# Solidity – Basics of Contracts

Difficulty Level : Easy • Last Updated : 11 May, 2022

Solidity Contracts are like a class in any other object-oriented programming language. They firmly contain data as state variables and functions which can modify these variables. When a function is called on a different instance (contract), the EVM function call happens and the context is switched in such a way that the state variables are inaccessible. A contract or its function needs to be called for anything to happen. Some basic properties of contracts are as follows :

- **Constructor:** Special method created using the constructor keyword, which is invoked only once when the contract is created.
- **State Variables:** These are the variables that are used to store the state of the contract.
- **Functions:** Functions are used to manipulate the state of the contracts by modifying the state variables.

## Creating a Contract

Creating contracts programmatically is generally done by using JavaScript API **web3.js,** which has a built-in function *web3.eth.Contract* to create the contracts. When a contract is created its constructor is executed, a constructor is an optional special method defined by using the constructor keyword which executes one per contract. Once the constructor is called the final code of the contract is added to the blockchain.

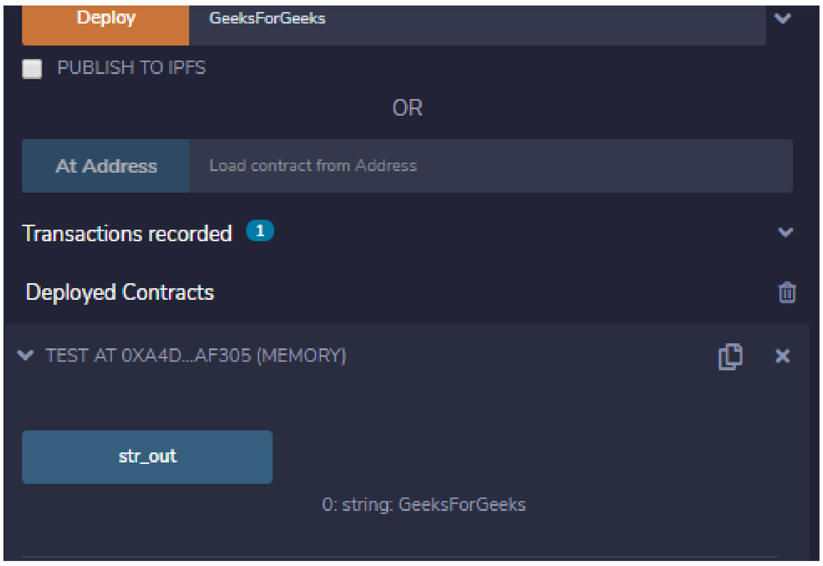
**Syntax:**

```
    constructor() <visibility>{
        .......
    }
    // rest code
}
```

**Example:** In the below example, the *contract Test* is created to demonstrate how to create a contract in Solidity.

## Solidity

```
// Solidity program to demonstrate
// how to create a contract
pragma solidity ^0.4.23;

// Creating a contract
contract Test {

  // Declaring variable
  string str;

  // Defining a constructor
  constructor(string str_in){
      str = str_in;
  }

  // Defining a function to
  // return value of variable 'str'
  function str_out(
  ) public view returns(string memory){
      return str;
  }
}
```



```
0: string: GeeksForGeeks
```

### Visibility Modifiers

Solidity provides four types of visibilities for functions and state variables. Functions have to specified by any of the four visibilities but for state variables *external* is not allowed.

1. **External:** External functions are can be called by other contracts via transactions. An external function cannot be called internally. For calling an external function within the contract *this.function_name()* method is used. Sometimes external functions are more efficient when they have large arrays of data.
2. **Public:** Public functions or variables can be called both externally or internally via messages. For public static variables, a getter method is created automatically in solidity.
3. **Internal:** These functions or variables can be accessed only internally i.e. within the contract or the derived contracts.
4. **Private:** These functions or variables can only be visible for the contracts in which they are defined. They are not accessible to derived contracts also.

**Example:** In the below example, the *contract contract_example* is created to demonstrate different visibility modifiers discussed above.

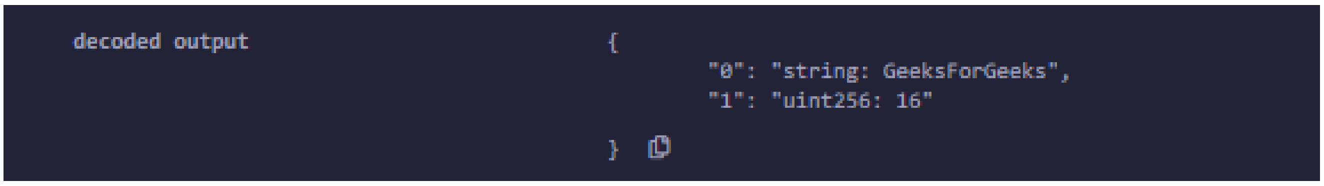
### Solidity

```
// Solidity program to demonstrate
// visibility modifiers
```

```
contract contract_example {

   // Declaring private
   // state variable
   uint private num1;

   // Declaring public
   // state variable
   uint public num2;

  // Declaring Internal
  // state variable
   string internal str;

   // Defining a constructor
   constructor() public {
      num2 = 10;
   }

   // Defining a private function
   function increment(
     uint data1) private pure returns(
     uint) { return data1 + 1; }

   // Defining public functions
   function updateValue(
     uint data1) public { num1 = data1; }
   function getValue(
   ) public view returns(
     uint) { return num1; }

   // Declaring public functions
   function setStr(
     string memory _str) public;
   function getStr(
   ) public returns (string memory);
 }

   // Child contract inheriting
   // from the parent contract
   // 'contract_example'
   contract derived_contract is contract_example{

   // Defining public function of
   // parent contract
   function setStr(
     string memory _str) public{
   str = _str;
   }
```

```
    ) public returns (
      string memory){ return str; }
  }

  //External Contract
  contract D {

     // Defining a public function to create
     // an object of child contract access the
     // functions from child and parent contract
     function readData(
     ) public payable returns(
       string memory, uint) {
        contract_example c
          = new derived_contract();
       c.setStr("GeeksForGeeks");
        c.updateValue(16);
        return (c.getStr(), c.getValue());
     }
  }
```

**Output :**



```
decoded output                    {
                                        "0": "string: GeeksForGeeks",
                                        "1": "uint256: 16"
                                  }
```

Next

Introduction to Solidity

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