

### Intro & State Variables

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

variables declared outside a function are state variables

variables declared inside a function are only available during a call of that function, and such variables are not stored on the blockchain

Smart contracts can be written and deployed to a test environment here: <https://remix.ethereum.org>

The Solidity compiler automatically generates the code that runs on the blockchain

STEP 1: Write a smart contract in this file

STEP 2: Compile the smart contract with the compiler

STEP 3: Deploy the smart contract to the blockchain

NOTE: If you hold down both Left-Alt and Left-Shift, you can see the code that is being compiled

Variables in Solidity are stored in one of three locations

Storage: This is where data is permanently stored. It is the only place where data can be accessed after the function has finished executing.

Memory: This is where data is stored temporarily. It is used for variables that are only needed for the duration of a function call.

Calldata: This is where data is stored for the duration of a function call. It is used for arguments that are passed to a function.

Types of Functions in Solidity

Functions that create transactions write data to the blockchain by changing the value of a state variable, which is then stored on the blockchain. These functions are called "stateful" functions.

Functions that do not create transactions are called "stateless" functions. They do not change the value of any state variable.

The function has a simple syntax of type `functionName(parameters)`. For certain data types, you have to specify the data location (e.g. `storage` or `memory`).

Variables in Solidity are stored in one of three locations: storage, memory, and calldata.

Storage: This is where data is permanently stored. It is the only place where data can be accessed after the function has finished executing.

Memory: This is where data is stored temporarily. It is used for variables that are only needed for the duration of a function call.

Calldata: This is where data is stored for the duration of a function call. It is used for arguments that are passed to a function.

### Ether and Wei

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

The currently used unit within Ethereum is Ether, it can be used to:

- pay transaction fees
- transfer between accounts

The smallest unit of Ether is Wei. 1 Ether is equal to 10<sup>18</sup> Wei.

Units can only be added after fixed numbers, for example, 1 Wei + 1 Wei is not valid.

Units can only be added after fixed numbers, for example, 1 Wei + 1 Wei is not valid.

Units can only be added after fixed numbers, for example, 1 Wei + 1 Wei is not valid.

### Invalid Functions

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

Invalid inputs & Outputs for Public Functions

- 1. Multi-dimensional arrays (not allowed)
- 2. Arrays of arrays (not allowed)
- 3. Arrays of structs (not allowed)
- 4. Arrays of functions (not allowed)
- 5. Arrays of pointers (not allowed)
- 6. Arrays of references (not allowed)
- 7. Arrays of references to references (not allowed)
- 8. Arrays of references to references to references (not allowed)
- 9. Arrays of references to references to references to references (not allowed)
- 10. Arrays of references to references to references to references to references (not allowed)

NOTE: This is a function to call when you want to delete your contract from the blockchain.

According to the Solidity docs, the following are considered reading from the state:

- 1. Accessing a variable (this) or balance or address
- 2. Accessing a variable (this) or balance or address
- 3. Accessing a variable (this) or balance or address
- 4. Accessing a variable (this) or balance or address
- 5. Accessing a variable (this) or balance or address
- 6. Accessing a variable (this) or balance or address
- 7. Accessing a variable (this) or balance or address
- 8. Accessing a variable (this) or balance or address
- 9. Accessing a variable (this) or balance or address
- 10. Accessing a variable (this) or balance or address

### View and Pure Functions

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

view functions can only modify the state of the blockchain

pure functions can only read the state of the blockchain

According to the Solidity docs, the following are considered reading from the state:

- 1. Accessing a variable (this) or balance or address
- 2. Accessing a variable (this) or balance or address
- 3. Accessing a variable (this) or balance or address
- 4. Accessing a variable (this) or balance or address
- 5. Accessing a variable (this) or balance or address
- 6. Accessing a variable (this) or balance or address
- 7. Accessing a variable (this) or balance or address
- 8. Accessing a variable (this) or balance or address
- 9. Accessing a variable (this) or balance or address
- 10. Accessing a variable (this) or balance or address

### Constructor

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

constructor is an optional function

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

the constructor is used to initialize the state of the contract

### Inheritance (Override-2)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

inheritance is a way to reuse code

### Error

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

errors are used to handle exceptional situations

### Enums

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

enums are used to represent a set of values

### Sending Ether

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

transferring ether is a common operation

### Call

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

calling a function is a common operation

### Delegation

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

delegation is a way to delegate authority

### Gas and Gas Price

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

gas is used to pay for transactions

### Types of Functions in Solidity

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

Functions that create transactions write data to the blockchain by changing the value of a state variable, which is then stored on the blockchain. These functions are called "stateful" functions.

Functions that do not create transactions are called "stateless" functions. They do not change the value of any state variable.

The function has a simple syntax of type `functionName(parameters)`. For certain data types, you have to specify the data location (e.g. `storage` or `memory`).

Variables in Solidity are stored in one of three locations: storage, memory, and calldata.

Storage: This is where data is permanently stored. It is the only place where data can be accessed after the function has finished executing.

Memory: This is where data is stored temporarily. It is used for variables that are only needed for the duration of a function call.

Calldata: This is where data is stored for the duration of a function call. It is used for arguments that are passed to a function.

### Function Modifiers

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

modifiers are used to change the behavior of a function

### Visibility

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

visibility determines where a function can be called

### Looping

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

loops are used to repeat a block of code

### Inheritance (Order)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

inheritance order is important

### External, Public, Private, Internal

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

visibility modifiers control access to functions

### Events

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

### Arrays

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

arrays are used to store multiple values

### Payable

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

payable functions can receive ether

### Mapping

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

mappings are used to store key-value pairs

### Computations

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

computations are used to calculate values

### Tradeoffs

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

tradeoffs are used to balance gas and functionality

### Inheritance (Constructor-1)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

### Inheritance (Constructor-2)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

constructors are used to initialize the state of the contract

### Inheritance (Events)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

events are used to log data to the blockchain

### Inheritance (Super)

A video discussing all of this material is available here: <https://youtu.be/4RQ4H48J650>

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

super keyword is used to call parent functions

YouTube Tutorial References:

Learn Solidity (0.5) by Examples

Smart Contract Programmer

github.com/Richard-Burd/solidity-sandbox

last updated @ 11:25am on 18/August/2021 by Richard Burd

rick.a.burd@gmail.com

# Solidity Illustrated