



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

School: Campus:

Academic Year: Subject Name: Subject Code:

Semester: Program: Branch: Specialization:

Date:

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiment :

* Coding Phase: Pseudo Code / Flow Chart / Algorithm

Algorithm:

1. User initiates a token transfer on Chain A (Ethereum).
2. Smart contract locks the tokens in a "bridge" contract on Chain A.
3. A message is sent to Chain B (Polygon) to mint equivalent tokens.
4. User receives wrapped tokens on the destination chain.

* Softwares used

1. Remix IDE
2. Solidity ^0.8.x
3. MetaMask Wallet (for multi-chain testing)
4. JavaScript VM for simulation.

* Testing Phase: Compilation of Code (error detection)

```

1 // SPDX-License-Identifier: MIT
2 pragma solidity ^0.8.7;
3
4 contract TokenBridge {
5     mapping(address => uint256) public lockedBalance;
6
7     // Lock tokens on source chain
8     function lockTokens(uint256 _amount) public {    ⛽ infinite gas
9         lockedBalance[msg.sender] += _amount;
10    }
11
12    // Unlock tokens on destination chain
13    function unlockTokens(address _to, uint256 _amount) public {    ⛽ infinite gas
14        require(lockedBalance[_to] >= _amount, "Insufficient locked tokens");
15        lockedBalance[_to] -= _amount;
16        // Mint or transfer equivalent tokens on destination
17    }
18
19    // View locked balance
20    function getLockedTokens(address _user) public view returns (uint256) {    ⛽ 2806 gas
21        return lockedBalance[_user];
22    }
23 }
24

```

Account 1

Deploy a contract

This site wants you to deploy a contract

Estimated changes ?

No changes

Network

S Sepolia

Request from ?

⚠ HTTP localhost:49589

Network fee ? 0.0001

S SepoliaETH

\$0.39

Speed

Market ~12 sec

Max fee ?

0.0001

Cancel

Confirm

Account 1

Transaction request

Estimated changes ?

No changes

Network

S Sepolia

Request from ?

⚠ HTTP localhost:49589

Interacting with ? Alert >

0x6c50F...2837d

Method ?

Lock Tokens

Network fee ? 0.0001

S SepoliaETH

\$0.24

Speed

Market ~12 sec

Cancel

Confirm

* Implementation Phase: Final Output (no error)

Applied and Action Learning

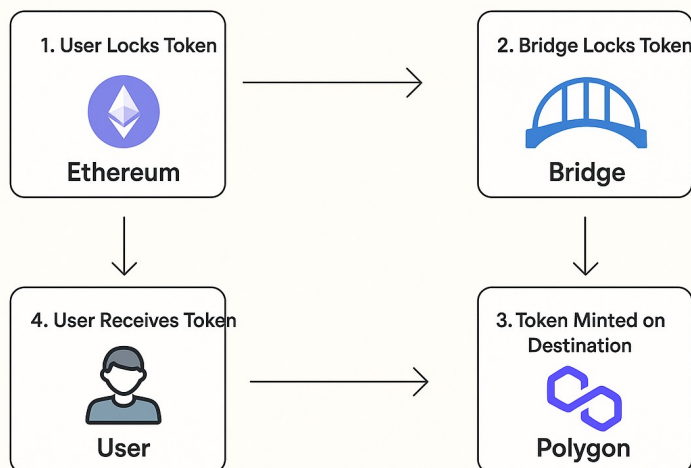
```
creation of TokenBridge pending...

[block:9553273 txIndex:4] from: 0xe4a...ca52e to: TokenBridge.(constructor)
value: 0 wei data: 0x608...e0033 logs: 0 hash: 0xd54...4973f
view on Etherscan view on Blockscout
transact to TokenBridge.lockTokens pending ...

view on Etherscan view on Blockscout

[block:9553279 txIndex:26] from: 0xe4a...ca52e
to: TokenBridge.lockTokens(uint256) 0x6c5...2837d value: 0 wei
data: 0x6e2...00001 logs: 0 hash: 0x144...5d747
```

Cross the Chain – Bridge or Interoperability Demo



* Observations

- 1.The bridge architecture uses a lock-and-mint mechanism to maintain token peg across chains.
- 2.Ideal for DeFi apps requiring cross-chain liquidity sharing.
- 3.Special relayer contracts or oracle networks (e.g., Chainlink CCIP) are used for message passing.
- 4.Cross-chain smart contracts must handle security issues like replay protection and double-spend.

ASSESSMENT

Rubrics	Full Mark	Marks Obtained	Remarks
Concept	10		
Planning and Execution/ Practical Simulation/ Programming	10		
Result and Interpretation	10		
Record of Applied and Action Learning	10		
Viva	10		
Total	50		

Signature of the Student:

Name :

Regn. No. :

Signature of the Faculty:

Page No.....

* As applicable according to the experiment.
Two sheets per experiment (10-20) to be used.