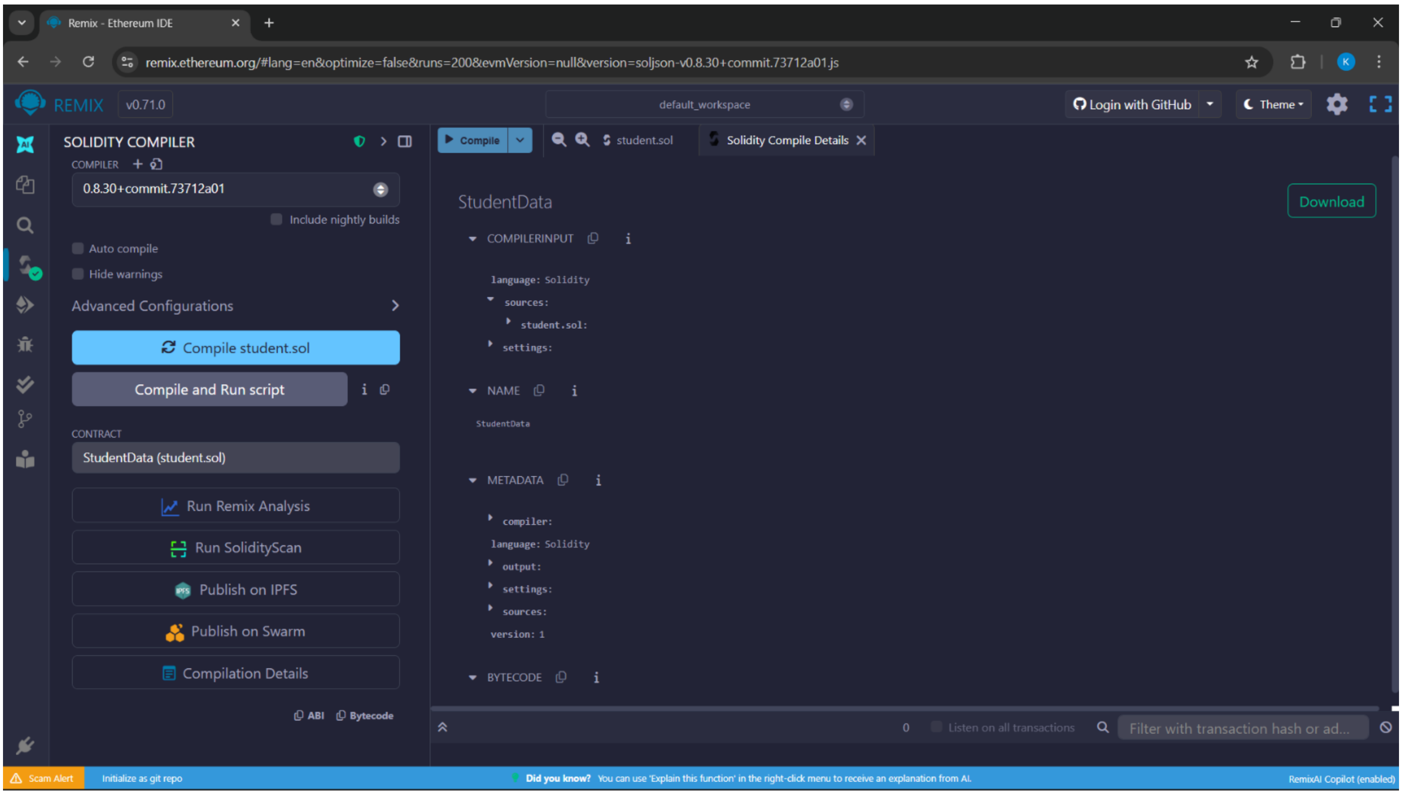
LAB ASSIGNMENT – 04

Program

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.20;

contract StudentData {
    // Structure to store student info
    struct Student {
        uint256 id;
        string name;
        uint8 age;
        string course;
    }

    // Dynamic array of students
    Student[] private students;

    // Event logs
    event StudentAdded(uint256 id, string name, uint8 age, string course);
    event FallbackCalled(address sender, uint256 value, string message);

    function addStudent(
        uint256 _id,
        string memory _name,
        uint8 _age,
        string memory _course
    ) public {
        students.push(Student(_id, _name, _age, _course));
        emit StudentAdded(_id, _name, _age, _course);
    }

    /**
     * @dev Get details of a student by index
     * @param index Index in array
     */
    function getStudent(uint256 index)
        public
        view
        returns (uint256, string memory, uint8, string memory)
    {
        require(index < students.length, "Invalid index");
        Student memory s = students[index];
        return (s.id, s.name, s.age, s.course);
    }

    /**
     * @dev Get total students stored
     */
    function getStudentCount() public view returns (uint256) {
        return students.length;
    }

    /**
     * @dev Fallback function (called if no function matches or Ether sent directly)
     */
    fallback() external payable {
        emit FallbackCalled(msg.sender, msg.value, "Fallback triggered");
    }

    // Receive Ether directly
    receive() external payable {
        emit FallbackCalled(msg.sender, msg.value, "Ether received");
    }
}
```

OUTPUT



COMPILER: 0.8.30+commit.73712a01

☐ Include nightly builds

☐ Auto compile

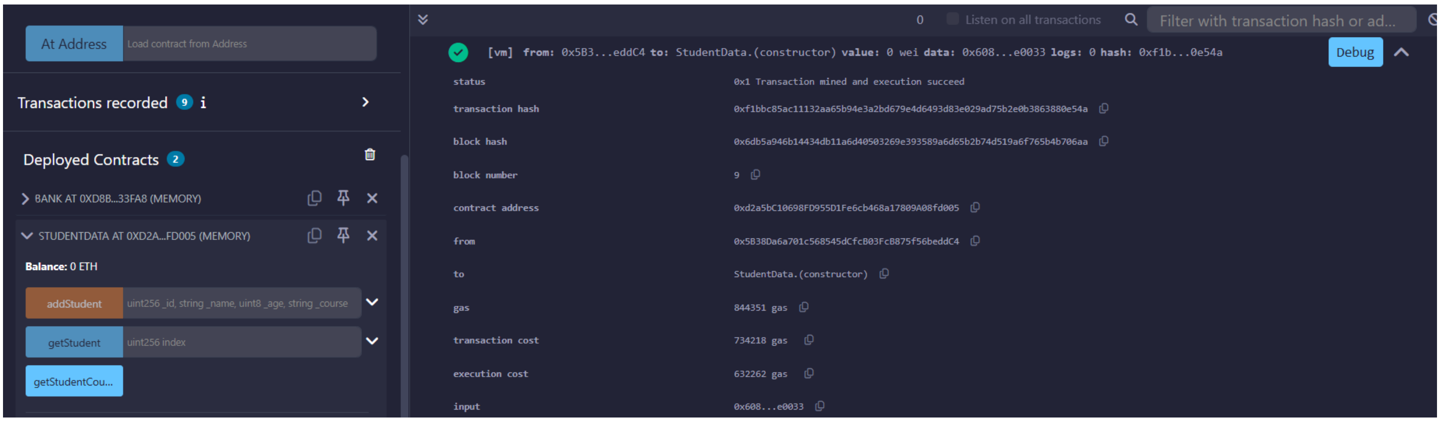
☐ Hide warnings

CONTRACT: StudentData (student.sol)

Did you know? You can use 'Explain this function' in the right-click menu to receive an explanation from AI.

```
StudentData
COMPILERINPUT
  language: Solidity
  sources:
    student.sol:
  settings:
NAME
  StudentData
METADATA
  compiler:
  language: Solidity
  output:
  settings:
  sources:
  version: 1
BYTECODE
```

Fig 1: Compiling student.sol – Solidity Program.

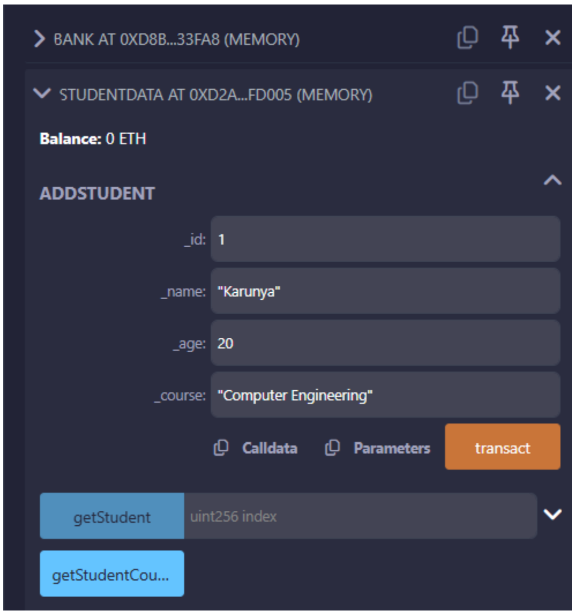


At Address
Load contract from Address
Transactions recorded 9
Deployed Contracts 2
BANK AT 0XD8B...33FA8 (MEMORY)
STUDENTDATA AT 0XD2A...FD005 (MEMORY)
addStudent
uint256 _id, string _name, uint8 _age, string _course
getStudent
uint256 index
getStudentCou...
Listen on all transactions
Filter with transaction hash or ad...
Debug

Balance: 0 ETH

```
[vm] from: 0x5B3...eddC4 to: StudentData.(constructor) value: 0 wei data: 0x608...e0033 logs: 0 hash: 0xf1b...0e54a
status              0x1 Transaction mined and execution succeed
transaction hash    0xf1bbc85ac11132aa65b94e3a2bd679e4d6493d83e029ad75b2e0b3863880e54a
block hash          0x6db5a946b14434db11a6d40503269e393589a6d65b2b74d519a6f765b4b706aa
block number        9
contract address    0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
from                0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                  StudentData.(constructor)
gas                 844351 gas
transaction cost    734218 gas
execution cost      632262 gas
input               0x608...e0033
```

Fig 2: Deployed Student.



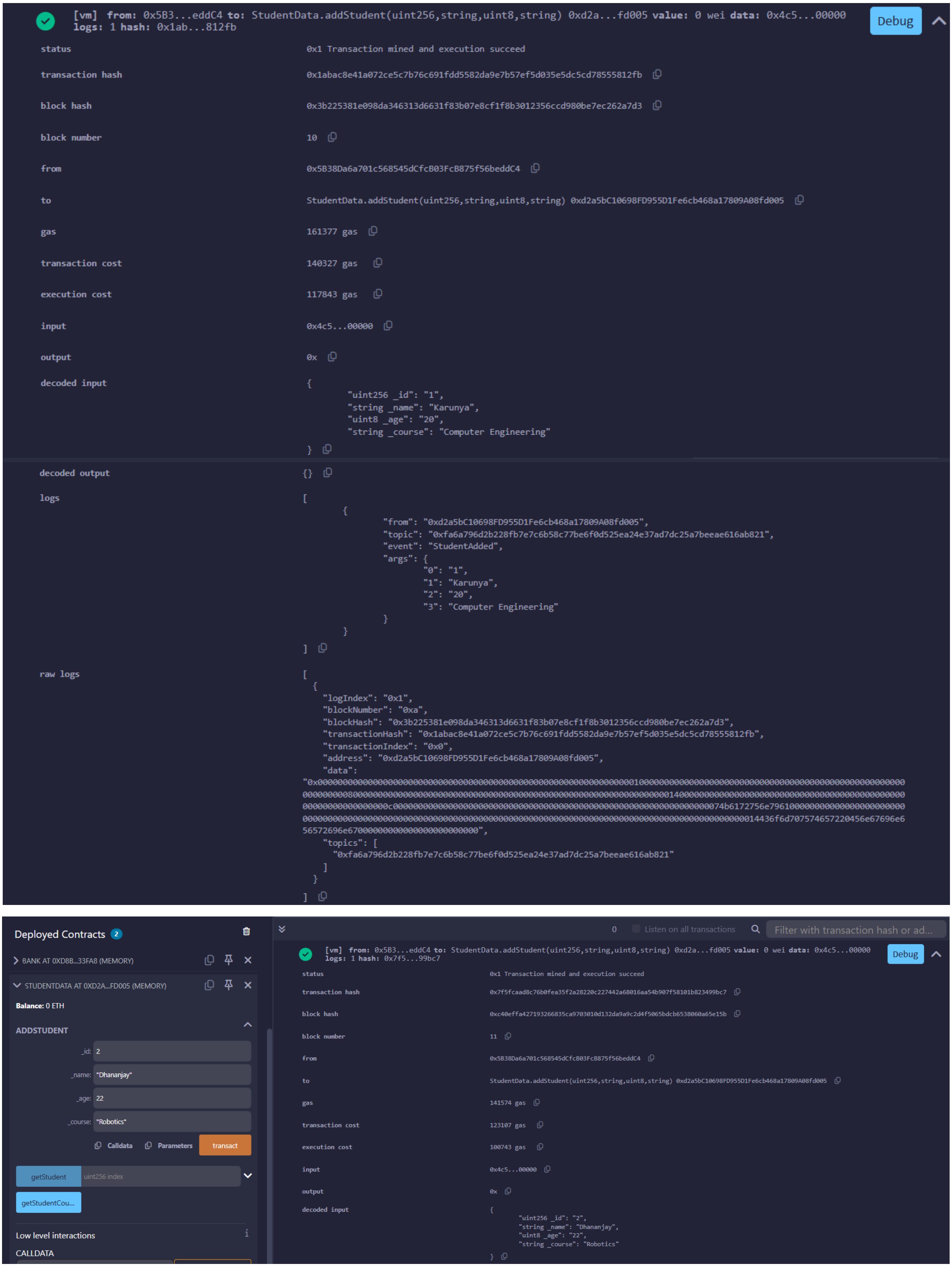
Balance: 0 ETH

_id: 1

_name: "Karunya"

_age: 20

_course: "Computer Engineering"



```
[vm] from: 0x5B3...eddC4 to: StudentData.addStudent(uint256,string,uint8,string) 0xd2a...fd005 value: 0 wei data: 0x4c5...00000
logs: 1 hash: 0x1ab...812fb
```

```
status              0x1 Transaction mined and execution succeed
transaction hash    0x1abac8e41a072ce5c7b76c691fdd5582da9e7b57ef5d035e5dc5cd78555812fb
block hash          0x3b225381e098da346313d6631f83b07e8cf1f8b3012356ccd980be7ec262a7d3
block number        10
from                0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                  StudentData.addStudent(uint256,string,uint8,string) 0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
gas                 161377 gas
transaction cost    140327 gas
execution cost      117843 gas
input               0x4c5...00000
output              0x
decoded input       {
                            "uint256 _id": "1",
                            "string _name": "Karunya",
                            "uint8 _age": "20",
                            "string _course": "Computer Engineering"
                    }
decoded output      {}
logs                [
                            {
                                    "from": "0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005",
                                    "topic": "0xfa6a796d2b228fb7e7c6b58c77be6f0d525ea24e37ad7dc25a7beeae616ab821",
                                    "event": "StudentAdded",
                                    "args": {
                                            "0": "1",
                                            "1": "Karunya",
                                            "2": "20",
                                            "3": "Computer Engineering"
                                    }
                            }
                    ]
raw logs            [
                      {
                        "logIndex": "0x1",
                        "blockNumber": "0xa",
                        "blockHash": "0x3b225381e098da346313d6631f83b07e8cf1f8b3012356ccd980be7ec262a7d3",
                        "transactionHash": "0x1abac8e41a072ce5c7b76c691fdd5582da9e7b57ef5d035e5dc5cd78555812fb",
                        "transactionIndex": "0x0",
                        "address": "0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005",
                        "data":
                    "0x000000000000000000000000000000000000000000000000000000000000000100000000000000000000000000000000000000000000000000000
                    0000000000800000000000000000000000000000000000000000000000000000000000000140000000000000000000000000000000000000000000000
                    00000000000000000c0000000000000000000000000000000000000000000000000000000000000074b6172756e796100000000000000000000000
                    000000000000000000000000000000000000000000000000000000000000000000000000000000000000000014436f6d707574657220456e67696e6
                    56572696e67000000000000000000000000",
                        "topics": [
                          "0xfa6a796d2b228fb7e7c6b58c77be6f0d525ea24e37ad7dc25a7beeae616ab821"
                        ]
                      }
                    ]
```

Deployed Contracts 2

BANK AT 0XD8B...33FA8 (MEMORY)

STUDENTDATA AT 0XD2A...FD005 (MEMORY)

Balance: 0 ETH

ADDSTUDENT

_id: 2

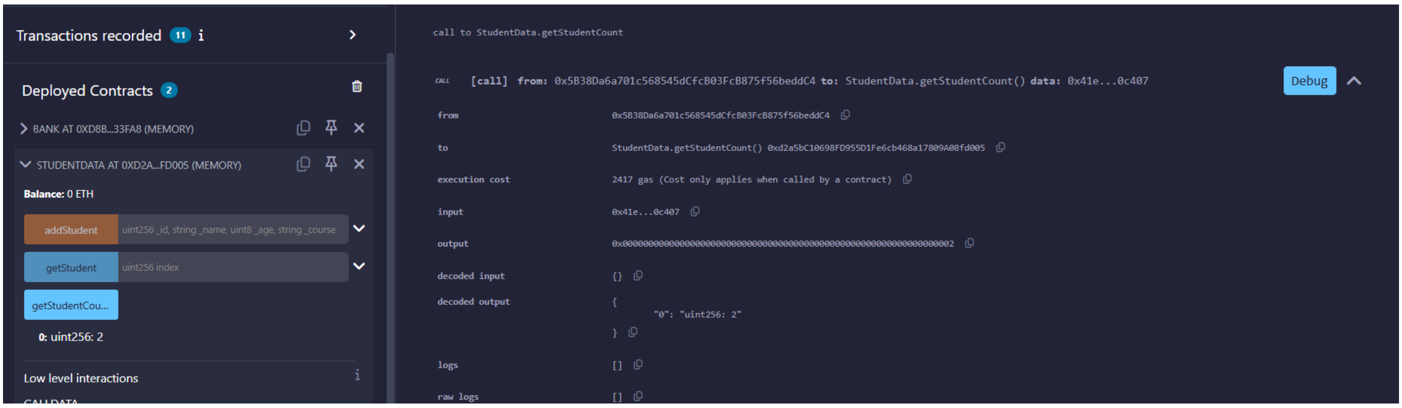
_name: "Dhananjay"

_age: 22

_course: "Robotics"

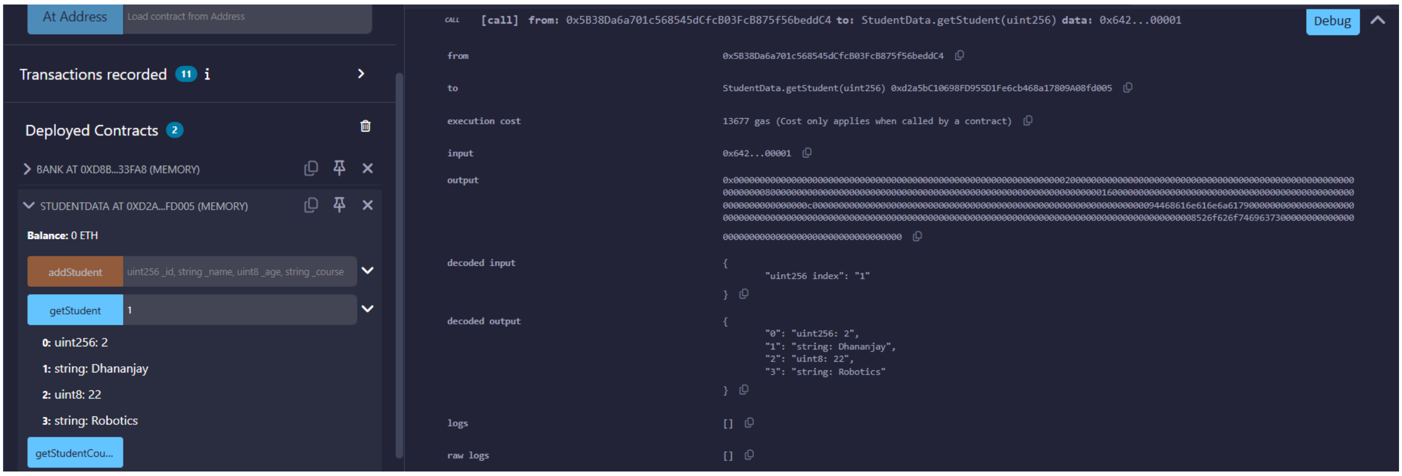
```
[vm] from: 0x5B3...eddC4 to: StudentData.addStudent(uint256,string,uint8,string) 0xd2a...fd005 value: 0 wei data: 0x4c5...00000
logs: 1 hash: 0x7f5...99bc7
status              0x1 Transaction mined and execution succeed
transaction hash    0x7f5fcaad8c76b0fea35f2a28220c227442a68016aa54b907f58101b823499bc7
block hash          0xc40effa427193266835ca9703010d132da9a9c2d4f5065bdcb6538060a65e15b
block number        11
from                0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                  StudentData.addStudent(uint256,string,uint8,string) 0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
gas                 141574 gas
transaction cost    123107 gas
execution cost      100743 gas
input               0x4c5...00000
output              0x
decoded input       {
                            "uint256 _id": "2",
                            "string _name": "Dhananjay",
                            "uint8 _age": "22",
                            "string _course": "Robotics"
                    }
```

Fig 3: Added two new students.


Transactions recorded 11 i
Deployed Contracts 2
BANK AT 0XD8B...33FA8 (MEMORY)
STUDENTDATA AT 0XD2A...FD005 (MEMORY)
Balance: 0 ETH
addStudent
uint256 _id, string _name, uint8 _age, string _course
getStudent
uint256 index
getStudentCou...
0: uint256: 2
Low level interactions
CALLDATA
Debug

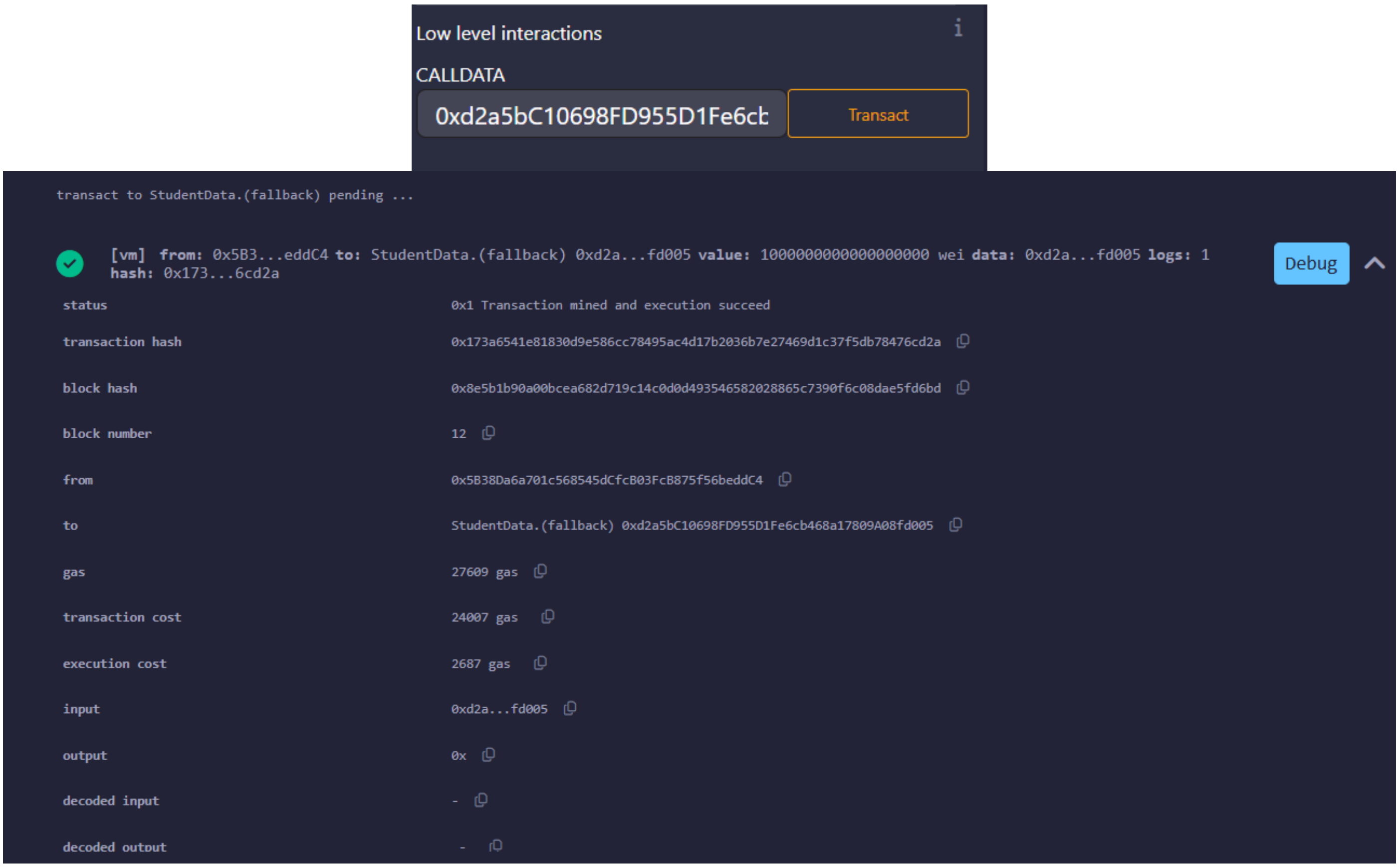
```
call to StudentData.getStudentCount

CALL  [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: StudentData.getStudentCount() data: 0x41e...0c407
from              0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                StudentData.getStudentCount() 0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
execution cost    2417 gas (Cost only applies when called by a contract)
input             0x41e...0c407
output            0x0000000000000000000000000000000000000000000000000000000000000002
decoded input     {}
decoded output    {
                        "0": "uint256: 2"
                  }
logs              []
raw logs          []
```

Fig 4: Getting count of students added.


At Address
Load contract from Address
Transactions recorded 11 i
Deployed Contracts 2
BANK AT 0XD8B...33FA8 (MEMORY)
STUDENTDATA AT 0XD2A...FD005 (MEMORY)
Balance: 0 ETH
addStudent
uint256 _id, string _name, uint8 _age, string _course
getStudent
1
0: uint256: 2
1: string: Dhananjay
2: uint8: 22
3: string: Robotics
getStudentCou...
Debug

```
CALL  [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: StudentData.getStudent(uint256) data: 0x642...00001
from              0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                StudentData.getStudent(uint256) 0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
execution cost    13677 gas (Cost only applies when called by a contract)
input             0x642...00001
output            0x000000000000000000000000000000000000000000000000000000000000000200000000000000000000000000000000000000000000000000000000
                  000000008000000000000000000000000000000000000000000000000000000000000000160000000000000000000000000000000000000000000000
                  000000000000000000c000000000000000000000000000000000000000000000000000000000000000094468616e616e6a61790000000000000000000000
                  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000008526f626f746963730000000000000000
                  0000000000000000000000000000000000
decoded input     {
                        "uint256 index": "1"
                  }
decoded output    {
                        "0": "uint256: 2",
                        "1": "string: Dhananjay",
                        "2": "uint8: 22",
                        "3": "string: Robotics"
                  }
logs              []
raw logs          []
```

Fig 5: Retrieving specific student's data.



```
transact to StudentData.(fallback) pending ...

[vm] from: 0x5B3...eddC4 to: StudentData.(fallback) 0xd2a...fd005 value: 1000000000000000000 wei data: 0xd2a...fd005 logs: 1
hash: 0x173...6cd2a
status              0x1 Transaction mined and execution succeed
transaction hash    0x173a6541e81830d9e586cc78495ac4d17b2036b7e27469d1c37f5db78476cd2a
block hash          0x8e5b1b90a00bcea682d719c14c0d0d4935465820288 65c7390f6c08dae5fd6bd
block number        12
from                0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to                  StudentData.(fallback) 0xd2a5bC10698FD955D1Fe6cb468a17809A08fd005
gas                 27609 gas
transaction cost    24007 gas
execution cost      2687 gas
input               0xd2a...fd005
output              0x
decoded input       -
decoded output      -
```

Fig 6: Fallback Triggered when attempted to send 1ETH at student's address.