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Department of Computer Engineering
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Course: Laboratory Practice III
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Course Code: 410246
Class: BE
Div: A

Assignment No: 15

Problem Statement:

Write a program in solidity to create Student data. Use the following constructs:

- Structure
- Arrays
- Fallback

Objective:

Understand and explore the working of Blockchain technology and its applications.

Course Outcome:

CO6: Interpret the basic concepts in Blockchain technology and its applications.

Description:

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met.

A smart contract is just a digital contract with the security coding of the blockchain.

- It has details and permissions written in code that require an exact sequence of events to take place to trigger the agreement of the terms mentioned in the smart contract.
- It can also include the time constraints that can introduce deadlines in the contract.
- Every smart contract has its address in the blockchain. The contract can be interacted with by using its address presuming the contract has been broadcasted on the network.

The idea behind smart contracts is pretty simple. They are executed on a basis of simple logic, IF-THEN for example:

- **IF** you send object A, **THEN** the sum (of money, in cryptocurrency) will be transferred to you.
- **IF** you transfer a certain amount of digital assets (cryptocurrency, for example, ether, bitcoin), **THEN** the A object will be transferred to you.
- **IF** I finish the work, **THEN** the digital assets mentioned in the contract will be transferred to me.

Code:

```
//SPDX-License-Identifier: MIT
pragma solidity ^0.6;
contract Student_management{
    struct Student{
        int stud_id;
        string Name;
        string department;
    }

    Student[] Students;

    function add_stud(int stud_id, string memory Name, string memory department) public{
        Student memory stud = Student(stud_id, Name, department);
        Students.push(stud);
    }

    function getStudent(int stud_id) public view returns(string memory, string memory){
        for(uint i=0; i< Students.length; i++){
            Student memory stud = Students[i];
            if(stud.stud_id == stud_id){
                return(stud.Name, stud.department);
            }
        }
        return("Student Information not found...!", "Not Found");
    }
}
```

OUTPUT:

```
[vm] from: 0x5B3...eddC4 to: Student_management.(constructor) value: 0 wei data: 0x608...c0033 logs: 0
hash: 0xfa5...f21d9

status          true Transaction mined and execution succeed
transaction hash 0xfa591e58975583f54477867bfdc5c9233d95be71d11b7fbc1661d88d3f3f21d9 ⓘ
from            0x5B38Da6a701c568545dCfcB03FcB875f96beddC4 ⓘ
to             Student_management.(constructor) ⓘ
gas            471422 gas ⓘ
transaction cost 409932 gas ⓘ
execution cost  409932 gas ⓘ
input          0x608...c0033 ⓘ
decoded input   {} ⓘ
decoded output  - ⓘ
```

```
✓ [vm] from: 0x5B3...eddC4 to: Student_management.add_stud(int256,string,string) 0xD4F...2cbee value: 0 wei data: 0xbfc...00000
logs: 0 hash: 0x904...40c6f

status      true Transaction mined and execution succeed

transaction hash  0x904e9b65c12d0fab9ade88506559112a2d0fa3ebfa3b0e8a7c392b28e3f40c6f ⓘ

from      0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 ⓘ

to      Student_management.add_stud(int256,string,string) 0xD4Fc541236927E2EAf8F27606b07309C1Fc2cbee ⓘ

gas      110032 gas ⓘ

transaction cost  95600 gas ⓘ

execution cost    95600 gas ⓘ

input      0xbfc...00000 ⓘ

decoded input  {
    "int256 stud_id": "22",
    "string Name": "Asmeeta Bardiya",
    "string department": "Computer Engineering"
} ⓘ
```

```
CALL [call] from: 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 to: Student_management.getStudent(int256) data: 0xce5...00016

from      0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 ⓘ

to      Student_management.getStudent(int256) 0xD4Fc541236927E2EAf8F27606b07309C1Fc2cbee ⓘ

execution cost  32085 gas (Cost only applies when called by a contract) ⓘ

input      0xce5...00016 ⓘ

decoded input  {
    "int256 stud_id": "22"
} ⓘ

decoded output  {
    "0": "string: Asmeeta",
    "1": "string: Computer"
} ⓘ

logs      [] ⓘ ⓘ
```

Conclusion:

I studied about smart contract and concept such as array, fallback and how to write and execute it using remix ide.