

Ethereum Blockchain

Development Workshop

Making Everything Easier!

8th Edition

Personal Finance

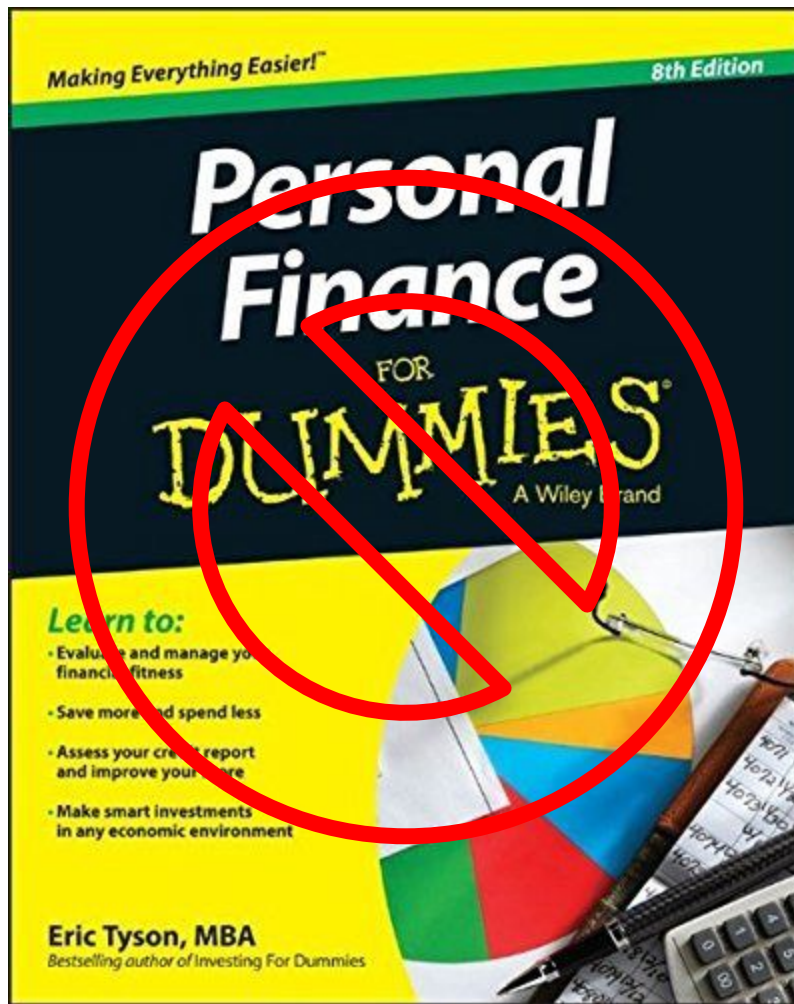
FOR
DUMMIES
A Wiley Brand

Learn to:

- Evaluate and manage your financial fitness
- Save more and spend less
- Assess your credit report and improve your score
- Make smart investments in any economic environment

Eric Tyson, MBA

Bestselling author of Investing For Dummies



Agenda

Slides bit.do/quantox-blockchain-1

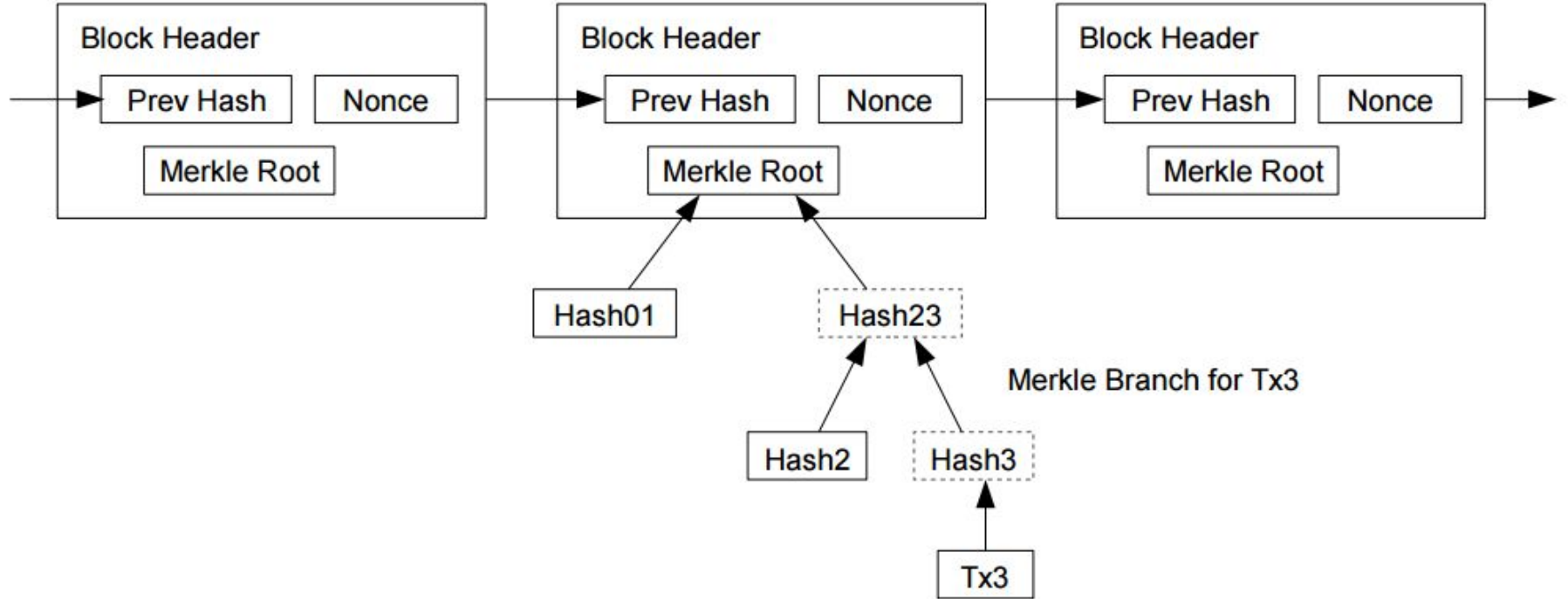
- **Today**

- Ethereum blockchain overview
- Setup the development environment
- Communication with the blockchain overview
- **Discussion**

- **Next time**

- Initialize a Truffle project
- Create a simple smart contract
- Compile it
- Deploy to local TestRPC
- Integration with JS
- Deploying to a testnet

Ethereum Blockchain



Block 1432

Tx feab...4822
Tx 5ea2...ba72
Tx 487a...12ef

Block 1433

Tx 8f1f...d9d0
Tx 6add...b657
Tx 0744...fafd

Block 1434?

Tx 9695...1cd3
Tx 629a...b291
Tx a6a0...fb6e

Tx 737f...c5bf

Tx 6c5e...7f32

Tx a6c8...cb2e

Tx 9695...1cd3

Tx 629a...b291

Tx pool

Tx 998b...5aec

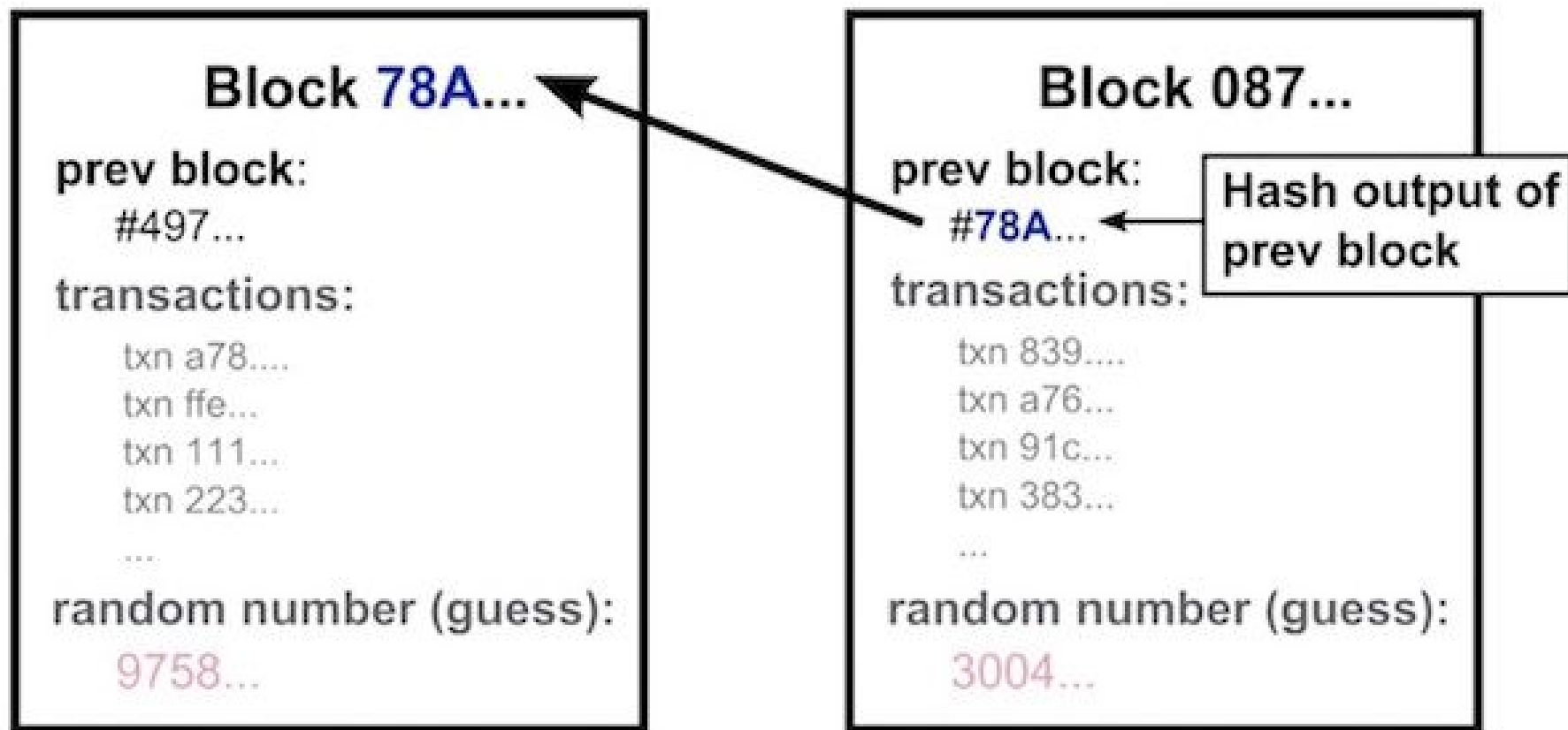
Tx 2a91...d5b5

Tx f195...9076

Tx b33f...e80c

Tx f195...9076

Tx a6a0...fb6e



```
graph TD; A[Accounts] --> B[Externally owned account (EOAs)]; A --> C[Contract account]
```

Accounts

**Externally owned
account (EOAs)**

Contract account



My Ether Wallet

www.MyEtherWallet.com



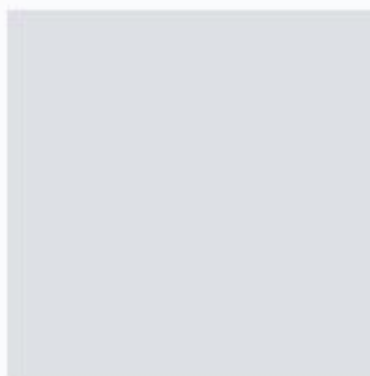
YOUR ADDRESS

Your Address:

0xEBf7261CC04DDF33A001b5F6E931f8231E88Df94

Your Private Key:

8257b6e05da39b0cc89f77e6b4a1189f26cb8e4f24bca7a2137938a50c6d2446



AMOUNT / NOTES



YOUR PRIVATE KEY



Always look for this icon
when sending to this wallet.



Smart Contract

Ethereum Account Type (Just like User Account)



Address

0x16E0022b17B...



Balance

0 Ether

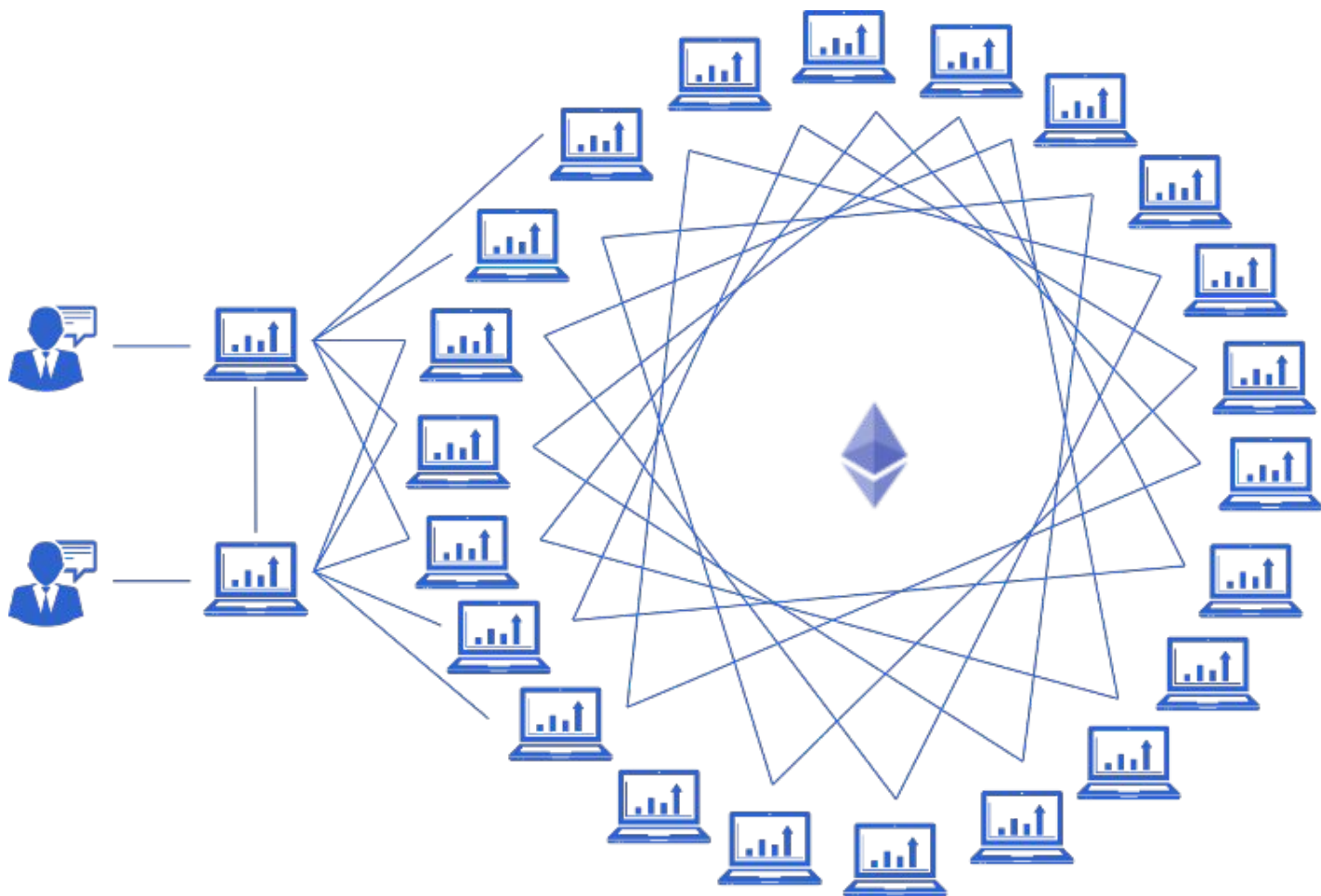


Code

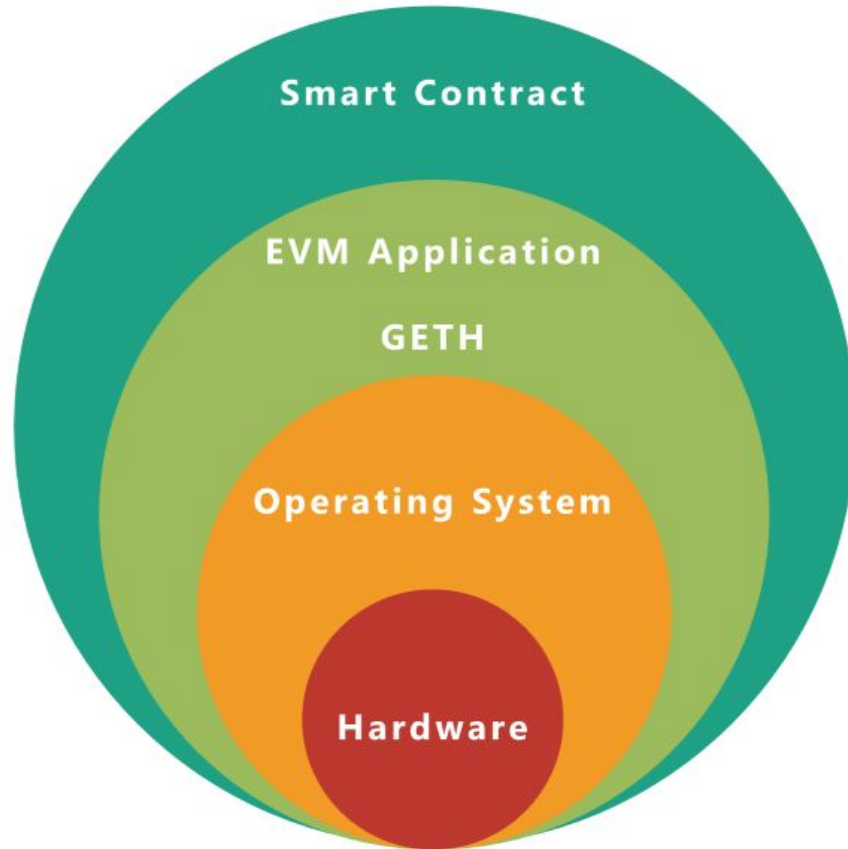


State

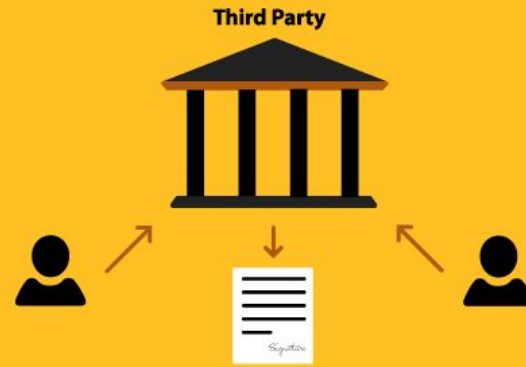
```
contract Counter {  
    uint counter;  
  
    function Counter() public {  
        counter = 0;  
    }  
    function count() public {  
        counter = counter + 1;  
    }  
}
```



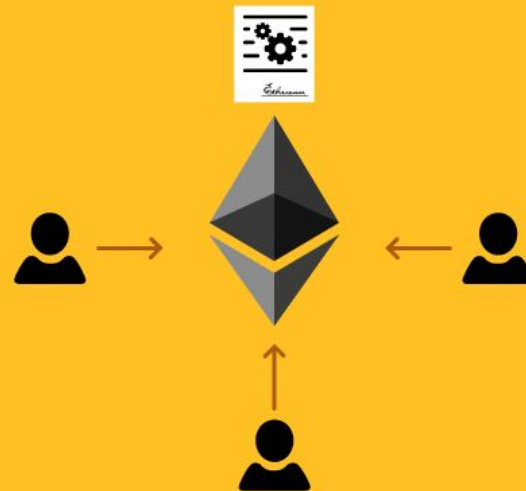
EVM Node



**Traditional
contractual
agreement
method**



**Ethereum
smart contract**





solidity

```
contract Counter {  
    address public id;  
    uint private balance;  
  
    function get() returns (uint) {  
        return balance;  
    }  
  
    function set() returns (uint) {  
        uint t = balance;  
        balance = msg.value;  
        msg.sender.send(t);  
        return t;  
    }  
}
```

block
msg
tx

```
contract Counter {  
    address public id;  
    uint private balance;  
  
    function get() returns (uint) {  
        return balance;  
    }  
  
    function set() returns (uint) {  
        uint t = balance;  
        balance = msg.value;  
        msg.sender.send(t);  
        return t;  
    }  
}
```

Price of executing code on EVM

- Gas - Relative complexity of operations
- ADD - 3 gas
- MUL - 5 gas
- Generally EVM code execution is millions of times more expensive than e.g. AWS
- Why use Ethereum then?

```
contract Counter {  
    address public id;  
    uint private balance;  
  
    function get() returns (uint) {  
        return balance;  
    }  
  
    function set() returns (uint) {  
        uint t = balance;  
        balance = msg.value;  
        msg.sender.send(t);  
        return t;  
    }  
}
```


transaction /
function call



→ 0xDEB97C21...
contract
address

solc → deployment

Solidity
EVM ASM

Raw
Assembly

serpent

serpent
compiler

{source code}

|||

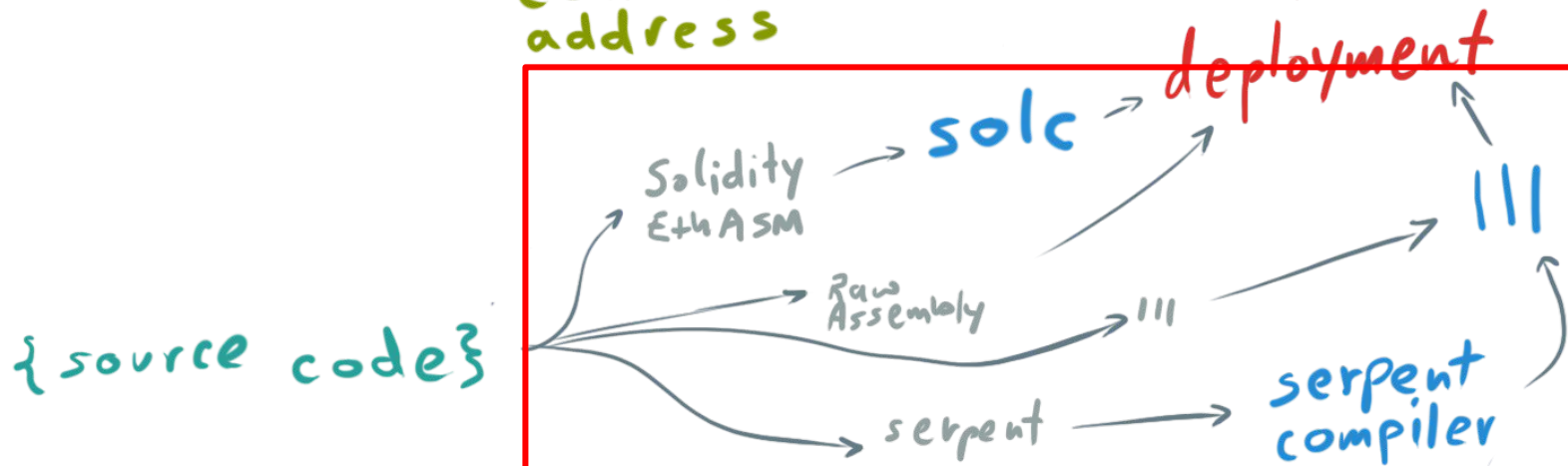
|||

|||

transaction /
function call



0xDEB97C21...
contract
address



transaction /
function call

→ 0xDEB97C21...
contract
address

input
state



output
state

deployment

solc

Solidity
EVM ASM

Raw
Assembly

serpent

serpent
compiler

{source code}

|||

|||

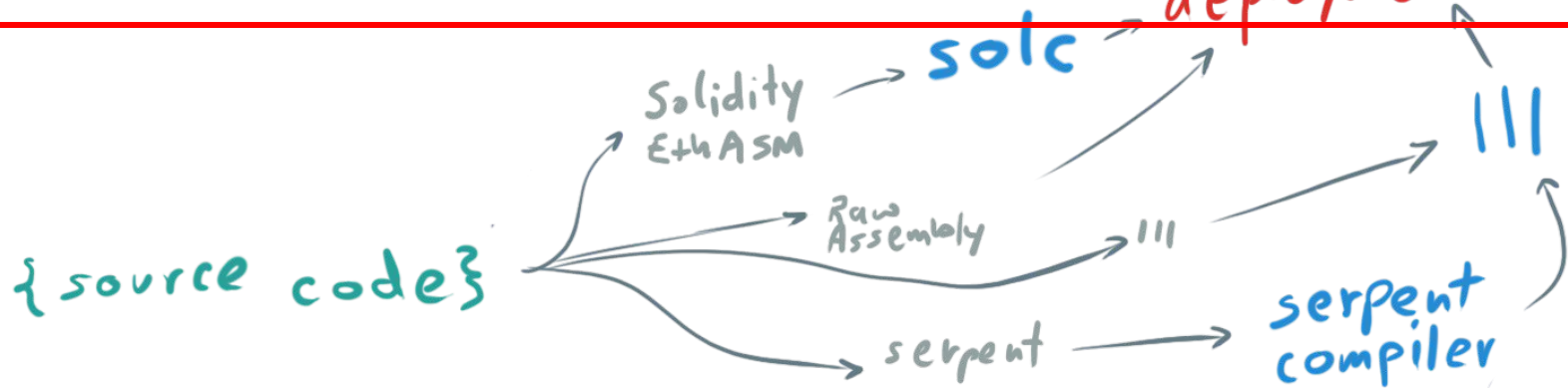
|||

transaction /
function call



0xDEB97C21...
contract
address

deployment





Ropsten
Test Net



Main Ethereum Network



Account 1



Ropsten Test Network ✓



Kovan Test Network



Rinkeby Test Network

No tokens found



Localhost 8545



Custom RPC

7.986 ETH
2612.37 USD

BUY

SEND

SENT

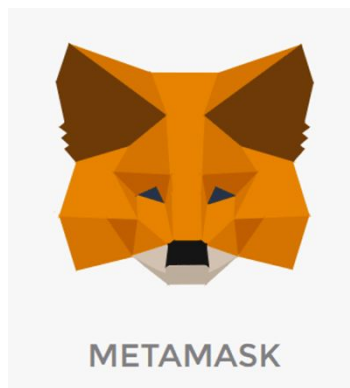
TOKENS

ADD TOKEN

Environment

- Terminal
- Node
- Truffle
- Ganache (personal Ethereum blockchain)
- Parity (for testnet / livenet access)
- Metamask (for Front End integration)

... or Remix IDE



Let's set it up!

Instal NodeJS

- Install Node JS (latest version)
- <https://nodejs.org/en/>



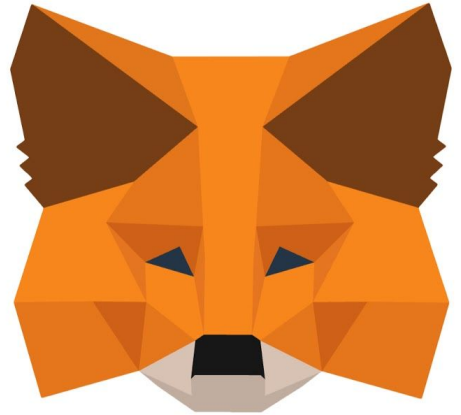
Instal Truffle

```
$ npm install -g truffle
```



Instal MetaMask

<https://metamask.io/>



Instal Ganache

truffleframework.com/ganache/



Instal Parity

- Install Parity
- Sync with Ropsten (at Home for next time)
- `$ parity --warp --chain ropsten`



Communication with the Blockchain

- RPC calls over HTTP
- Connecting to Nodes
- Infura Nodes
- Web3.js - Ethereum JavaScript API

```
web3 = new Web3(new Web3.providers.HttpProvider("http://localhost:8545"));  
web3.eth.getBalance(address)
```

Next time

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