Blockchains & Server side Swift

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https://katalysis.io

Monetisation and ownership management of digital content using blockchain technology

Tech stack

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Katalysis libraries

Zewo Server side Swift libraries

Ethereum Smart Contract Blockchain

Blockchain

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- Peer to peer system secured by Crypto and Consensus Algorithms
- Enables Transactions between untrusted participants
- Underlying technology to Bitcoin, Ethereum

Signing

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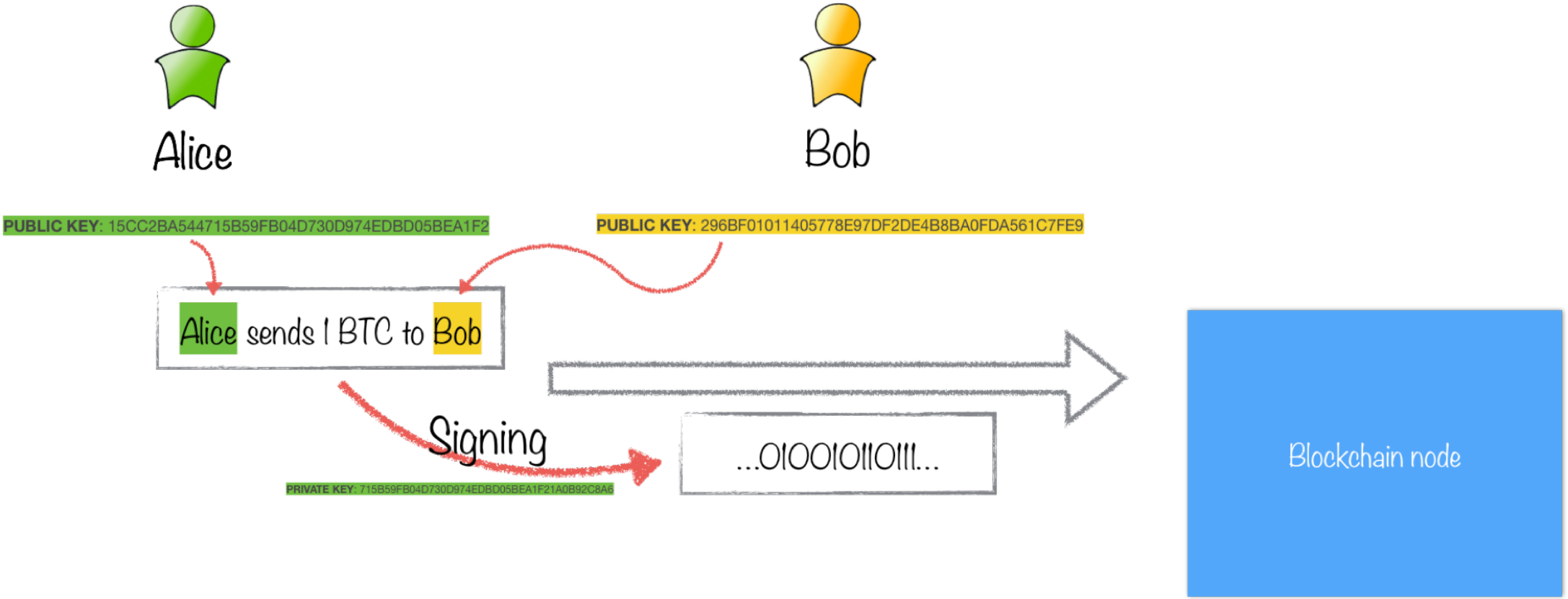

State Engine

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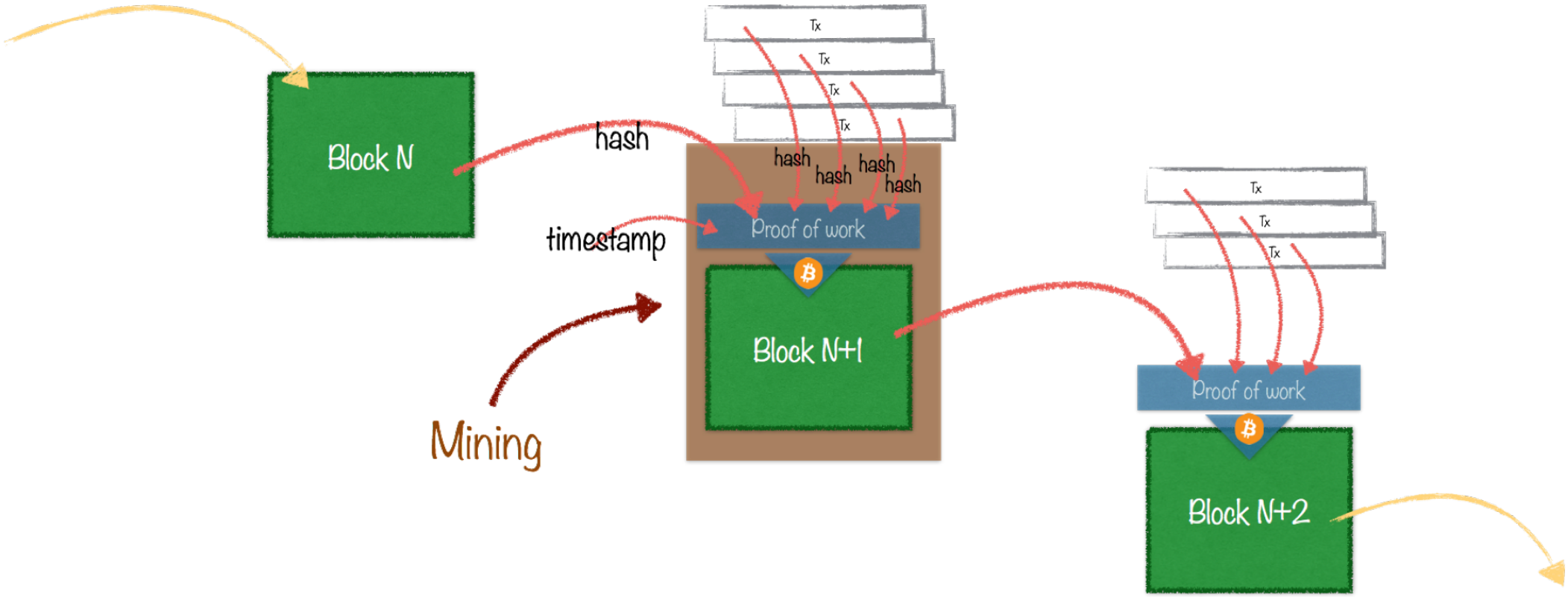

Consensus over P2P

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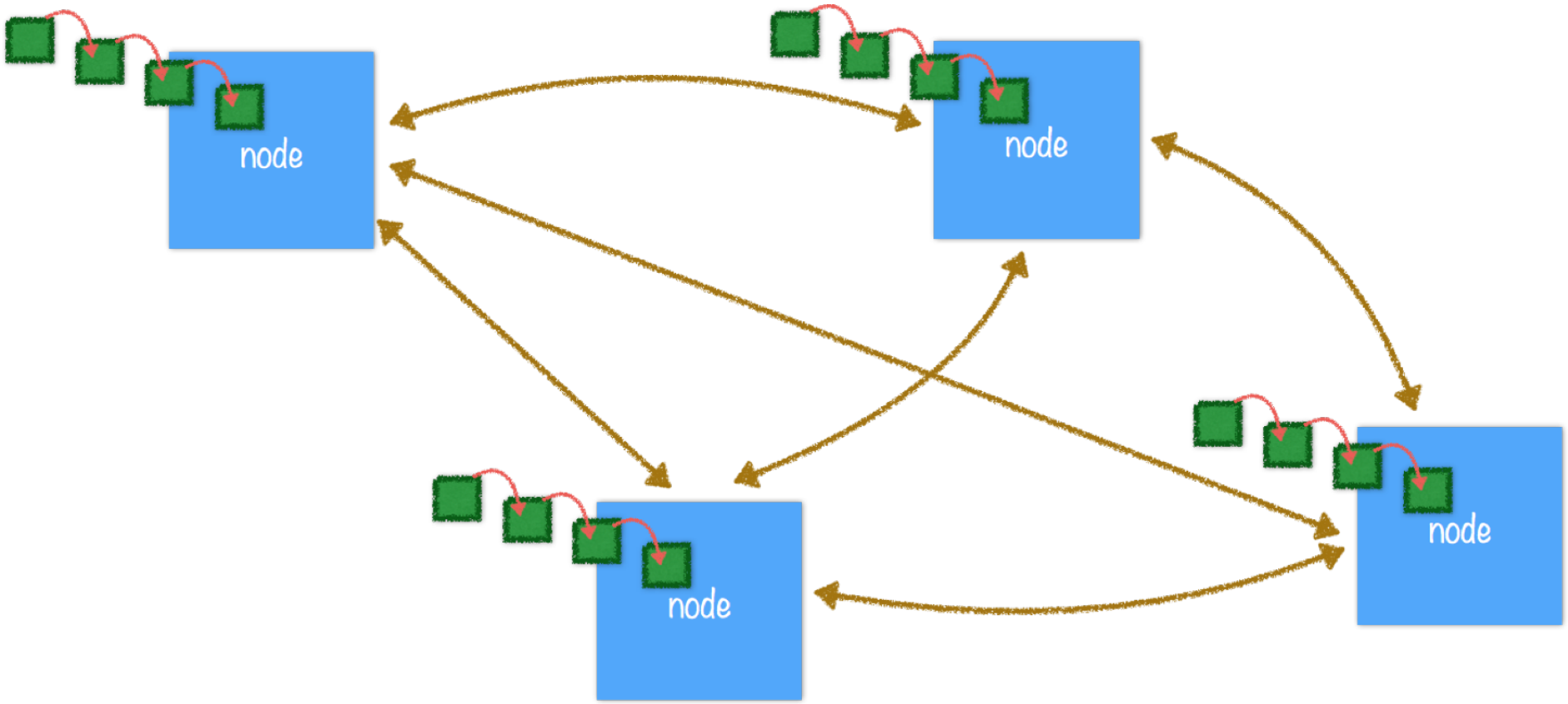

Blockchain node

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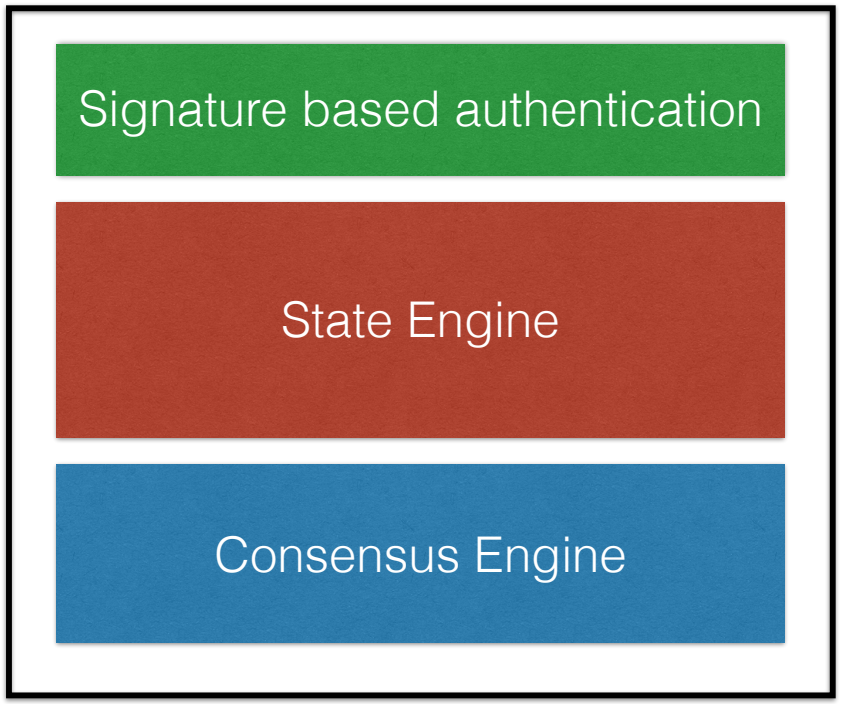

- Secured by crypto algorithms (hashing and signing)
- State engine stores transactions and possibly code and an execution environment
- Proof of Work (PoW), Proof of Stake (PoS), …

Datastore with following properties:

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- **Immutability** = “very difficult” to change history
- **Transparency** amongst participants
- **Decentralised**
- **Pseudonymity**

Ethereum Smart Contracts

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- https://ethereum.org
- Ethereum Virtual Machine (EVM)
- Storage of data AND code in the State Engine
- EVM language is a JS like language called **Solidity**

“Smart Contracts”

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Blockchain node

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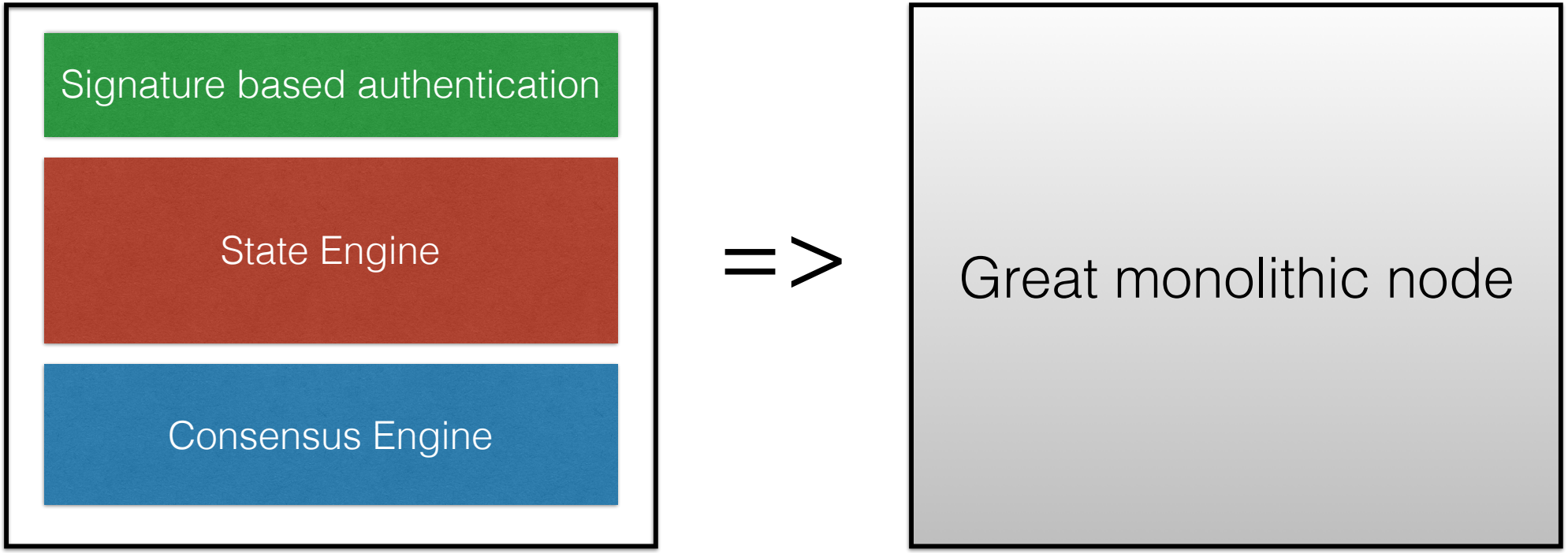

Tendermint

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- **Toolkit** for building blockchains
- tendermint/ethermint: fully Ethereum compatible node, either public or private
- https://github.com/tendermint/ethermint/
- https://tendermint.com

Tendermint

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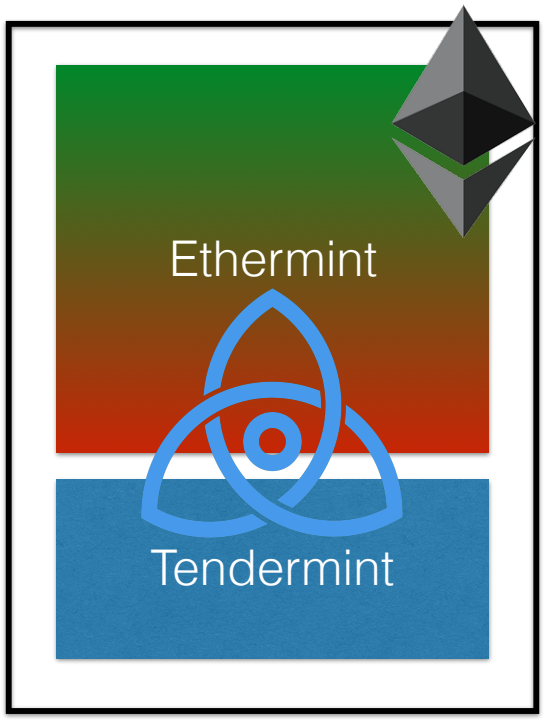

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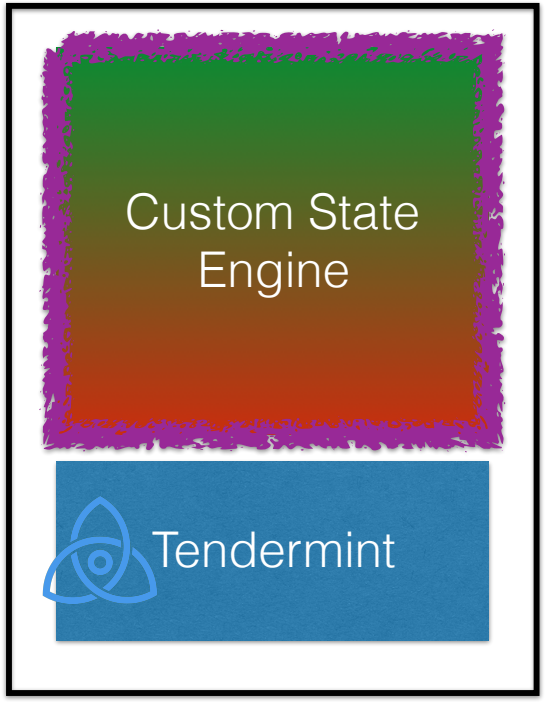

Tendermint

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Written in Go.

Zewo

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Zewo

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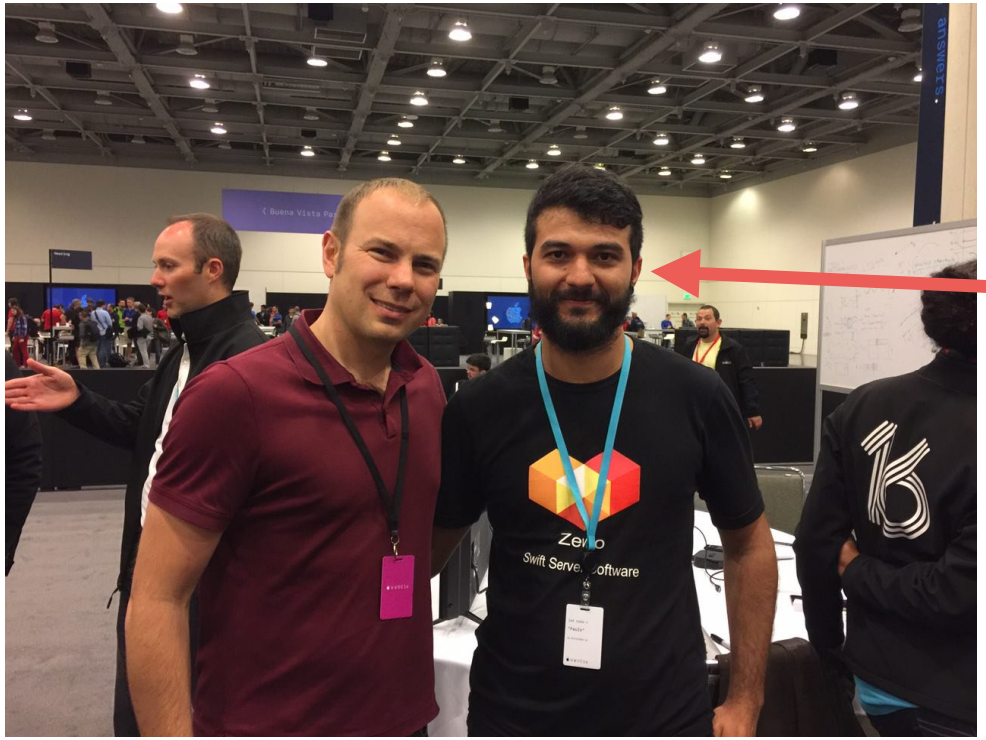

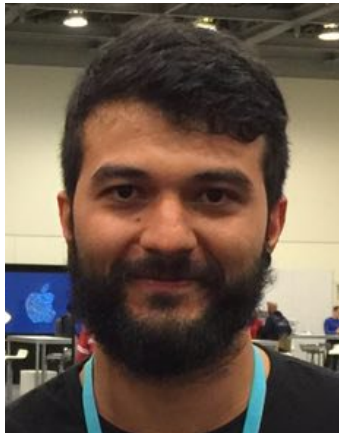

Paulo Faria

Zewo

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Lightweight libraries for web application in Swift

Zewo

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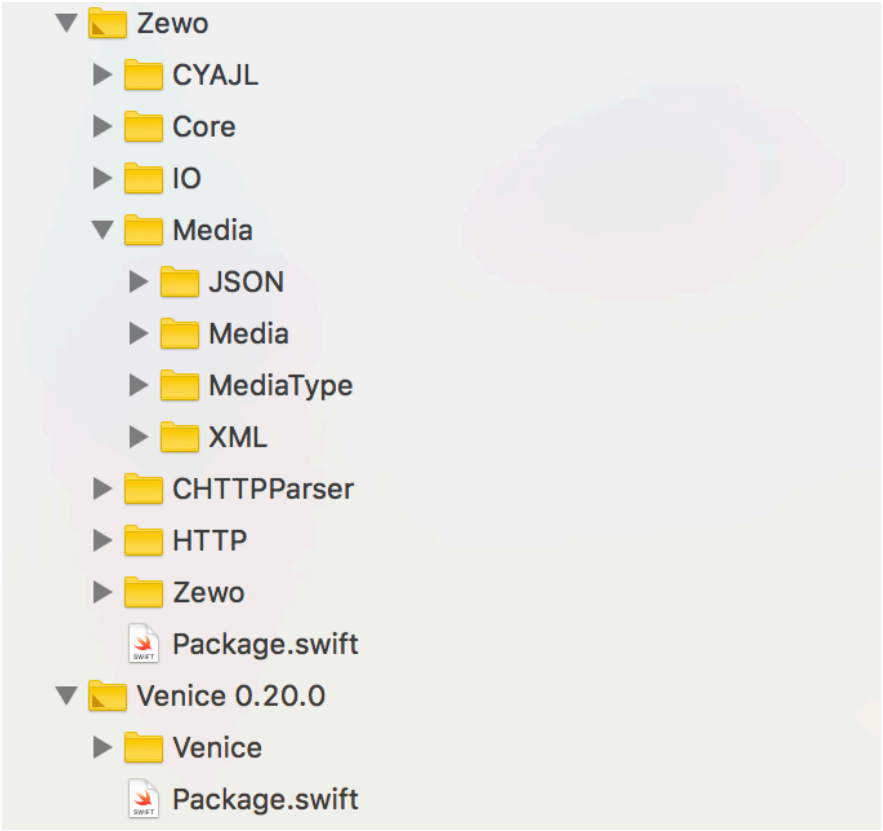

Zewo

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“Don’t communicate by sharing memory. Share memory by communicating.”

Rob Pike (co-designer of Go)

Zewo

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Coroutines instead of Multi-threading

Zewo/Venice

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Coroutines in Swift

zewo.github.io/Venice/

Wraps libdill.org

libdill.org/structured-concurrency.html

libdill

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- Structured concurrency (coroutine nesting)
- Coroutines run on a single CPU core
- Coroutines must yield control to achieve concurrency
- Blocking functions automatically yield

Zewo/Venice

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```
func testWakeUpWithChannels() throws {
    let channel = try Channel<Int>()
    let group = Coroutine.Group()

    func send(_ value: Int, after delay: Duration) throws {
        try Coroutine.wakeUp(delay.fromNow())
        try channel.send(value, deadline: .never)
    }

    try group.addCoroutine(body: { try send(111, after: 30.milliseconds) })
    try group.addCoroutine(body: { try send(222, after: 40.milliseconds) })
    try group.addCoroutine(body: { try send(333, after: 10.milliseconds) })
    try group.addCoroutine(body: { try send(444, after: 20.milliseconds) })

    XCTAssert(try channel.receive(deadline: .never) == 333)
    XCTAssert(try channel.receive(deadline: .never) == 444)
    XCTAssert(try channel.receive(deadline: .never) == 111)
    XCTAssert(try channel.receive(deadline: .never) == 222)
    group.cancel()

}
```

Katalysis libraries

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Problem: interact with a blockchain node from Swift

Solutions:

- EthereumBlockchain Swift library: Ethereum node compliant JSON-RPC calls, including transaction generation and signing.
- ABCISwift library: Tendermint ABCIServer allowing the use of the underlying Consensus Engine.

Ethereum Blockchain library

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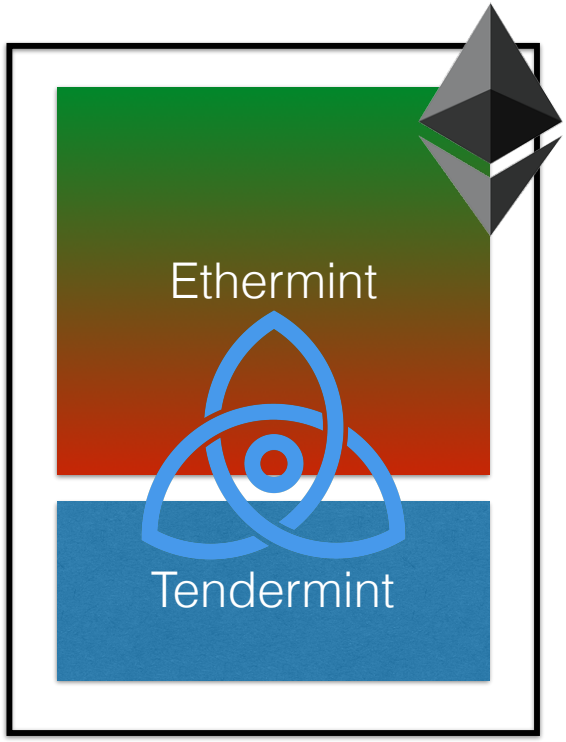

Communicate to an Ethereum compatible node (web3.js)

Ethereum Blockchain library

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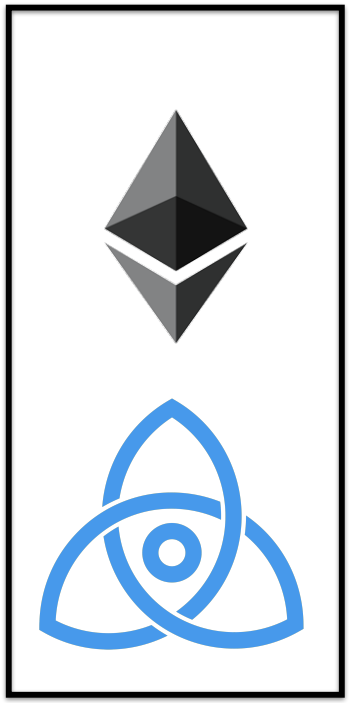

```
import EthereumKeys
import EthereumBlockchain

func run() {
    do {
        let priv = [UInt8](repeating: 0x46, count: 32)
        let key = EthereumKey(seed:priv)!
        let ebc = EthereumBlockchain("http://localhost:8545/", key)
        let to = try? Address(bytes:[UInt8](repeating: 0x35, count: 20))

        let tx = TransactionRequest(to: to, value: 100)
        let txHash = try ebc.transact(tx)
        print("Transaction hash: \(txHash)")

    } catch let error {
        print ("\(error)")
    }
}
```

ABCISwift library

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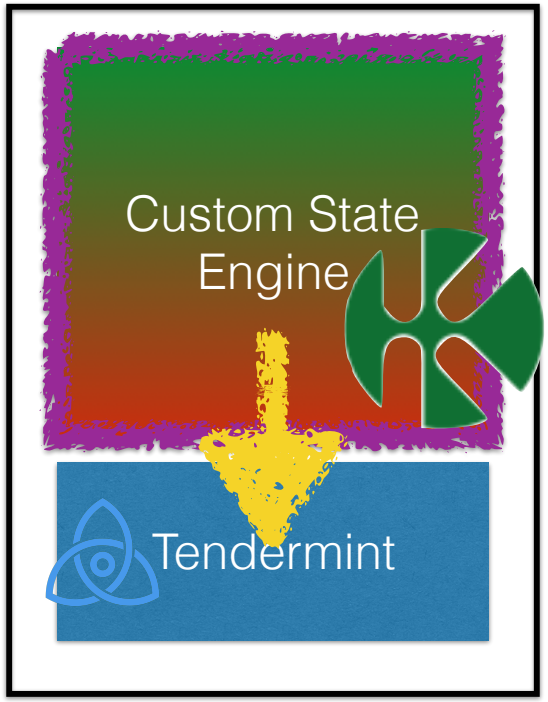

Communicate directly to
a Consensus Engine
(ABCIClient)

ABCISwift library

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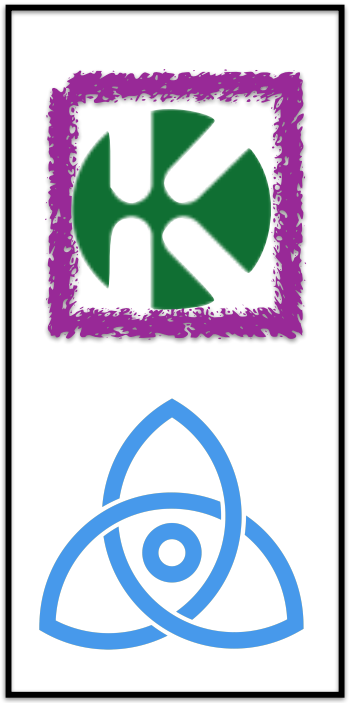

```swift
// ABCI apps should comply to the following protocol
public protocol ABCIApplication {

    func initChain(_ validators: [Validator])
    func info(_ version: String) -> ResponseInfo
    func echo(_ message: String) -> ResponseEcho
    func flush()
    func setOption(_ key: String, _ value: String) -> ResponseSetOption
    func deliverTx(_ tx: Data) -> Result
    func checkTx(_ tx: Data) -> Result
    func query(_ q: Query) -> ResponseQuery
    func beginBlock(_ hash: Data, _ header: Header)
    func endBlock(_ height: UInt64) -> ResponseEndBlock
    func commit() -> Result
}
```

Katalysis libraries

Current Status:

- Most building blocks (EthereumKey, RPL, Crypto algos, …) are already open sourced, work with Swift 4.0.x
- Earlier implementation of the EthereumBlockchain libraries (BurrowBlockchain) are open sourced
- Open Sourcing EthereumBlockchain and ABCISwift libraries is on the roadmap. Talk to us if you are interested.

Katalysis libraries

https://gitlab.com/katalysis

Recap

katalysis

https://gitlab.com/katalysis

https://github.com/Zewo


https://ethereum.org, https://tendermint.com

katalysis

We’re Hiring!

Alex Tran Qui (alex@katalysis.io)

Questions?


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https://katalysis.io