

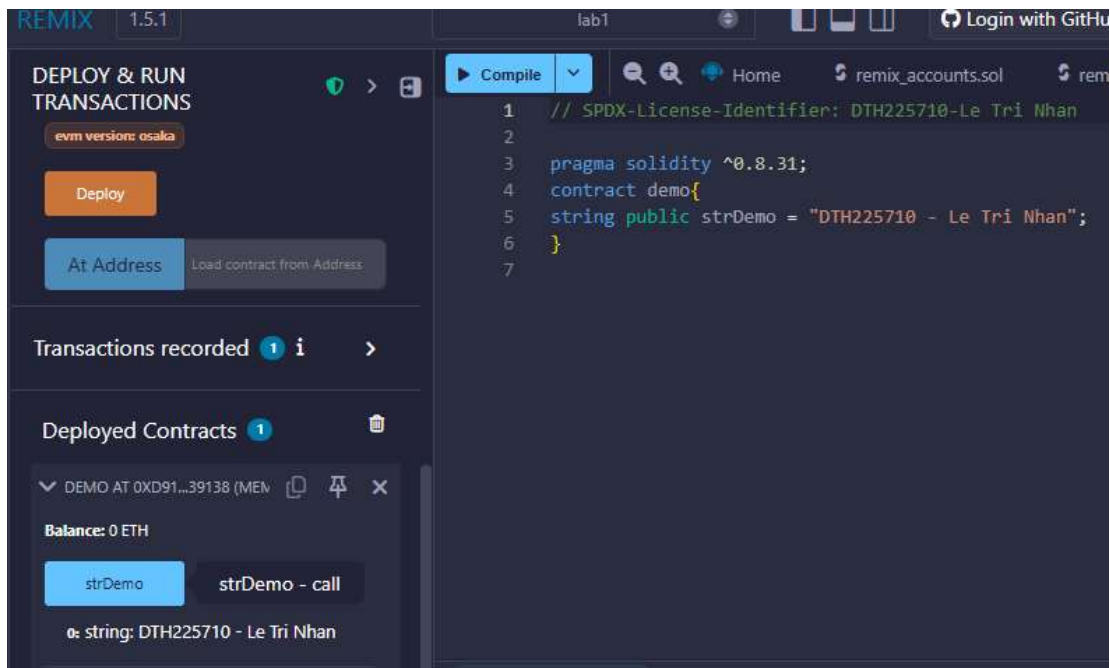
MSSV: DTH225710

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Lớp: DH23TH2

Ngày thực hiện: 22/01/2026

LAB 1:



The screenshot displays the Remix IDE interface. On the left sidebar, the 'DEPLOY & RUN TRANSACTIONS' panel is active, showing the 'evm version: osaka' and a 'Deploy' button. Below it, the 'Transactions recorded' section shows one transaction. The 'Deployed Contracts' section lists a contract named 'demo' at address '0xD91...39138'. The contract's balance is '0 ETH'. Two buttons are visible: 'strDemo' and 'strDemo - call'. The 'strDemo' button is highlighted, and the output below it shows '0: string: DTH225710 - Le Tri Nhan'. The main editor area on the right shows the Solidity code for the 'demo' contract:

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract demo{
5     string public strDemo = "DTH225710 - Le Tri Nhan";
6 }
7
```

LAB 2:

REMI 1.5.1

lab1

Deployed Contracts 2

DEMO AT 0XD91...39138 (MEM)

VARIABLEEXAMPLE AT 0XD88...

Balance: 0 ETH

globalVariable

address: 0x5838Da6a701c568545dCfc803FcB875f56beddC4

localVariable

uint256: 29

statevar

uint256: 9

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4
5 contract VariableExample{
6     uint public statevar = 9;
7     function localVariable() public view returns(uint){ infinite gas
8         uint localVal = 20;
9         return statevar + localVal;
10    }
11    function globalVariable() public view returns (address){ 401 gas
12        return msg.sender;
13    }
14 }
```

data: 0x3fb...0007b logs: 0 hash: 0x033...865e0

call to FunctionsExample.getNumber

[call] from: 0x5838Da6a701c568545dCfc803FcB875f56beddC4 to: FunctionsExample.getNumber() data: 0xf2c...9ecd8

Low level interactions

CALLDATA

Transact

Debug

LAB 3:

DEPLOY & RUN TRANSACTIONS

SIMPLEERC20 AT 0XA13...EAD95

SIMPLEERC20 AT 0XA83...5B10A

SIMPLEERC20 AT 0XBBA...F0CE8

SIMPLEERC20 AT 0XB34...24E5F

SIMPLEERC20 AT 0X14A...94CD0

DATALOCATIONEXAMPLE AT 0X...

ERROREXAMPLE AT 0X24F...B270

CHILD AT 0XAA7...D2BF4 (MEM)

FUNCTIONSEXAMPLE AT 0X96...

Balance: 0 ETH

setNumber 36

getNumber getNumber - call

uint256: 36

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract FunctionsExample {
5     uint number = 99;
6
7     function setNumber(uint _number) public { 22492 gas
8         number = _number;
9     }
10
11     function getNumber() public view returns (uint) { 2431 gas
12         return number;
13     }
14 }
```

Explain contract

AI copilot

Listen on all transactions

Filter with transaction hash or address

creation of FunctionsExample pending...

[vm] from: 0xAb8...35cb2 to: FunctionsExample.(constructor) value: 0 wei data: 0x608...f0033 logs: 0 hash: 0x6bb...d3198

transact to FunctionsExample.setNumber pending ...

Debug

LAB 4:

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract if_else_Example {
5     function checkNumber(uint _number) public pure returns(string memory){
6         if(_number > 10){
7             return "so > 10";
8         }else{
9             return "so <= 10";
10        }
11    }
12 }
```

IF_ELSE_EXAMPLE AT 0X358...E

Balance: 0 ETH

checkNumber 10

0: string: so <= 10

IF_ELSE_EXAMPLE AT 0X358...E

Balance: 0 ETH

checkNumber 11

0: string: so > 10

LAB 5:

DEPLOY & RUN TRANSACTIONS

- DEMO AT 0XD91...39138 (MEM)
- VARIABLEEXAMPLE AT 0XD8B...3
- FUNCTIONSEXAMPLE AT 0XF8E
- IF_ELSE_EXAMPLE AT 0XDA0...4
- IF_ELSE_EXAMPLE AT 0X358...D
- FOR_LOOP_EXAMPLES AT 0X9I

Balance: 0 ETH

sum 9

0: uint256: 45

Compiled

lab1.sol lab2.sol lab3.sol

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract for_loop_Examples{
5     function sum(uint _num) public pure returns (uint){
6         uint total = 0;
7         for(uint i=0;i<=_num;i++){
8             total+=i;
9         }
10        return total;
11    }
12 }
```

Explain contract

AI copil

Listen on all transactions

Filter with transaction hash or ad...

LAB 6:

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract array_Example{
5     uint[] public arrayNumber;
6
7     function addNumber(uint _num) public { 46864 gas
8         arrayNumber.push(_num);
9     }
10
11     function getNumber(uint index) public view returns(uint){
12         return arrayNumber[index];
13     }
14
15     function popNumber() public returns (string memory) {
16         if (arrayNumber.length == 0) {
17             return "mang rong!!";
18         } else {
19             arrayNumber.pop();
20             return "da xoa phan tu cuoi";
21         }
22     }
23 }
```

ARRAY_EXAMPLE AT 0XD2A...F

Balance: 0 ETH

addNumber	1234	▼
popNumber		
arrayNumber	10	▼
0: uint256: 1234		
getNumber	10	▼
0: uint256: 1234		

Xóa mảng

```
decoded output {
  "0": "string: da xoa phan tu cuoi"
}
```

```
decoded input {}
decoded output {
  "0": "string: mang rong!!"
}
```

LAB 7:

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract StructExample{
5     struct Student {
6         string name;
7         uint age;
8     }
9
10    Student[] public students;
11
12    function addStudent(string memory _name, uint _age) public {
13        students.push(Student(_name, _age));
14    }
15
16    function getStudent(uint index) public view returns(string memory,uint){
17        Student memory s = students[index];
18        return (s.name, s.age);
19    }
20 }
```

STRUCTEXAMPLE AT 0XBE4...0

Balance: 0 ETH

addStudent minh thu, 18

getStudent 1

0: string: minh thu
1: uint256: 18

students 1

0: string: name minh thu
1: uint256: age 18

STRUCTEXAMPLE AT 0XBE4...0

Balance: 0 ETH

addStudent minh thu, 18

getStudent 0

0: string: tri nhan
1: uint256: 22

students 0

0: string: name tri nhan
1: uint256: age 22

LAB 8:

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract Mapping_Examples{
5     mapping(address=>uint) public balances;
6
7     function setBalance(uint _value) public{
8         balances[msg.sender] = _value;
9     }
10
11     function getBalance() public view returns(uint){
12         return balances[msg.sender];
13     }
14 }
```

▼ MAPPING_EXAMPLES AT 0X39

Balance: 0 ETH

setBalance	225710	▼
balances	address	▼
getBalance	getBalance - call	

0: uint256: 225710

▼ MAPPING_EXAMPLES AT 0X39

Balance: 0 ETH

setBalance	123456	▼
balances	address	▼
getBalance	getBalance - call	

0: uint256: 123456

LAB 9:

TRANSACTIONS

> FUNCTIONSEXAMPLE AT 0XF8f

> IF_ELSE_EXAMPLE AT 0XDA0_4

> IF_ELSE_EXAMPLE AT 0X358_D

> FOR_LOOP_EXAMPLES AT 0X9C

> ARRAY_EXAMPLE AT 0XD2A_F

> STRUCTEXAMPLE AT 0XB4_0E

> MAPPING_EXAMPLES AT 0X39f

> EVENTEXAMPLE AT 0X9DA_D

Balance: 0 ETH

setValue

123456

value

0: uint256: 123456

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract EventExample{
5     event EventChanged(uint newValue);
6     uint public value;
7     function setValue(uint _value)public{ infinite gas
8         value = _value;
9         emit EventChanged(_value);
10    }
11 }
```

✖ Explain contract

0 ☐ Listen on all transactions 🔍 Filter with tran

decoded input

{
 "uint256 _value": "123456"
}

decoded output

{}

logs

[
 {
 "from": "0x9d4f7c849c208e671315E77CB689811b05EDefe6",
 "topic":
 "0xc3bb07d672a05c6f9c6b4e49e138c0a87683d02b54f1536ff2c05f23acd8fd3a",
 "event": "EventChanged",
 "args": {
 "0": "123456"
 }
 }
]

LAB 10:

TRANSACTIONS

- FUNCTIONSEXAMPLE AT 0XF81
- IF_ELSE_EXAMPLE AT 0XDA0...4
- IF_ELSE_EXAMPLE AT 0X358...D
- FOR_LOOP_EXAMPLES AT 0X9E
- ARRAY_EXAMPLE AT 0XD2A...F1
- STRUCTEXAMPLE AT 0XBE4...0E
- MAPPING_EXAMPLES AT 0X39F
- EVENTEXAMPLE AT 0X9DA...DE
- PAYABLEEXAMPLE AT 0X3CA...**

Balance: 0 ETH

getBalance

0: uint256: 0

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract PayableExample{
5     event Receive(address sender, uint amount);
6     receive() external payable { undefined gas
7         emit Receive(msg.sender, msg.value);
8     }
9
10    function getBalance() public view returns(uint){
11        return address(this).balance;
12    }
13 }
```

Explain contract

input: 0x120...65fe0

output: 0x00

LAB 11:

DEPLOY & RUN TRANSACTIONS

CONTRACT

ModifierExample - DTH225710-LeTriNhan

evm version: osaka

Deploy

At Address An Giang

Transactions recorded 1 i

Deployed Contracts 1

MODIFIEREXAMPLE AT 0XD91...

Balance: 0 ETH

changerOwner An Giang

owner

0: address: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract ModifierExample{
5     address public owner;
6
7     constructor(){ 166252 gas 141800 gas
8         owner = msg.sender;
9     }
10
11     modifier onlyOwner(){
12         require(owner == msg.sender, "khong phai chu so huu");
13         _;
14     }
15
16     function changerOwner(address _newOwner) public onlyOwner{
17         owner = _newOwner;
18     }
19 }
20 }
```

Explain contract

- 1 transact to ModifierExample.changerOwner errored: Error encoding arguments: TypeError: invalid address (argument="address", value="An Giang", code=INVALID_ARGUMENT, version=6.14.0) (argument="", value="An Giang", code=INVALID_ARGUMENT, version=6.14.0)
- 2 transact to ModifierExample.changerOwner errored: Error encoding arguments: TypeError: invalid address (argument="address", value="Long Xuyên", code=INVALID_ARGUMENT, version=6.14.0) (argument="", value="Long Xuyên", code=INVALID_ARGUMENT, version=6.14.0)

LAB 12:

B

to: "0x14A919590E83B987aF5f7A32731"

amount: "10"

Calldata

Parameters

transact

BALANCEOF

A

: "0xAb8483F64d9C6d1EcF9b849Ae6"

Calldata

Parameters

call

o: uint256: 90

decimals

o: uint8: 22

name

o: string: DTH225710

symbol

o: string: Le_Tri_Nhan

totalSupply

o: uint256: 100

```
uint public totalSupply;

mapping (address=>uint) public balanceOf;

constructor(uint initialSupply){
    totalSupply = initialSupply;
    balanceOf[msg.sender] = initialSupply;
}

function transfer(address to, uint amount) public {
    require(balanceOf[msg.sender] >= amount, "khoa");
    balanceOf[msg.sender] -= amount;
```

✖ Explain contract

0

☐ Listen on all transactions

🔍 Filter with transaction hash

block hash	0xdc43dcadf2c42f00c27a79d7d903797c894c738acac819
block number	32
from	0xAb8483F64d9C6d1EcF9b849Ae677dD3315835cb2
to	SimpleERC20.transfer(address,uint256)
	0x14A919590E83B987aF5f7A3273D07006A794CD0
transaction cost	50387 gas

A

B

LAB 13:

DEPLOY & RUN TRANSACTIONS

- > SIMPLERC20 AT 0X7EF...8CB47
- > SIMPLERC20 AT 0X7EF...8CB47
- > SIMPLERC20 AT 0XA13...EAD95
- > SIMPLERC20 AT 0XA83...5B10A
- > SIMPLERC20 AT 0XBBA...F0CE8
- > SIMPLERC20 AT 0XB34...24E5F
- > SIMPLERC20 AT 0X14A...94CD0

DATALOCATIONEXAMPLE AT 0:

Balance: 0 ETH

addNumber 15

getTempArray

o: uint256[]: 3,6,9,12

number 36

```
2
3 pragma solidity ^0.8.31;
4 contract DataLocationExample{
5     uint[] public number;
6
7     function addNumber(uint _number)public{ 46842 gas
8         number.push(_number);
9     }
10
11    function getTempArray()public view returns(uint[] memory){ infinite
12        uint[] memory tmp;
13        tmp = number;
14        return tmp;
15    }
```

Explain contract

AI copilot

0 Listen on all transactions Filter with transaction hash or ad...

[vm] from: 0xAb8...35cb2
to: DataLocationExample.addNumber(uint256) 0x424...15e81
value: 0 wei data: 0xfce...0000c logs: 0 hash: 0x8e6...f7499
transact to DataLocationExample.addNumber pending ...

[vm] from: 0xAb8...35cb2
to: DataLocationExample.addNumber(uint256) 0x424...15e81
value: 0 wei data: 0xfce...0000c logs: 0 hash: 0x77f...0114a
call to DataLocationExample.getTempArray

DATALOCATIONEXAMPLE AT 0:

Balance: 0 ETH

addNumber 15

getTempArray

o: uint256[]: 3,6,9,12,15

number uint256

Thêm 15 vào chuỗi

LAB 14:

DEPLOY & RUN TRANSACTIONS

- > SIMPLERC20 AT 0x7EF...8CB47
- > SIMPLERC20 AT 0x7EF...8CB47
- > SIMPLERC20 AT 0xA13...EAD95
- > SIMPLERC20 AT 0xA83...5B10A
- > SIMPLERC20 AT 0XBBA...FOCE8
- > SIMPLERC20 AT 0XB34...24E5F
- > SIMPLERC20 AT 0X14A...94CD0
- > DATALOCATIONEXAMPLE AT 0X...
- ▼ ERROREXAMPLE AT 0x24f...B27

Balance: 0 ETH

giaoDich 99

value

0: uint256: 99

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract ErrorExample{
5     uint public value;
6     function giaoDich(uint _value) public{
7         require(_value>0," gia tri phai lon hon 0");
8         value = _value;
9     }
10 }
```

Explain contract

0 ☐ Listen on all transactions

[vm] from: 0xAb8...35cb2 to: ErrorExample.(constructor) value: 0 wei
data: 0x608...f0033 logs: 0 hash: 0xa7d...296f1
transact to ErrorExample.giaoDich pending ...

[vm] from: 0xAb8...35cb2 to: ErrorExample.giaoDich(uint256) 0x24f...b27f4 value: 0 wei
data: 0x112...00063 logs: 0 hash: 0xba2...47091
call to ErrorExample.value

[vm] from: 0xAb8...35cb2 to: ErrorExample.giaoDich(uint256) 0x24f...b27f4 value: 0 wei
data: 0x112...00000 logs: 0 hash: 0x828...d8ebf
transact to ErrorExample.giaoDich errored: Error occurred: revert.

revert

The transaction has been reverted to the initial state.
Reason provided by the contract: " gia tri phai lon hon 0".
If the transaction failed for not having enough gas, try increasing the gas limit gently.

call to ErrorExample.value

LAB 15:

DEPLOY & RUN TRANSACTIONS

- > SIMPLERC20 AT 0x7EF...8CB47
- > SIMPLERC20 AT 0xA13...EAD95
- > SIMPLERC20 AT 0xA83...5B10A
- > SIMPLERC20 AT 0XBBA...FOCE8
- > SIMPLERC20 AT 0XB34...24E5F
- > SIMPLERC20 AT 0X14A...94CD0
- > DATALOCATIONEXAMPLE AT 0X...
- > ERROREXAMPLE AT 0x24f...B27
- ▼ CHILD AT 0xA7...D2BF4 (MEM)

Balance: 0 ETH

greetChil

0: string: I am Parent !!!

greetInParent

0: string: I am Parent !!!

```
1 // SPDX-License-Identifier: DTH225710-Le Tri Nhan
2
3 pragma solidity ^0.8.31;
4 contract Parent{
5     function greetInParent() public pure returns(string memory){
6         return "I am Parent !!!";
7     }
8 }
9
10 contract Child is Parent{
11     function greetChil() public pure returns(string memory){
12         return greetInParent();
13     }
14 }
15
```

Explain contract

0 ☐ Listen on all transactions

[call] from: 0xAb8483F64d9C6d1EcF9b849Ae677dD3315835cb2 to: ErrorExample.value() data: 0x3fa...4f245
creation of Child pending...

[vm] from: 0xAb8...35cb2 to: Child.(constructor) value: 0 wei
data: 0x608...f0033 logs: 0 hash: 0x331...97212
call to Child.greetInParent

