replayed in another environment. e.g Transactions created in Javascript VM can be replayed in the Injected Web3.

Deployed Contracts

C AT 0XD91...39138 (MEMORY)

updateData: 4

getData

0: uint256: 4

info

0: uint256: 10

Low level interactions

CALLDATA

```
pragma solidity ^0.5.0;

contract C {
   //private state variable
   uint private data;

   //public state variable
   uint public info;

   //constructor
   constructor() public {
      info = 10;
   }
   //private function
   function increment(uint a) private pure returns(uint) { return a + 1; }

   //public function
   function updateData(uint a) public { data = a; }
   function getData() public view returns(uint) { return data; }
```

0 □ listen on network

```
remix.loadgist(id): Load a gist in the file explorer.

remix.loadurl(url): Load the given url in the file explorer. The url can be of type github, swarm, ipfs or raw http

remix.execute(filepath): Run the script specified by file path. If filepath is empty, script currently displayed in the editor is executed.

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remix.help(): Display this help message


 - Welcome to Remix 0.10.10 -

33 new unread log entries
```

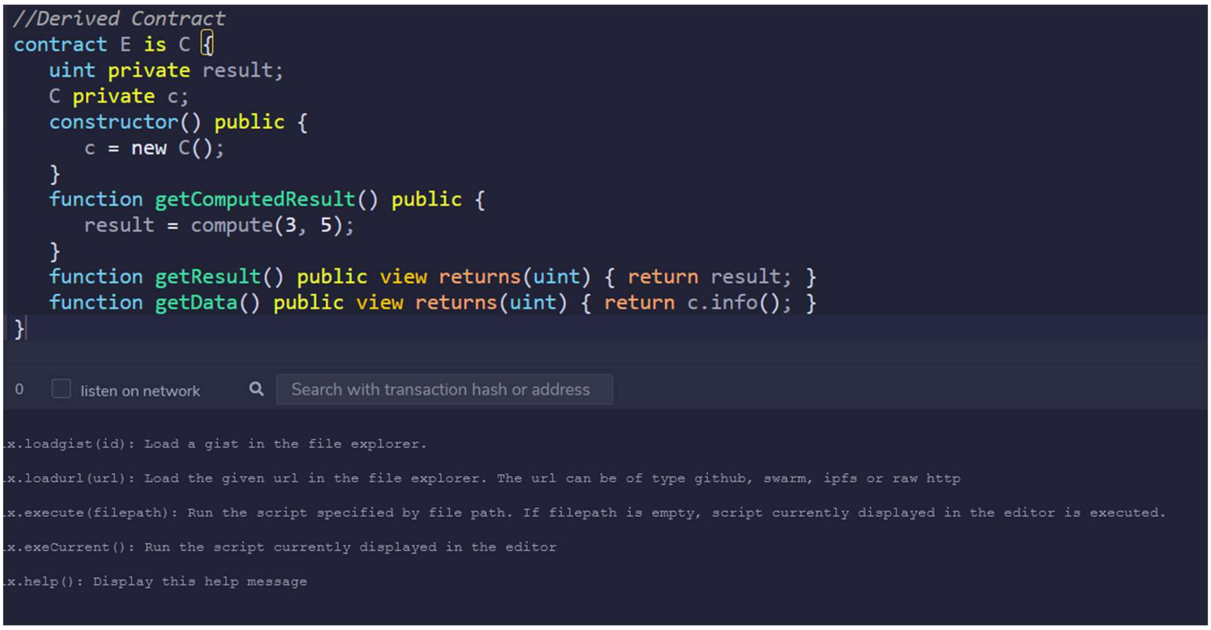

```
//Derived Contract
contract E is C {
   uint private result;
   C private c;
   constructor() public {
      c = new C();
   }
   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return result; }
   function getData() public view returns(uint) { return c.info(); }
}
```

0 □ listen on network

```
x.loadgist(id): Load a gist in the file explorer.

x.loadurl(url): Load the given url in the file explorer. The url can be of type github, swarm, ipfs or raw http

x.execute(filepath): Run the script specified by file path. If filepath is empty, script currently displayed in the editor is executed.

x.exeCurrent(): Run the script currently displayed in the editor

x.help(): Display this help message
```