

APPLICATION :1. Decentralized Greeting DApp

PROBLEM STATEMENT:

Objective: Expand the basic greeting smart contract into a functional DApp.

Key Features:

Create a smart contract to store and update greetings.

Build a frontend where users can read and update the greeting.

Connect the frontend with Ethereum using web3.js.

Objectives:

Basics of smart contracts, web3.js integration, and DApp structure.

Tools:

Solidity, Truffle, Ganache, MetaMask, and HTML/JavaScript.

Application Development Process:

Step→1

→Create a folder with command in command prompt

```
mkdir Greetings-dapp
```

→Change the directory

```
cd Greetings-dapp
```

→for creating folders contracts,migrations,test use

```
truffle init
```

Step→2

→**ADD Greetings.sol code in contracts folder:**

```
// SPDX-License-Identifier: MIT
```

```
pragma solidity ^0.8.0;
```

```
contract Greeting {
    string public greeting;
    constructor(string memory _initialGreeting) {
        greeting = _initialGreeting;
    }
    function setGreeting(string memory _newGreeting) public {
        greeting = _newGreeting;
    }
    function getGreeting() public view returns (string memory) {
        return greeting;
    }
}
```

What happens in Greetings.sol-

- When deployed, the contract initializes the greeting with the value passed to the constructor.
- Users can call getGreeting() to retrieve the current greeting stored in the contract.
- Users can also call setGreeting() to update the greeting. Each update is a transaction that changes the state on the Ethereum blockchain.

→**ADD 2_deploy_contracts.js code in migrations folder:**

```
const Greeting = artifacts.require("Greeting");
```

```
module.exports = function (deployer) {  
  deployer.deploy(Greeting, "Hello, World!");  
};
```

→**Changes in the truffle-config.js:**

```
module.exports = {  
  networks: {  
    development: {  
      host: "127.0.0.1", // Localhost (default Ganache)  
      port: 7545, // Ganache default port  
      network_id: "5777", // Ganache network ID  
      gas: 6721975, // Gas limit  
      gasPrice: 20000000000, // Gas price (20 Gwei)  
    },  
  },  
  compilers: {  
    solc: {  
      version: "0.8.21", // Use the same version as your Solidity contract  
    },  
  },  
};
```

.....
Step→3

Compile and migrate truffle into the ganache:

```
→truffle compile  
→truffle migrate  
→truffle migrate --network development
```

.....
Step→4

Index.html with javascript:

```
<!DOCTYPE html>  
<html lang="en">  
<head>
```

```
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Greeting DApp</title>
<script src="https://cdn.jsdelivr.net/npm/web3@latest/dist/web3.min.js"></script>
<style>
  /* General Reset */
  * {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
  }

  /* Body Styling */
  body {
    font-family: Arial, sans-serif;
    background-color: #f4f4f9;
    display: flex;
    justify-content: center;
    align-items: center;
    height: 100vh;
  }

  /* Container Box Styling */
  .container {
    background-color: white;
    border-radius: 10px;
    padding: 30px;
    box-shadow: 0 4px 10px rgba(0, 0, 0, 0.1);
    width: 400px;
    text-align: center;
  }

  /* Heading Styling */
  h1 {
    font-size: 24px;
    margin-bottom: 20px;
    color: #333;
  }

  /* Form Elements Styling */
  label {
    font-size: 16px;
    color: #333;
    margin-bottom: 5px;
    display: block;
  }

  input {
```

```

width: 100%;
padding: 10px;
margin-bottom: 20px;
border: 1px solid #ccc;
border-radius: 5px;
font-size: 16px;
}

button {
  background-color: powderblue;
  color: black;
  border: none;
  padding: 10px 20px;
  font-size: 16px;
  border-radius: 5px;
  cursor: pointer;
  transition: background-color 0.3s;
}

button:hover {
  background-color: pink;
}

/* Display the current greeting text */
p {
  font-size: 18px;
  margin-bottom: 20px;
  color: #333;
}

#greeting {
  font-weight: bold;
  color: #4CAF50;
}
</style>
</head>
<body>
<div class="container">
  <h1>Decentralized Greeting DApp</h1>

  <!-- Display Current Greeting -->
  <!-- <p><strong>Current Greeting:</strong> <span id="greeting"></span></p> -->

  <!-- Input to Set New Greeting -->
  <b><label for="newGreeting">New Greeting:</label></b>
  <input type="text" id="newGreeting" placeholder="Enter a new greeting"><br><br>

  <!-- Input for Ethereum Address -->

```

```
<b><label for="address">Ethereum Address:</label></b>
<input type="text" id="address" placeholder="Enter Ethereum address"><br><br>
```

```
<button onclick="setGreeting()">Set Greeting</button>
</div>
```

```
<script>
let web3;
let contract;

// Replace with your deployed contract address
const contractAddress = "0xF057cb13FcB710fFD9a131781DC55d7E0111d966";

const contractABI = [
  {
    "inputs": [
      { "internalType": "string", "name": "_initialGreeting", "type": "string" }
    ],
    "stateMutability": "nonpayable",
    "type": "constructor"
  },
  {
    "inputs": [],
    "name": "getGreeting",
    "outputs": [
      { "internalType": "string", "name": "", "type": "string" }
    ],
    "stateMutability": "view",
    "type": "function"
  },
  {
    "inputs": [
      { "internalType": "string", "name": "_newGreeting", "type": "string" }
    ],
    "name": "setGreeting",
    "outputs": [],
    "stateMutability": "nonpayable",
    "type": "function"
  },
  {
    "inputs": [],
    "name": "greeting",
    "outputs": [
      { "internalType": "string", "name": "", "type": "string" }
    ],
    "stateMutability": "view",
    "type": "function"
  }
]
```

```

];

// Initialize Web3 and connect to Ganache
async function init() {
  web3 = new Web3(new Web3.providers.HttpProvider("http://localhost:7545"));

  // Set up the contract
  contract = new web3.eth.Contract(contractABI, contractAddress);

  // Display the current greeting
  const currentGreeting = await contract.methods.getGreeting().call();
  document.getElementById("greeting").innerText = currentGreeting;
}

// Set new greeting
async function setGreeting() {
  const newGreeting = document.getElementById("newGreeting").value;
  const address = document.getElementById("address").value;

  // Validate that the address is not empty
  if (!web3.utils.isAddress(address)) {
    alert("Please enter a valid Ethereum address.");
    return;
  }

  // Send a transaction to update the greeting from the specified address
  await contract.methods.setGreeting(newGreeting).send({
    from: address,
    gas: 3000000 // Ensure enough gas is available for the transaction
  });

  // Refresh the displayed greeting
  const updatedGreeting = await contract.methods.getGreeting().call();
  document.getElementById("greeting").innerText = updatedGreeting;
}

window.onload = init;
</script>
</body>
</html>

```

Copy the contract address after migrating and keep it in js:

const contractAddress = "0x8a8E7ae0D059371a331f0510007E330321ACDf99";

```
2_deploy_contracts.js
=====

Replacing 'Greeting'
-----
> transaction hash:    0x2aa9901e633cdbaa35d7ebfbdf56af512215976a674f1376b9b0d0ae7bf5ae7d
> Blocks: 0           Seconds: 0
> contract address:   0x4a9e4E02665fB6b0fcfcF156C7f3cc9a1c614596
> block number:       9
> block timestamp:    1734502483
> account:            0x8a8E7ae0D059371a331f0510007E330321ACDf99
> balance:            99.98417969301446192
> gas used:           367070 (0x599de)
> gas price:          2.823735474 gwei
> value sent:         0 ETH
> total cost:         0.00103650858044118 ETH

> Saving artifacts
-----
> Total cost:         0.00103650858044118 ETH

Summary
=====
> Total deployments:   1
> Final cost:          0.00103650858044118 ETH
```

Run:

npm http-server

Copy the url and open in chrome

.....

OUTPUTS:::

truffle compile

```
Microsoft Windows [Version 10.0.22631.4460]
(c) Microsoft Corporation. All rights reserved.

C:\Users\SIDDU\OneDrive\Desktop\Greetings>truffle compile

Compiling your contracts...
=====
> Compiling .\contracts\Greeting.sol
> Artifacts written to C:\Users\SIDDU\OneDrive\Desktop\Greetings\build\contracts
> Compiled successfully using:
   - solc: 0.8.0+commit.c7dfd78e.Emscripten.clang

C:\Users\SIDDU\OneDrive\Desktop\Greetings>truffle migrate

Compiling your contracts...
=====
> Compiling .\contracts\Greeting.sol
> Artifacts written to C:\Users\SIDDU\OneDrive\Desktop\Greetings\build\contracts
> Compiled successfully using:
   - solc: 0.8.0+commit.c7dfd78e.Emscripten.clang

Starting migrations...
=====
> Network name:      'development'
> Network id:        5777
> Block gas limit: 6721975 (0x6691b7)
```

truffle migrate

→truffle migrate --network development

```
C:\Users\SIDDU\OneDrive\Desktop\Greetings>truffle migrate

Compiling your contracts...
=====
> Compiling .\contracts\Greeting.sol
> Artifacts written to C:\Users\SIDDU\OneDrive\Desktop\Greetings\build\contracts
> Compiled successfully using:
   - solc: 0.8.0+commit.c7dfd78e.Emscripten.clang

Starting migrations...
=====
> Network name:      'development'
> Network id:        5777
> Block gas limit: 6721975 (0x6691b7)

2_deploy_contracts.js
=====

Deploying 'Greeting'
-----
> transaction hash:  0xcfdc553b549def4b1a4f2a3360e4b897fb47cc63402f09da85c49caeefbc6e78
> Blocks: 0         Seconds: 0
> contract address: 0x69C54EaC39a9B0c641cA0981cF27499a9A391dBA
> block number:     2
> block timestamp:  1734500289
> account:          0x8a8E7ae0D059371a331f0510007E330321ACDf99
> balance:          99.98744104595883309
> gas used:          367070 (0x599de)
> gas price:         3.284098513 gwei
> value sent:        0 ETH
> total cost:        0.00120549404116691 ETH

> Saving artifacts
-----
> Total cost:        0.00120549404116691 ETH

Summary
=====
```


Greeting Dapp → npx http-server

Now any greeting message like Siddu_sunkara and give the ethereum address and click set greeting, then the greeting gets added and the transaction will be included in the blockchain.

Decentralized Greeting DApp

New Greeting:

Ethereum Address:

Set Greeting

Ganache::

Ganache									
ACCOUNTS BLOCKS TRANSACTIONS CONTRACTS EVENTS LOGS									
SEARCH FOR BLOCK NUMBERS OR TX HASHES									
CURRENT BLOCK	GAS PRICE	GAS LIMIT	HARDFORK	NETWORK ID	RPC SERVER	MINING STATUS	WORKSPACE	SAVE	SWITCH
7	20000000000	6721975	MERGE	5777	HTTP://127.0.0.1:7545	AUTOMINING	QUICKSTART		
BLOCK 7	MINED ON 2024-12-18 11:33:09					GAS USED 21508	1 TRANSACTION		
BLOCK 6	MINED ON 2024-12-18 11:32:58					GAS USED 21628	1 TRANSACTION		
BLOCK 5	MINED ON 2024-12-18 11:32:48					GAS USED 21628	1 TRANSACTION		
BLOCK 4	MINED ON 2024-12-18 11:09:59					GAS USED 21544	1 TRANSACTION		
BLOCK 3	MINED ON 2024-12-18 11:08:52					GAS USED 367070	1 TRANSACTION		
BLOCK 2	MINED ON 2024-12-18 11:08:09					GAS USED 367070	1 TRANSACTION		
BLOCK 1	MINED ON 2024-12-18 10:01:16					GAS USED 567673	1 TRANSACTION		
BLOCK 0	MINED ON 2024-12-18 09:42:15					GAS USED 0	NO TRANSACTIONS		

Now select any address you wish from available accounts-(I chose the highlighted account address)

Ganache

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK
7

GAS PRICE
2000000000

GAS LIMIT
6721975

HARDFORK
MERGE

NETWORK ID
5777

RPC SERVER
HTTP://127.0.0.1:7545

MINING STATUS
AUTOMINING

WORKSPACE
QUICKSTART

SAVE

SWITCH

MNEMONIC ?

burger spin shed more neck wheel wonder play piece moment anger rate

HD PATH

m44'60'0'0account_index

ADDRESS	BALANCE	TX COUNT	INDEX	
0x8a8E7ae0D059371a331f0510007E330321ACDf99	99.99 ETH	3	0	
ADDRESS	BALANCE	TX COUNT	INDEX	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	100.00 ETH	4	1	

We can see that the transaction is added to the selected address.

Ganache

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK
9

GAS PRICE
2000000000

GAS LIMIT
6721975

HARDFORK
MERGE

NETWORK ID
5777

RPC SERVER
HTTP://127.0.0.1:7545

MINING STATUS
AUTOMINING

WORKSPACE
QUICKSTART

SAVE

SWITCH

MNEMONIC ?

burger spin shed more neck wheel wonder play piece moment anger rate

HD PATH

m44'60'0'0account_index

ADDRESS	BALANCE	TX COUNT	INDEX	
0x8a8E7ae0D059371a331f0510007E330321ACDf99	99.98 ETH	5	0	
ADDRESS	BALANCE	TX COUNT	INDEX	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	100.00 ETH	4	1	

Transactions after sending Greetings from html page:

Ganache

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK
10

GAS PRICE
2000000000

GAS LIMIT
6721975

HARDFORK
MERGE

NETWORK ID
5777

RPC SERVER
HTTP://127.0.0.1:7545

MINING STATUS
AUTOMINING

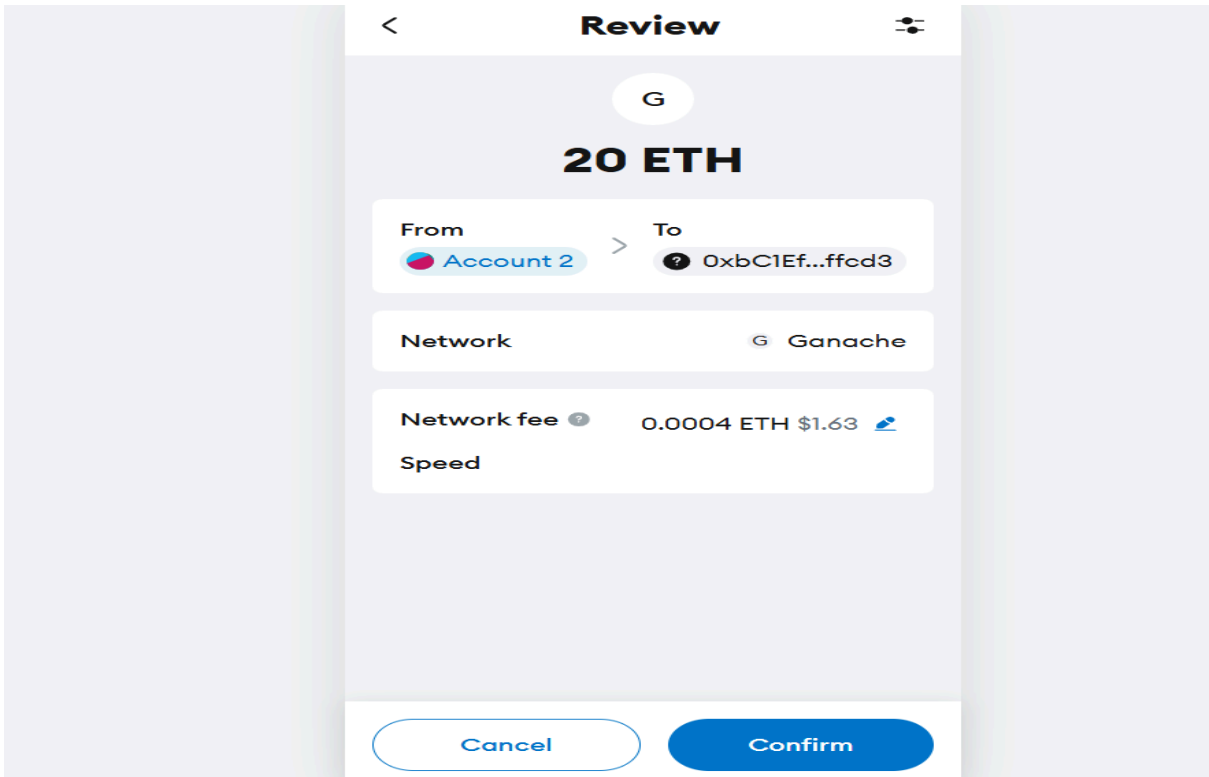
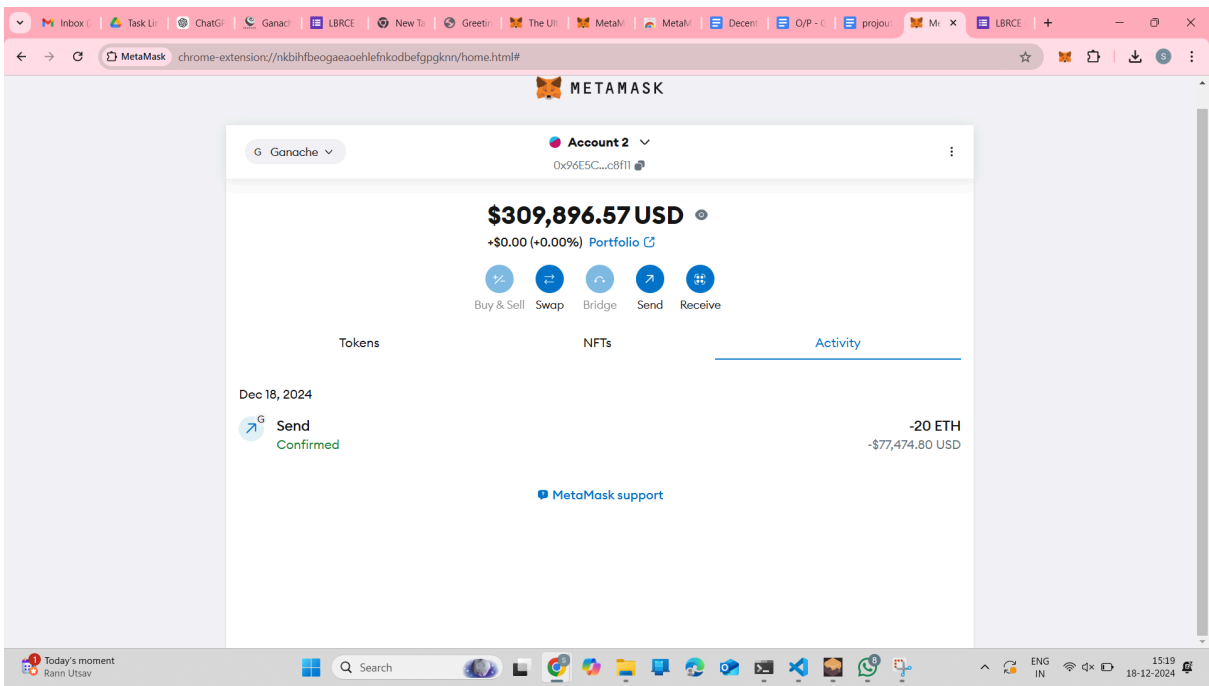
WORKSPACE
QUICKSTART

SAVE

SWITCH

TX HASH				CONTRACT CALL
0x32385396ce8fe49dda4b636094a36c67ce27f613babf366cf7d9c5cab507bdf				
FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	0xF057cb13FcB710fFD9a131781DC55d7E0111d966	21508	0	
TX HASH				CONTRACT CALL
0x9ed6d9270eae496fae72733b15c212c040d5e5534c698bf517e9bb9d27f7a837				
FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	0xF057cb13FcB710fFD9a131781DC55d7E0111d966	21628	0	
TX HASH				CONTRACT CALL
0xe498cb19677307125d05d3c6817e9965639a0ea405f85679068b3096582a438e				
FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	0xF057cb13FcB710fFD9a131781DC55d7E0111d966	21628	0	
TX HASH				CONTRACT CALL
0xb30be0bdbde3243396894d8d6573dac228dfc6d60eef2ecfab0b389524550cff				
FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	0xF057cb13FcB710fFD9a131781DC55d7E0111d966	21544	0	
TX HASH				CONTRACT CREATION
0x41d31469f55dfee3b90d43ecd4c18d2db6650f6958e74a91fcb7714184adb4c2				
FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE	
0x96E5C2B99F234Dfb37247ef0ADd3bAcDFf5c8f11	0xF057cb13FcB710fFD9a131781DC55d7E0111d966	21544	0	

METAMASK:



Value Transfer::

Ganache

— □ ×

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

Q

CURRENT BLOCK10

GAS PRICE2000000000

GAS LIMIT6721975

HARDFORKMERGE

NETWORK ID5777

RPC SERVERHTTP://127.0.0.1:7545

MINING STATUSAUTOMINING

WORKSPACEQUICKSTART

SAVE

SWITCH

TX HASH

0x64822afc6eb7fdd36f85806a1d3eaf57168a1523775967f94ce3d53b2027ae44

VALUE TRANSFER

FROM ADDRESS

TO ADDRESS

GAS USED

VALUE

0x96E5C2B99F234Dfb37247ef0ADd3bAcdFF5c8f11

0xbC1EfF70B669EE060639c8AeaDd6e84283dffcd3

21000

2000000000000000000

TX HASH

0x2aa9901e633cdbaa35d7ebfbdf56af512215976a674f1376b9b0d0ae7bf5ae7d

CONTRACT CREATION

FROM ADDRESS

CREATED CONTRACT ADDRESS

GAS USED

VALUE

0x8a8E7ae0D059371a331f0510007E330321ACDf99

0x4a9e4E02665fB6b0fcfcF156C7f3cc9a1c614596

367070

0

TX HASH

0x5d79f8601422f9ad8516c0a461fba60e9d44180afc12727976d97951150789fc

CONTRACT CREATION

FROM ADDRESS

CREATED CONTRACT ADDRESS

GAS USED

VALUE

0x8a8E7ae0D059371a331f0510007E330321ACDf99

0xBD68115fcCaD6106EE91BBED38EAdc13e9B5a6Af

367070

0

TX HASH

0x32385396ce8fe49dda4b636094a36c67ce27f613babf366cf7d9c5cab507bdf

CONTRACT CALL

FROM ADDRESS

TO CONTRACT ADDRESS

GAS USED

VALUE

0x96E5C2B99F234Dfb37247ef0ADd3bAcdFF5c8f11

0xF057cb13FcB710fFD9a131781DC55d7E0111d966

21508

0