Subject: - CCMP-606-T01 Integrated Services Using Smart Contracts

Title: - Smart Contract for Freelance Service Management

Professor: - Prakhyat Khati

Project Details:
https://github.com/yash91066/block_chain_freelancer.git

Members: - Aksh Patel, Prem Solanki, Yash Patel

1. Problem Definition

The freelance economy has grown rapidly, but it still faces several challenges:

1. **Trust Issues**: Clients may hesitate to pay upfront, while freelancers worry about not receiving payments after completing work.
2. **Manual Processes**: Relying on intermediaries or platforms increases overhead costs and delays.
3. **Lack of Accountability**: No transparent system exists for enforcing agreed-upon terms or collecting reliable feedback.

Proposed Solution

This project implements a **Freelance Service Management Smart Contract** on the Ethereum blockchain to:

- Provide a transparent, automated system to manage freelance contracts.
- Secure payments through deposits in the blockchain until task completion.
- Enable feedback mechanisms for future client-freelancer relationships.

The smart contract eliminates the need for intermediaries, reduces transaction costs, and ensures fair dealings between parties.

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2. Design and Architecture

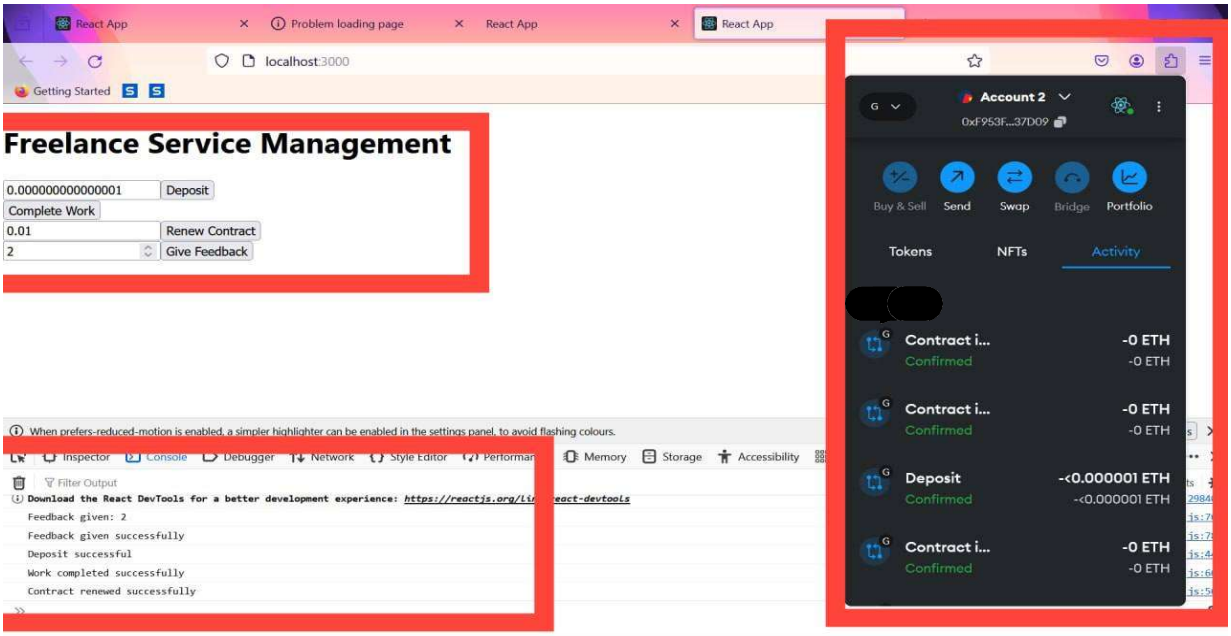
How It Works

1. **Client deposits money**: The client deposits funds into the smart contract. This money is locked in until the freelancer completes their work.
2. **Freelancer finishes the task**: The freelancer notifies the contract when the work is done. The system checks and releases the payment.
3. **Feedback is provided**: The client gives a rating to the freelancer, which is stored on the blockchain for future reference.

Tools Used

- **Ethereum Blockchain**: The backend where all transactions and functions are executed securely.
- **Ganache**: A tool to simulate a blockchain locally for testing purposes.
- **Truffle**: Used to write, compile, and deploy the smart contract.
- **MetaMask**: A browser extension for handling blockchain accounts and transactions.
- **Frontend Web Interface**: A user-friendly interface to interact with the contract.

System Diagram



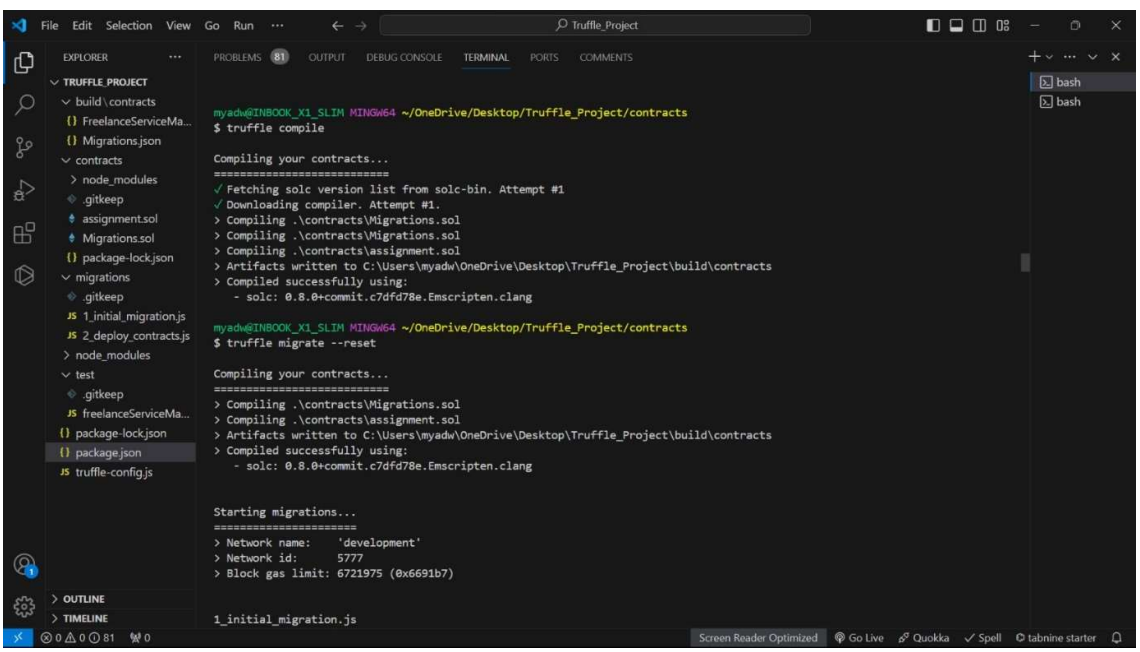
3. Implementation

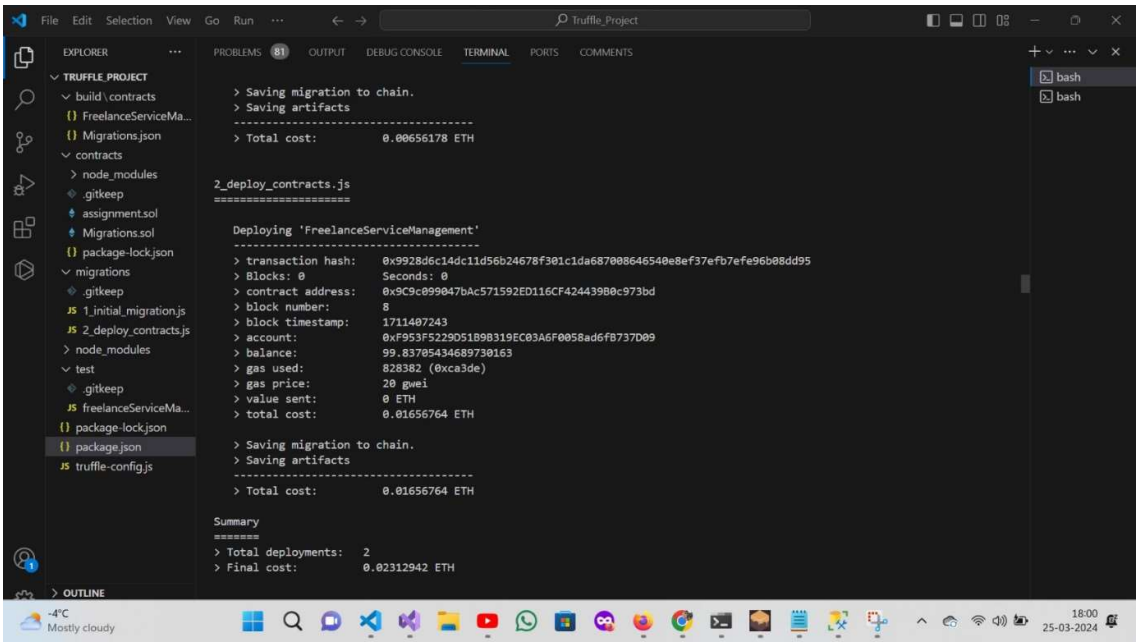
Setup Process

1. **Install Required Tools**
    - Install **Node.js** to manage dependencies.
    - Install **Truffle** (a framework for Ethereum development).
    - Download and install **Ganache** to simulate a blockchain locally.

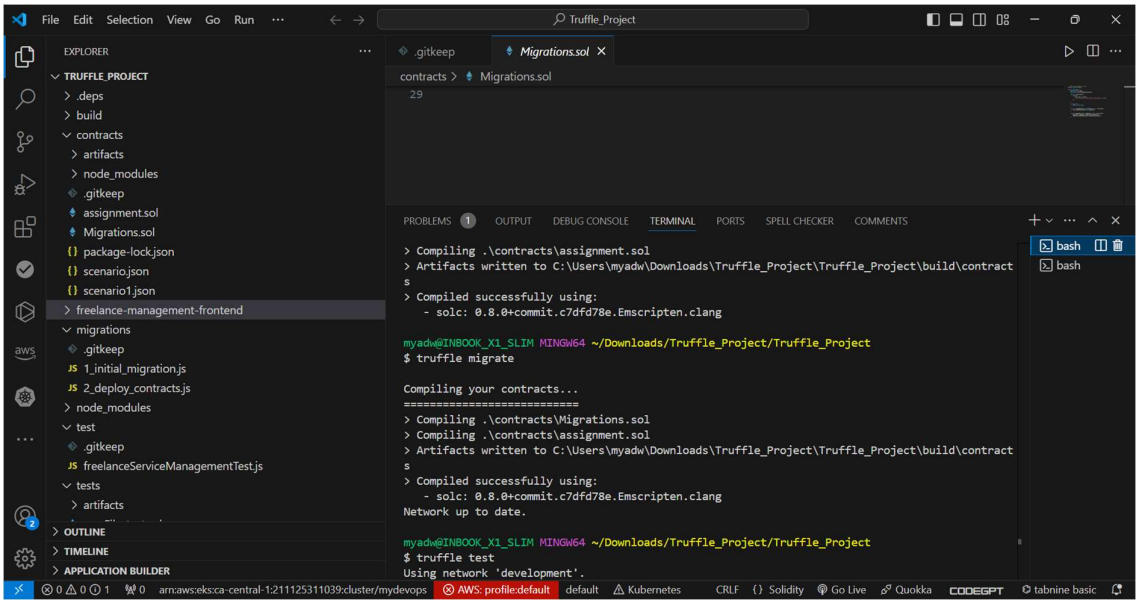
2. **Project Setup**
    - Extract the project files into a folder.
    - Open the folder in VS Code or another editor.
3. **Run the Blockchain**
    - Start Ganache, which creates a local blockchain.
    - Note the network address (e.g., http://127.0.0.1:7545).
4. **Deploy the Smart Contract**
    - Open a terminal in the project folder and run the following commands:

truffle compile # Compile our the smart contract





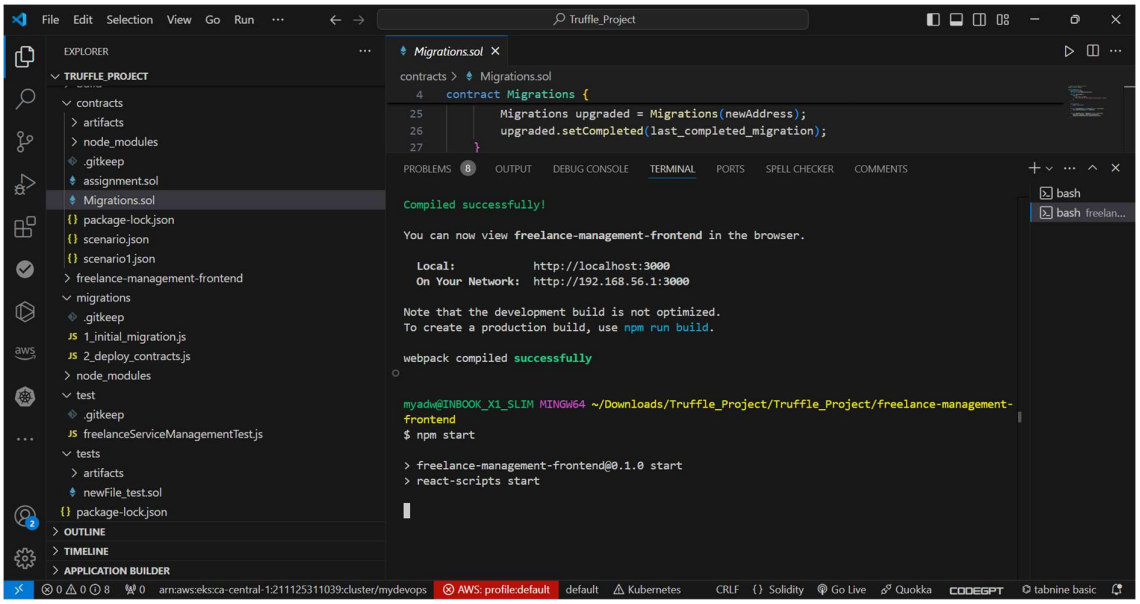
truffle migrate # Deploy the smart contract



5. **Launch the Frontend**
    - Navigate to the frontend folder:

      cd freelance-management-frontend

      npm start



    - Open your browser and access the interface.
6. **Connect MetaMask**
    - Set MetaMask to connect to the Ganache network.
    - Use the accounts from Ganache for testing the system.

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4. Key Functionalities

1. Deposit Funds

- **Functionality**:

  The client deposits an agreed amount (e.g., 0.000000000000001 ETH).
    - The smart contract locks the funds and confirms the transaction, ensuring payment security and initiating the contract workflow.

1.1 Details of Deposit Functionality:

- **Input Parameter Format**:

  The deposit function expects an input value in Ether, specifically 0.000000000000001 ETH for testing purposes. This amount must be provided in the **transaction value field** during the transaction, not passed as an argument to the function.

- **Expected Result**:
  - If the exact value of 0.000000000000001 ETH is sent:
    - The smart contract records the deposit successfully.
    - A success message is displayed in the console.
  - If a different amount is entered:
    - The transaction fails and reverts.
    - An error message explains that the deposit amount must match the exact required value.

This ensures the system adheres to agreed terms and protects both the client and freelancer from unintended discrepancies.

2. Complete Work

- **Functionality**:

  The freelancer, upon completing their assigned task, invokes the completeWork() function.
  - The system automatically transfers the locked funds to the freelancer's address.
  - The contract verifies task completion before executing the transfer, ensuring the freelancer is paid securely and trustlessly.

3. Renew Contract

- **Functionality**:

  If both the client and freelancer agree, they can extend the contract for additional work by invoking the renewContract() function.
  - This allows renegotiation of terms without creating a new contract, simplifying ongoing collaborations.

    - Ensures efficient contract management for long-term partnerships.

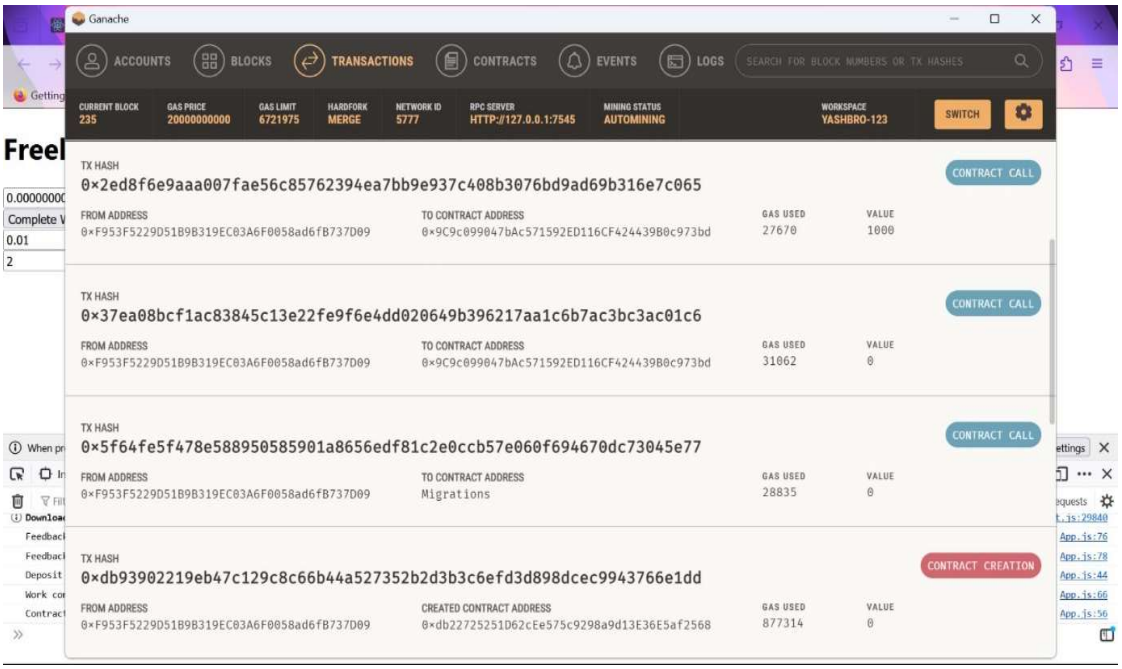
4. Feedback System

- **Functionality**:
  The client provides feedback on the freelancer's performance using the giveFeedback() function.
    - The feedback is recorded on the blockchain, contributing to the freelancer's reputation.
    - This stored rating ensures transparency and accountability for future engagements.

Test Results

The smart contract was tested successfully in the following scenarios:

Function	Action Taken	Result
Deposit	Client deposited funds	Funds locked in the contract.
Complete Work	Freelancer marked task complete	Funds released successfully.
Renew Contract	Updated contract terms	Contract renewed successfully.
Feedback	Client provided feedback	Rating stored on blockchain.


Ganache
ACCOUNTS
BLOCKS
TRANSACTIONS
CONTRACTS
EVENTS
LOGS
SEARCH FOR BLOCK NUMBERS OR TX HASHES
CURRENT BLOCK 235
GAS PRICE 20000000000
GAS LIMIT 6721975
HARDFORK MERGE
NETWORK ID 5777
RPC SERVER HTTP://127.0.0.1:7545
MINING STATUS AUTOMINING
WORKSPACE YASHBRO-123
SWITCH
TX HASH
0x2ed8f6e9aaa007fae56c85762394ea7bb9e937c408b3076bd9ad69b316e7c065
CONTRACT CALL
FROM ADDRESS
0xF953F5229D51B9B319EC03A6F0058ad6fB737D09
TO CONTRACT ADDRESS
0x9C9c099047bAc571592ED116CF424439B0c973bd
GAS USED
27670
VALUE
1000
TX HASH
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CONTRACT CALL
FROM ADDRESS
0xF953F5229D51B9B319EC03A6F0058ad6fB737D09
TO CONTRACT ADDRESS
0x9C9c099047bAc571592ED116CF424439B0c973bd
GAS USED
31062
VALUE
0
TX HASH
0x5f64fe5f478e588950585901a8656edf81c2e0ccb57e060f694670dc73045e77
CONTRACT CALL
FROM ADDRESS
0xF953F5229D51B9B319EC03A6F0058ad6fB737D09
TO CONTRACT ADDRESS
Migrations
GAS USED
28835
VALUE
0
TX HASH
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CONTRACT CREATION
FROM ADDRESS
0xF953F5229D51B9B319EC03A6F0058ad6fB737D09
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GAS USED
877314
VALUE
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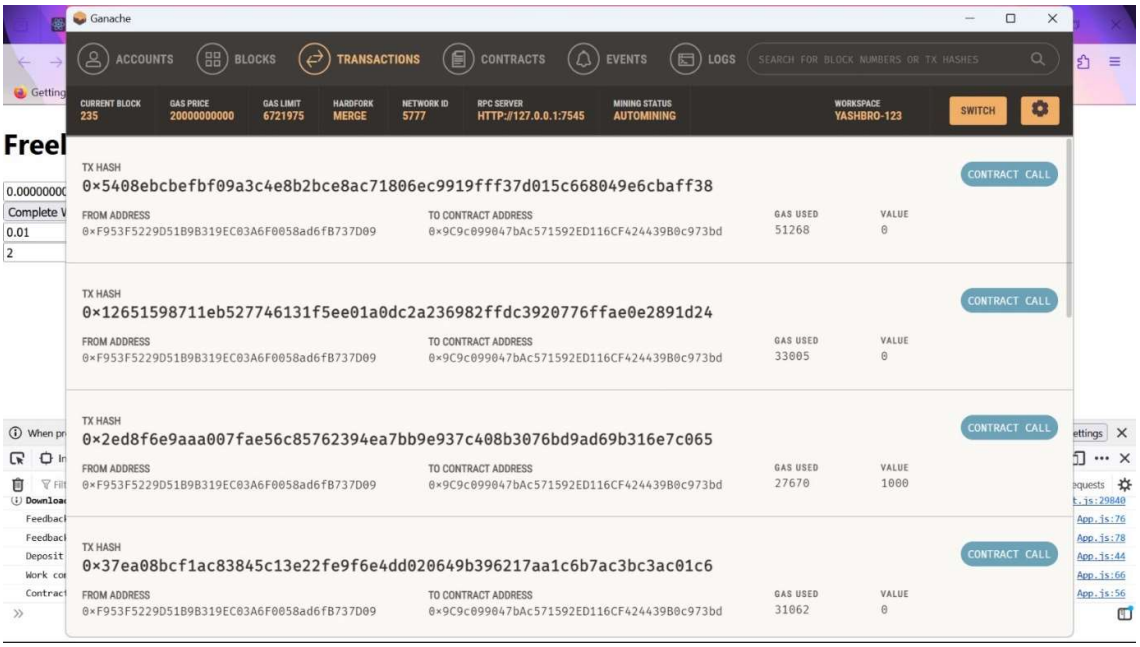
Ganache
ACCOUNTS
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GAS PRICE 20000000000
GAS LIMIT 6721975
HARDFORK MERGE
NETWORK ID 5777
RPC SERVER HTTP://127.0.0.1:7545
MINING STATUS AUTOMINING
WORKSPACE YASHBRO-123
SWITCH
TX HASH
0x5408ebcbefbf09a3c4e8b2bce8ac71806ec9919fff37d015c668049e6cbaff38
CONTRACT CALL
FROM ADDRESS
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TO CONTRACT ADDRESS
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VALUE
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GAS USED
33005
VALUE
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TO CONTRACT ADDRESS
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GAS USED
27670
VALUE
1000
TX HASH
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TO CONTRACT ADDRESS
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GAS USED
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VALUE
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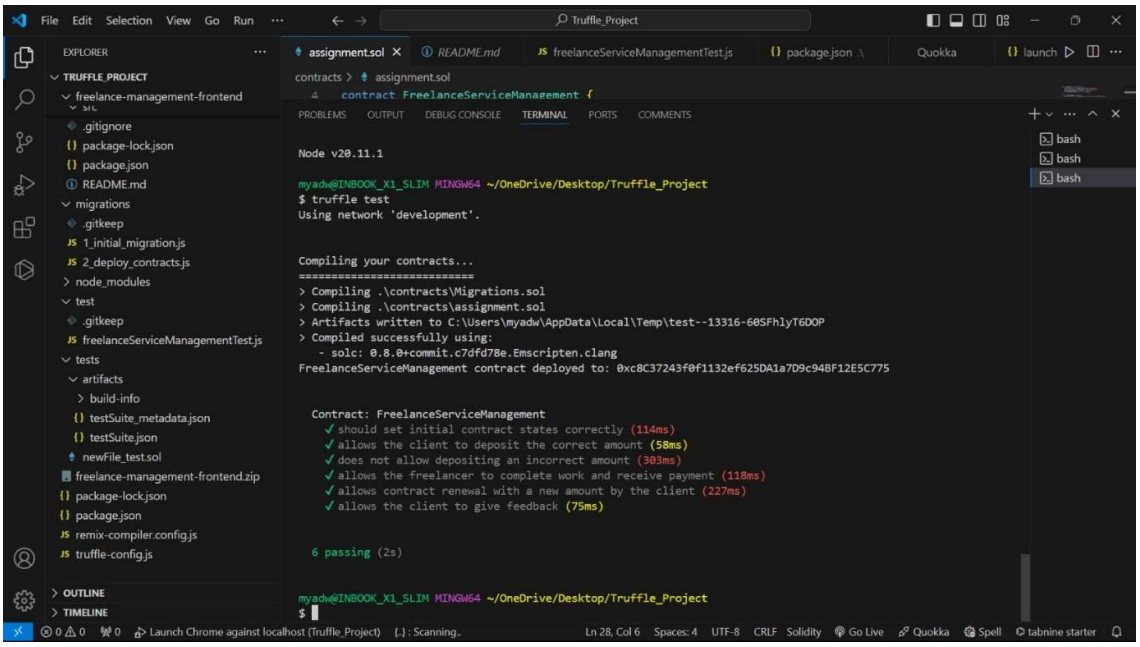

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5. Conclusion

The **Smart Contract for Freelance Service Management** successfully addresses key issues in the freelance industry by:

- Automating payments.
- Enforcing agreed terms.
- Building trust through transparent feedback.

Testing showed that the contract could handle common scenarios like deposits, task completion, and contract renewal efficiently. This project demonstrates how blockchain can improve the reliability and fairness of freelance services, making the process seamless for both clients and freelancers.