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Lab 3: Interacting with a Smart Contract through Web3.js

Step 1: Installing & Running the Ethereum TestRPC

check node , npm , yarn and Geth version `geth version node -v npm -v yarn -v`

```
npm -v: Command not found
root@LAPTOP-ORPFG98H:~# geth version
Geth
Version: 1.14.11-stable
Git Commit: f3c696fa1db75d0f78ea47dd0975f6f0de6fdd84
Architecture: amd64
Go Version: go1.23.1
Operating System: linux
GOPATH=
GOROOT=
root@LAPTOP-ORPFG98H:~# node -v
v18.20.4
root@LAPTOP-ORPFG98H:~# npm -v
10.7.0
root@LAPTOP-ORPFG98H:~# yarn -v
1.22.22
root@LAPTOP-ORPFG98H:~#
```

Use yarn

yarn global add ganache

```
root@LAPTOP-ORPFG98H:~# yarn global add ganache
yarn global v1.22.22
[1/4] Resolving packages...
[2/4] Fetching packages...
[3/4] Linking dependencies...
[4/4] Building fresh packages...
success Installed "ganache@7.9.2" with binaries:
  - ganache
  - ganache-cli
Done in 22.77s.
root@LAPTOP-ORPFG98H:~# |
```

start TestRPC

This provides you with 10 different accounts and private keys, along with a local server at localhost:8545.

```
root@LAPTOP-ORPFG98H:~# ganache -u
ganache v7.9.2 (@ganache/cli: 0.10.2, @ganache/core: 0.10.2)
Starting RPC server
```

Available Accounts

=====

```
(0) 0x8C5cb0F316Ffb53b08E90B8C41cbf9F6405Da321 (1000 ETH)
(1) 0x13E67194eF23531171ED81386197B93b303868cC (1000 ETH)
(2) 0x0bB4DbD9fB7ad119555F3D6915F19013ba5DdEe9 (1000 ETH)
(3) 0x9B794D3C15AE60888CFE6F1F53C41a4B3284194e (1000 ETH)
(4) 0xC8C97fFdB182De71B21a4c48151ab7692c098101 (1000 ETH)
(5) 0x0A642351524e36Fffea73D4919B454db5d46b0Cc (1000 ETH)
(6) 0xf3b52bFCD022eB269A2f564B072c399E3767c750 (1000 ETH)
(7) 0xA52B2B502E0ac547cd4195cFFc27B944531A6A7e (1000 ETH)
(8) 0xCE4cbe6a110EA0D70dB6Ef549984618Ed7C33A99 (1000 ETH)
(9) 0x5cEE93a71A15622b7d68d74BADf5731D307746ad (1000 ETH)
```

Private Keys

=====

```
(0) 0xcf0f92259d3603a9ea7db64036d37950475c4562700451b98479a4
(1) 0xd48be84b57a204e76df9217b1ebcf03097664f998d3e57117c539c
(2) 0xcdb61f957f289ba6639e293fae9dd879a551d9a394693a79bd078f
(3) 0x77818645da2bcbde514c1480d67aa2e58e08e7fee6e6f6339c8637
(4) 0x7dcd313e398d01e0977cd63747f7af86bae3473fc4aa28ec9b9bd9
(5) 0x40d93b2e253d3cfddfbae986f39d019e6e4c602875655438a69d87
(6) 0xd1838a46ef3d0a5a2315b6c2ab13a0b9fa7cd451523e114d52700b
(7) 0x6716c661cdef883cf137d7d133ecc895bba2aa523d282f84ff2bd5
(8) 0x393a8b6f4d6e39bf2a60880766d22f4c0cfe8d6677f3b20ace9eba
(9) 0x9784a04002021d21d7f1bde28148a43a99e7a4aef96f8f65d136b2
```

HD Wallet

=====

```
Mnemonic:      hub injury practice inside plastic spin cheap
Base HD Path:  m/44'/60'/0'/0/{account_index}
```

Default Gas Price

=====

2000000000

BlockGas Limit

=====

```
Default Gas Price
=====
2000000000

BlockGas Limit
=====
30000000

Call Gas Limit
=====
50000000

Chain
=====
Hardfork: shanghai
Id:      1337

RPC Listening on 127.0.0.1:8545
|
```

Step 2: Installing Web3.js

create a project and install the package

```
mkdir coursetro-eth
```

```
cd coursetro-eth
```

```
npm init -y
```

```
PS C:\Users\rajes> mkdir coursetro-eth
```

```
Directory: C:\Users\rajes
```

Mode		LastWriteTime	Length	Name
----		-----	-----	----
d-----		19-11-2024	15:37	coursetro-eth

```
PS C:\Users\rajes> cd coursetro-eth
```

```
PS C:\Users\rajes\coursetro-eth> npm init -y
```

```
Wrote to C:\Users\rajes\coursetro-eth\package.json:
```

```
{
  "name": "coursetro-eth",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "description": ""
}
```

```
PS C:\Users\rajes\coursetro-eth> |
```

create index_lab3.html

> Users > rajes > coursetro-eth > <> index_lab3.html > ...

```
1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4  <meta charset="UTF-8" />
5  <meta name="viewport" content="width=device-width, initial-scale=1.0" />
6  <meta http-equiv="X-UA-Compatible" content="ie=edge" />
7  <title>Lab 3: Interacting with a Smart Contract</title>
8  <link rel="stylesheet" type="text/css" href="main_lab3.css" />
9  <script src="._/node_modules/web3/dist/web3.min.js"></script>
10 </head>
11 <body>
12 <div class="container">
13 <h1>Coursetro Instructor</h1>
14 <h2 id="instructor"></h2>
15 <label for="name" class="col-lg-2 control-label">Instructor Name</label>
16 <input id="name" type="text" />
17 <label for="age" class="col-lg-2 control-label">Instructor Age</label>
18 <input id="age" type="text" />
19 <button id="button">Update Instructor</button>
20 </div>
21 <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js"></script>
22 <script>
23 const run = async () => {
24   var web3;
25   if (typeof web3 !== "undefined") {
26     web3 = new Web3(web3.currentProvider);
27   } else {
28     web3 = new Web3(new Web3.providers.HttpProvider("http://localhost:8545"));
29   }
30
31   const accounts = await web3.eth.getAccounts();
32   web3.eth.defaultAccount = accounts[0];
33   console.log(web3.eth.defaultAccount);
34
35   var Coursetro = new web3.eth.Contract(
```

```

var Coursetro = new web3.eth.Contract(
  [
    {
      inputs: [
        { internalType: "string", name: "_fName", type: "string" },
        { internalType: "uint256", name: "_age", type: "uint256" }
      ],
      name: "setInstructor",
      outputs: [],
      stateMutability: "nonpayable",
      type: "function"
    },
    { inputs: [], stateMutability: "nonpayable", type: "constructor" },
    {
      inputs: [],
      name: "getInstructor",
      outputs: [
        { internalType: "string", name: "", type: "string" },
        { internalType: "uint256", name: "", type: "uint256" }
      ],
      stateMutability: "view",
      type: "function"
    }
  ],
  "0xcE9AAae09De9e9ad492b0748D962b1D03ACd0D84"
);

Coursetro.methods.getInstructor().call(function (error, result) {
  if (!error) {
    $("#instructor").html(result[0] + " (" + result[1] + " years old)");
  }
});

```

```
51
52   Coursetro.methods.getInstructor().call(function (error, result) {
53     if (!error) {
54       $("#instructor").html(result[0] + " (" + result[1] + " years old)");
55     } else {
56       console.error(error);
57     }
58   });
59
70   $("#button").click(function () {
71     Coursetro.methods
72       .setInstructor($("#name").val(), $("#age").val())
73       .send({ from: accounts[0] });
74   });
75 };
76 run();
77 </script>
78 </body>
79 </html>
80 ~
```

create main_lab3.css


```
body {  
  background-color: #f0f0f0;  
  padding: 2em;  
  font-family: "Raleway", "Source Sans Pro", "Arial";  
}  
  
.container {  
  width: 50%;  
  margin: 0 auto;  
}  
  
label {  
  display: block;  
  margin-bottom: 10px;  
}  
  
input {  
  padding: 10px;  
  width: 50%;  
  margin-bottom: 1em;  
}  
  
button {  
  margin: 2em 0;  
  padding: 1em 4em;  
  display: block;  
}  
  
#instructor {  
  padding: 1em;  
  background-color: #fff;  
  margin: 1em 0;  
}
```

-install web3 package

yarn add web3@1.7.4

```
Received shutdown signal: SIGINT
PS C:\Users\rajes\coursetro-eth> yarn add
yarn add v1.22.22
info No lockfile found.
warning package-lock.json found. Your project
avoid resolution inconsistencies caused by
[1/4] Resolving packages...
warning web3 > web3-bzz > swarm-js > mkdirp
itch to that.
warning web3 > web3-eth > web3-eth-account
nces, which is known to be problematic. S
warning web3 > web3-eth > web3-eth-ens > c
warning web3 > web3-bzz > swarm-js > eth-l
warning web3 > web3-bzz > swarm-js > eth-l
in certain circumstances, which is known
warning web3 > web3-eth > web3-eth-ens > c
warning web3 > web3-eth > web3-eth-ens > c
warning web3 > web3-eth > web3-eth-ens > c
warning web3 > web3-eth > web3-eth-ens > c
warning web3 > web3-bzz > swarm-js > eth-l
[2/4] Fetching packages...
[3/4] Linking dependencies...
[4/4] Building fresh packages...
success Saved lockfile.
success Saved 260 new dependencies.
info Direct dependencies
├─ ganache@7.9.2
├─ solc@0.8.28
└─ web3@1.7.4
info All dependencies
├─ @ethereumjs/common@2.6.5
├─ @ethereumjs/tx@3.5.2
├─ @ethersproject/abi@5.7.0
├─ @ethersproject/abstract-provider@5.7.0
└─ @ethersproject/abstract-signer@5.7.0
```

Package.json


```
} package.json > ...
1  {
2    "name": "coursetro-eth",
3    "version": "1.0.0",
4    "main": "index.js",
5    "scripts": {
6      "test": "echo \"Error: no test specified\" && exit 1"
7    },
8    "keywords": [],
9    "author": "",
10   "license": "ISC",
11   "description": "",
12   "devDependencies": {
13     "ganache": "^7.9.2"
14   },
15   "dependencies": {
16     "solc": "^0.8.28",
17     "web3": "1.7.4"
18   }
19 }
20
```


Step 3: Changing the Environment in Remix

Go to Remix Ethereum IDE at <http://remix.ethereum.org> and create lab3.sol
lab3.sol content

```
// SPDX-License-Identifier: MIT
pragma solidity >=0.7.0 <0.9.0;

contract Coursetro {
    uint public age;
    string public fName;

    constructor() {  infinite gas 395200 gas
        fName = "Gray";
        age = 30;
    }

    function setInstructor(string memory _fName, uint _age) public { 
        fName = _fName;
        age = _age;
    }

    function getInstructor() public view returns (string memory, uint) {
        return (fName, age);
    }
}
```

Compile

☐ Include nightly builds

☒ Auto compile

☐ Hide warnings

Advanced Configurations >

Compile lab3.sol

Compile and Run script

CONTRACT

Coursetro (lab3.sol)

Run Remix Analysis

Run SolidityScan

Publish on IPFS

Publish on Swarm

```
7
8  constructor() {  Infinite gas 395280 gas
9      fName = "Gray";
10     age = 30;
11 }
12
13 function setInstructor(string memory _fName, uint _age) public {  Infinite gas
14     fName = _fName;
15     age = _age;
16 }
17
18 function getInstructor() public view returns (string memory, uint) {  Infinite gas
19     return (fName, age);
20 }
21
22 }
```

0 ☐ Listen on all tran

call to Coursetro.getInstructor

call [call] from: 0x5B380a6a701c568545dCfcB03FcB875f56beddC4 to: Coursetro.getInstructor() data: 0x3c1...b81a5



transact to Coursetro.setInstructor pending ...


✓ [vm] from: 0x5B3...eddC4 to: Coursetro.setInstructor(string,uint256) 0xd91...39138 value: 0 wei data: 0x22

call to Coursetro.getInstructor

call [call] from: 0x5B380a6a701c568545dCfcB03FcB875f56beddC4 to: Coursetro.getInstructor() data: 0x3c1...b81a5

Change ENVIRONMENT to External Http Provider and Deploy

ENVIRONMENT  

Custom - External Http Provider 

Injected Provider - MetaMask

Remix VM (Cancun)

Remix VM - Mainnet fork

WalletConnect

Custom - External Http Provider

Dev - Hardhat Provider

Dev - Foundry Provider

Customize this list...

evm version: cancun

Deploy

☐ Publish to IPFS

At Address

Load contract from Address

call to Cou

CALL [ca]

transact to

 [vm]

DEPLOY & RUN TRANSACTIONS

ENVIRONMENT

Custom - External Http Provider

Custom (1732220718023) network

ACCOUNT

0x409...e3c88 (1000 ether)

GAS LIMIT

☒ Estimated Gas

☐ Custom 3000000

VALUE

0 Wei

CONTRACT

Coursetro - lab3.sol

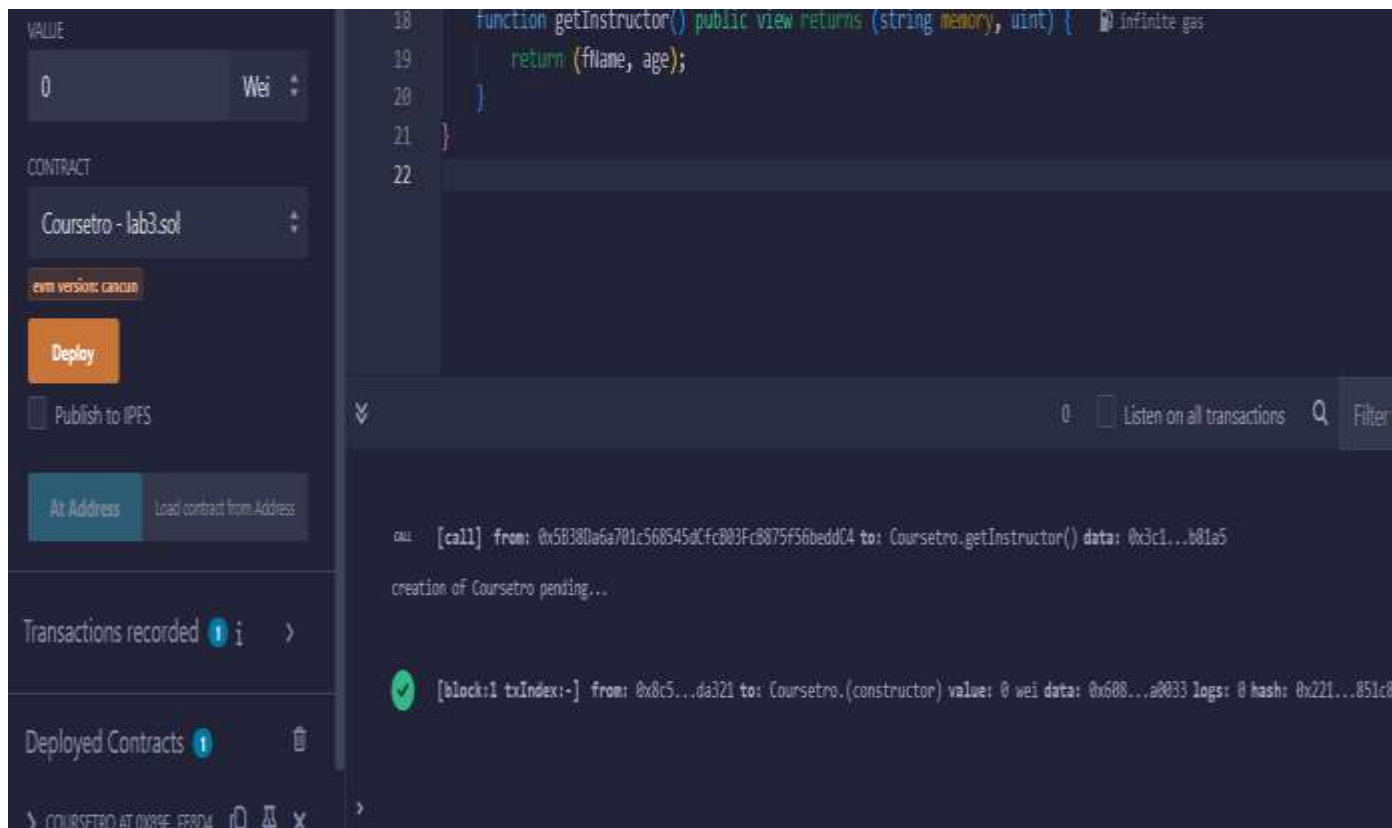
evm version: byzantium

Deploy

☐ Publish to IPFS

```
6
7 // Constructor to initialize fName and age
8 constructor() public {  undefined gas
9     fName = 'Gary';
10    age = 34;
11 }
12
13 // setInstructor accepts 2 parameters, _fName and _age.
14 // Once called, it sets the string fName and uint age
15 function setInstructor(string _fName, uint _age) public {  infinite gas
16     fName = _fName;
17     age = _age;
18 }
19
20 // The getInstructor() function is constant and returns
21 // a string and a uint. This is where we return fName and age.
22 function getInstructor() public constant returns (string, uint) {  infinite gas
23     return (fName, age);
24 }
25 }
26
```

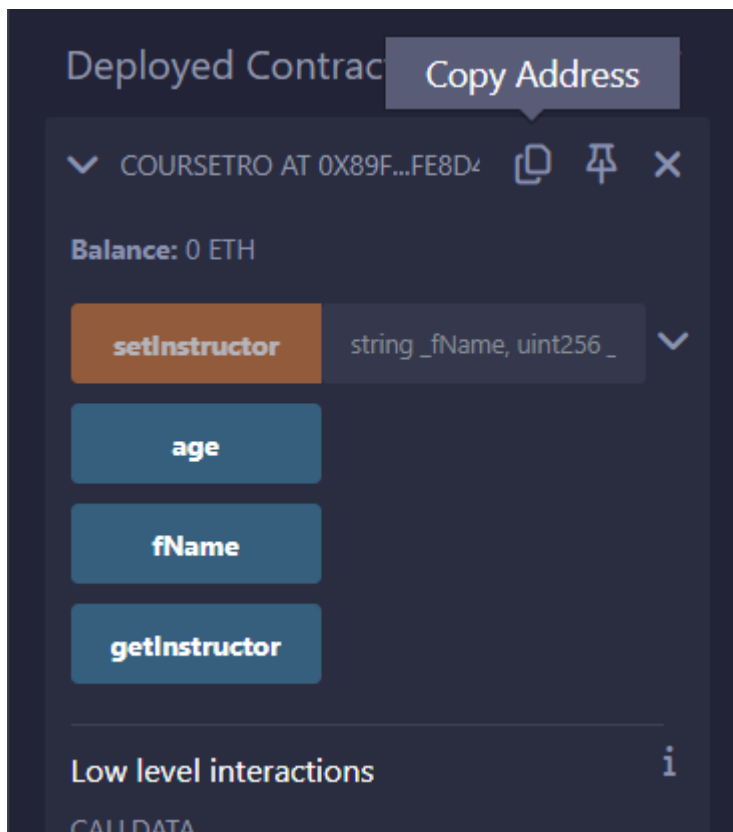
Click “Deploy”



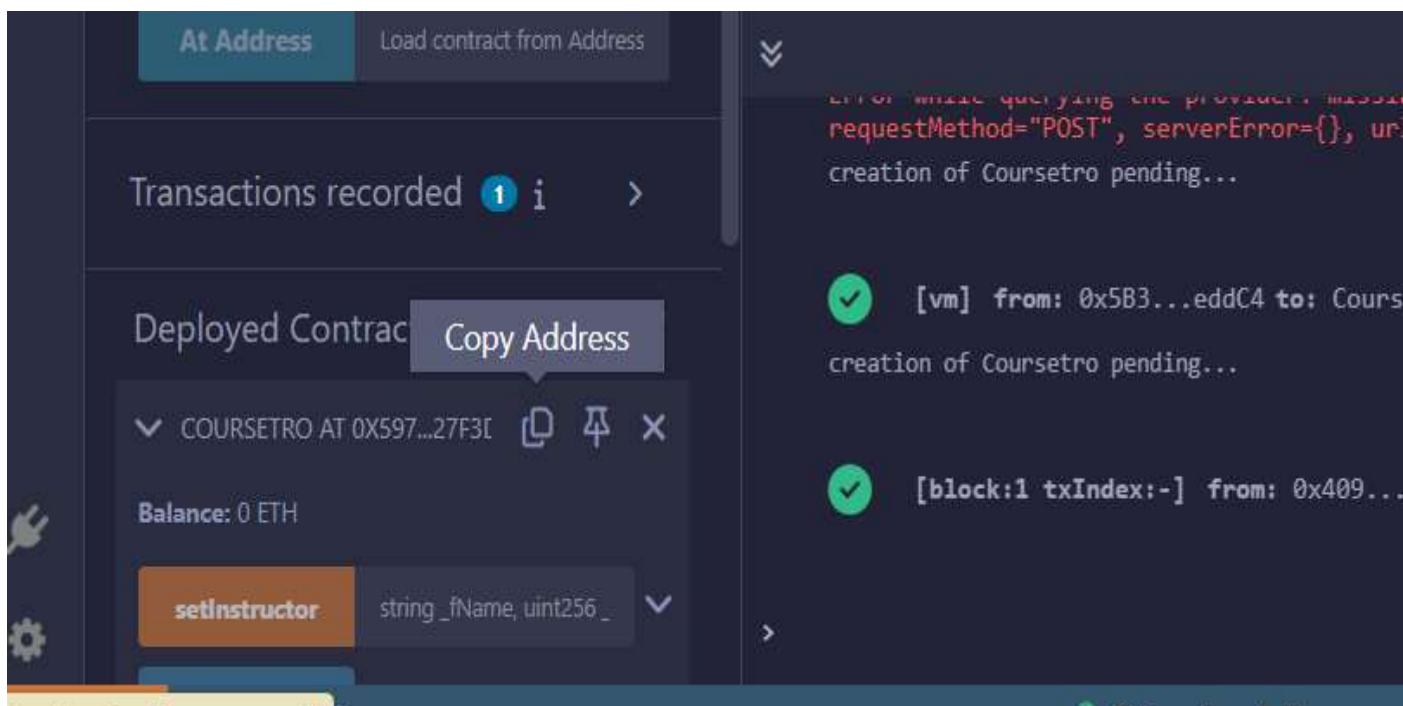
Step 4: Creating the UI

Update index_lab3.html

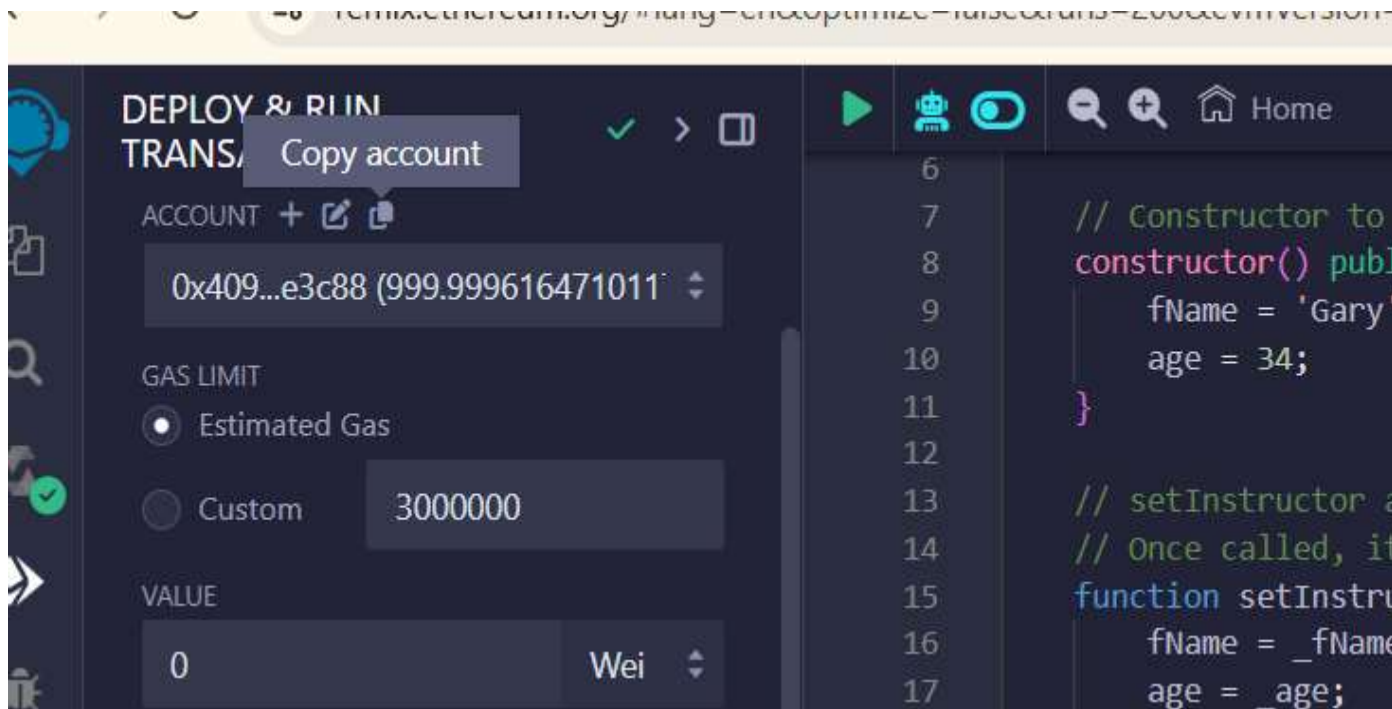
copy ABI and copy contract address



Copy deployed contract address



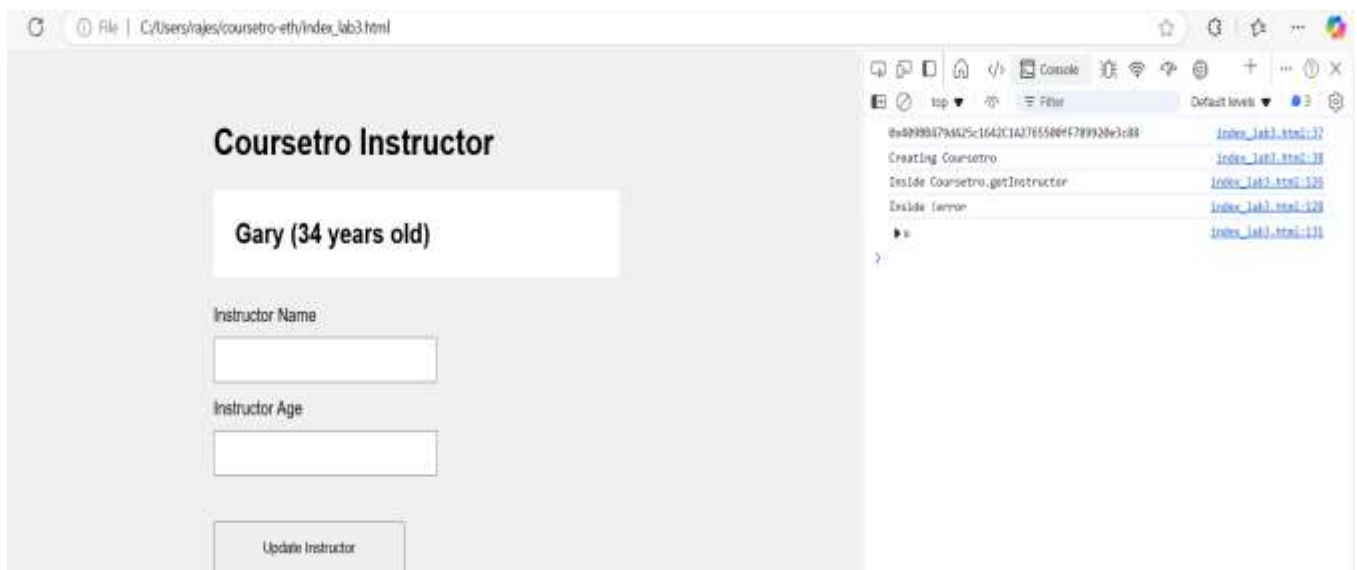
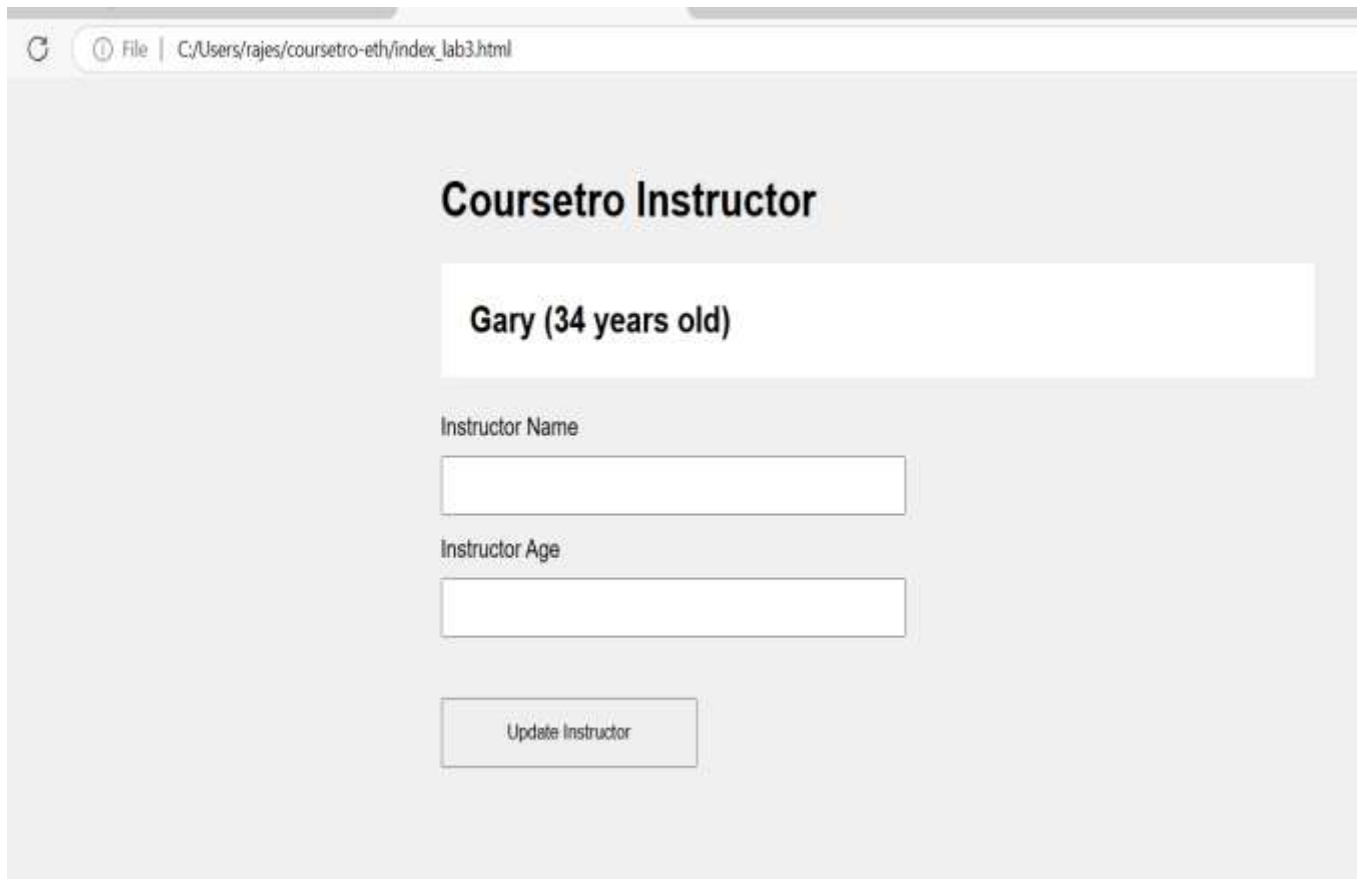
copy account address



Step 5:

Using Web3.js to Connect & Interact with the Smart Contract

open index_lab3.html and wait a bit



set name and age

File | C:/Users/rajes/coursetro-eth/index_lab3.html

Coursetro Instructor

Gary (34 years old)

Instructor Name

Instructor Age

Update Instructor

go to Remix Ethereum IDE and getInstructor

The screenshot displays the Remix Ethereum IDE interface. On the left, the 'Contract' panel shows the 'Coursetro' contract with a balance of 0 ETH. The 'Functions' list includes 'setInstructor', 'age', 'fName', and 'getInstructor'. The 'getInstructor' function is selected, and its parameters are shown as '0: string: pari' and '1: uint256: 23'. The 'Low level interactions' panel shows the 'CALLDATA' for the 'getInstructor' function. The main editor displays the Solidity code for the 'getInstructor' function, which is a public constant function returning a string and a uint. The 'Transactions' panel on the right shows a list of transactions, including the creation of the 'Coursetro' contract and a call to the 'getInstructor' function.

```
22 function getInstructor() public constant returns (string, uint) {
23     return (fName, age);
24 }
25 }
26
```

creation of Coursetro pending...

[block:1 txIndex:-] from: 0x409...e3c88 to: Coursetro.(constructor) value: 0 wei data: 0x608...a0029 logs: 0 hash: 0xb44...5d7d9

call to Coursetro.getInstructor

[call] from: 0x40988479dA25c1642C1A2765580FF789920e3c88 to: Coursetro.getInstructor() data: 0x3c1...b81a5

see the instructor from index_lab3.html

Coursetro Instructor

Gary (34 years old)

Instructor Name

Priyanka

Instructor Age

25

Update Instructor

0x4098B479dA25c1642C1A2765500FF789920e3c88 [index_lab3.html:37](#)
Creating Coursetro [index_lab3.html:38](#)
Inside Coursetro.getInstructor [index_lab3.html:126](#)
Inside ferror [index_lab3.html:128](#)
▶ u [index_lab3.html:131](#)
Inside click [index_lab3.html:145](#)
>

Balance: 0 ETH

setInstructor string fName, uint256

age

fName

getInstructor

0: string: Priyanka

1: uint256: 25

Low level interactions

CALLDATA

Transact

```
21 // a string and a uint, this is where we return fName and age.  
22 function getInstructor() public constant returns (string, uint) { Infinite gas  
23     return (fName, age);  
24 }  
25 }  
26
```

⌵

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✓ [block:1 txIndex:-] from: 0x409...e3c88 to: Coursetro.(constructor) value: 0 wei data: 0x508...a0029 logs:
call to Coursetro.getInstructor

out: [call] from: 0x4098B479dA25c1642C1A2765500FF789920e3c88 to: Coursetro.getInstructor() data: 0x3c1...b81a5
call to Coursetro.getInstructor

out: [call] from: 0x4098B479dA25c1642C1A2765500FF789920e3c88 to: Coursetro.getInstructor() data: 0x3c1...b81a5

