Solidity

Solidity

- Looks familiar to JavaScript
- Behaves very differently!
- Contracts look similar to classes
- Functions are public by default
- Static typing

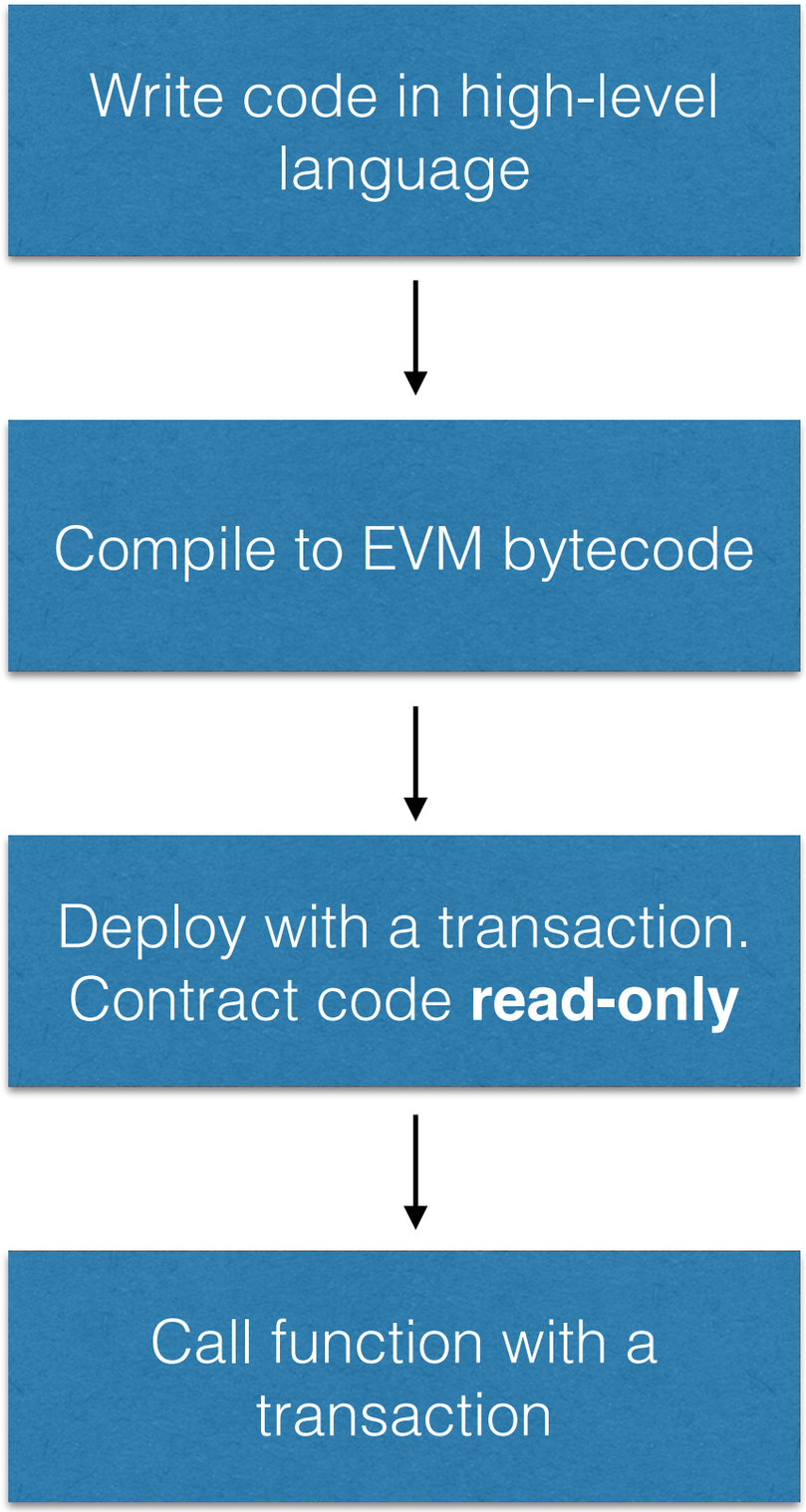
- Solidity source code should start with

```
pragma solidity ^0.5.3;
```

- Good resource

https://solidity.readthedocs.io/en/develop/solidity-in-depth.html

Smart Contract Lifecycle

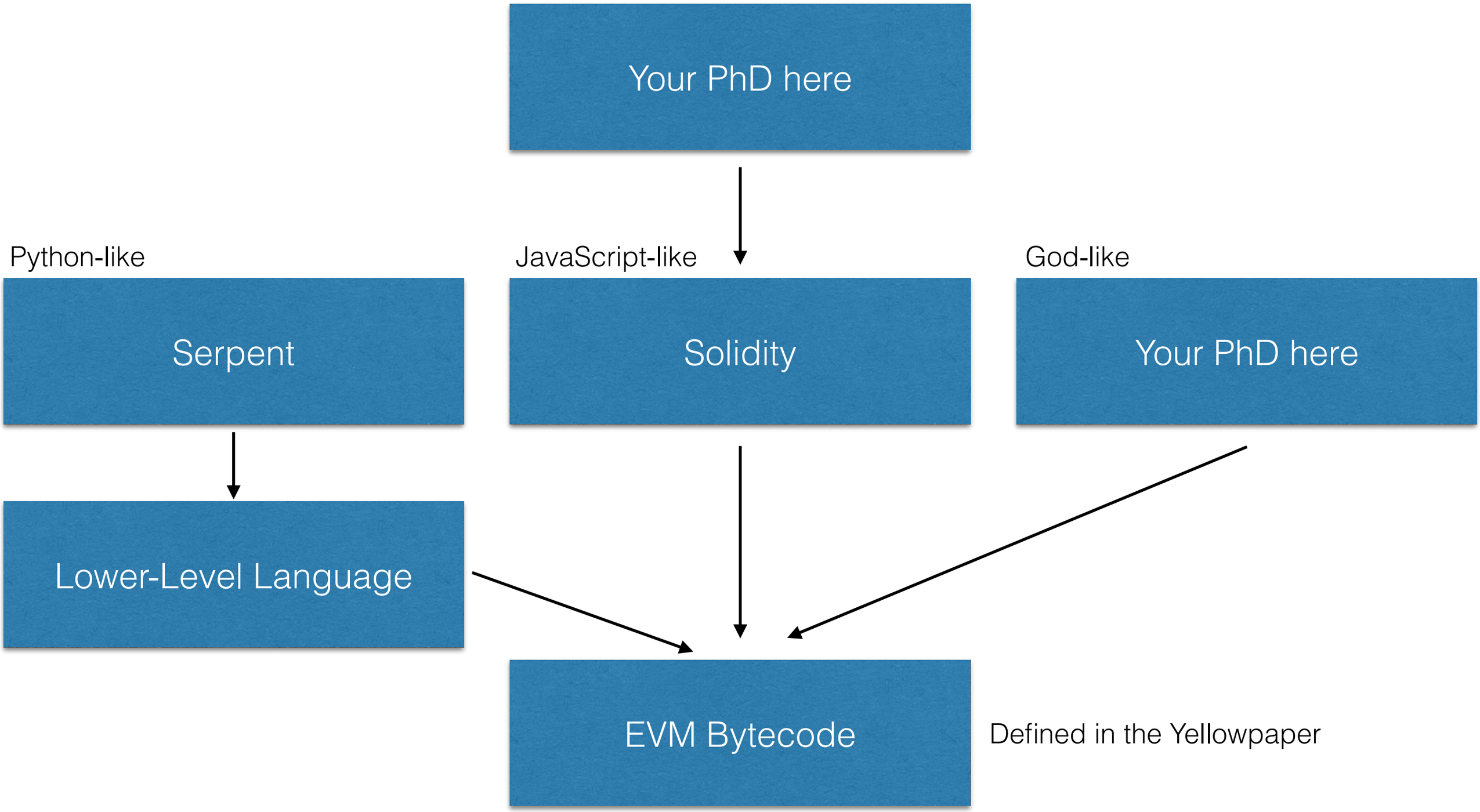


- Lives forever if no destruct defined

  —> no keep-alive cost

- Contracts can call other contracts

Smart Contract Development



ETHFiddle

EthFiddle - Solidity IDE in the B

https://ethfiddle.com

EthFiddle | Security Audit | Share | Login

Compile | Auto Compile | Solidity 0.4.18

```
//Write your own contracts here. Currently compiles using solc v0.4.15+commit.bbb8e6
pragma solidity ^0.4.18;
contract SimpleStore {
  function set(uint _value) public {
    value = _value;
  }

  function get() public constant returns (uint) {
    return value;
  }

  uint value;
}
```

Compiler Errors | Compiled output

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Flint - a language to replace Solidity

Welcome - Flint Programming

https://docs.flintlang.org

Flint Programming Language Guide

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Last updated 4 months ago

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Language Overview

Contributing

Flint is a new type-safe, contract-oriented programming language specifically designed for writing robust smart contracts on Ethereum.

Flint is still in **alpha**, and is not ready to be used in production yet.

Medium article: Flint: A New Language for Safe Smart Contracts on Ethereum

Programming! 2018 paper: Writing Safe Smart Contracts in Flint

Franklin Schrans MEng thesis: Writing Safe Smart Contracts in Flint

Language Overview

The **Flint Programming Language Guide** gives a high-level overview of the language, and helps you getting started with smart contract development in Flint.

Flint is still under active development and proposes a variety of novel *contract-oriented* features.

Contributing

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Solidity - Types

```
bool, uint8, uint16, ... uint256, int8, ... int256

address

string

byte[]

mapping(keyType ==> valueType)
```

- State variables reside in storage

Solidity - Throw

```
uint8 numCandidates;
uint32 votingFee;
mapping(address => bool) hasVoted;
mapping(uint8 => uint32) numVotes;

/// Cast a vote for a designated candidate
function castVote(uint8 candidate) {
  if (msg.value < votingFee)
    return;
  if (hasVoted[msg.sender])
    throw;

  hasVoted[msg.sender] = true;
  numVotes[candidate] += 1;
}
```

- Throw makes sure that only gas is consumed.

Solidity - State Variables

```
pragma solidity ^0.5.3;

contract SimpleStorage {
    uint storedData; // State variable
    // ...
}
```

- State variables reside in storage

Solidity - Functions

```
pragma solidity ^0.5.3;

contract SimpleAuction {
    function bid() public payable { // Function
        // ...
    }
}
```

- Internal/External function calls

- Visibility
  - External (can be called from other contracts)
  - Public (like external, can also be called internally)
  - Internal (can only be called internally)
  - Private (not visible in derived contracts)

Solidity - Modifiers

```
contract Purchase {
    address public seller;

    modifier onlySeller() { // Modifier
        require(msg.sender == seller);
        _;
    }

    function abort() public onlySeller { // Mod. usage
        // ...
    }
}
```

- Amend the semantics of functions

Solidity - Events

```
contract SimpleAuction {
    event HighestBidIncreased(address bidder, uint
amount); // Event

    function bid() public payable {
        // ...
        HighestBidIncreased(msg.sender, msg.value); //
Triggering event
    }
}
```

- Events interface with EVM's logging capabilities
- Allows to call JavaScript callbacks in a dApp
- Function bid() is marked *payable* to receive funds

Namecoin in Solidity

```
contract Namespace {

    struct NameEntry {
        address owner;
        bytes32 value;
    }

    uint32 constant REGISTRATION_COST = 100;
    uint32 constant UPDATE_COST = 10;
    mapping(bytes32 => NameEntry) data;

    function nameNew(bytes32 hash){
        if (msg.value >= REGISTRATION_COST){
            data[hash].owner = msg.sender;
        }
    }

    function nameUpdate(bytes32 name, bytes32 newValue, address newOwner){
        bytes32 hash = sha3(name);
        if (data[hash].owner == msg.sender && msg.value >= UPDATE_COST){
            data[hash].value = newValue;
            if (newOwner != 0){
                data[hash].owner = newOwner;
            }
        }
    }

    function nameLookup(bytes32 name){
        return data[sha3(name)];
    }

}
```