Web3j and Blockchain

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Blockchain Platform Engineers
Web3 Labs

King's College Web3j Workshop, 2019

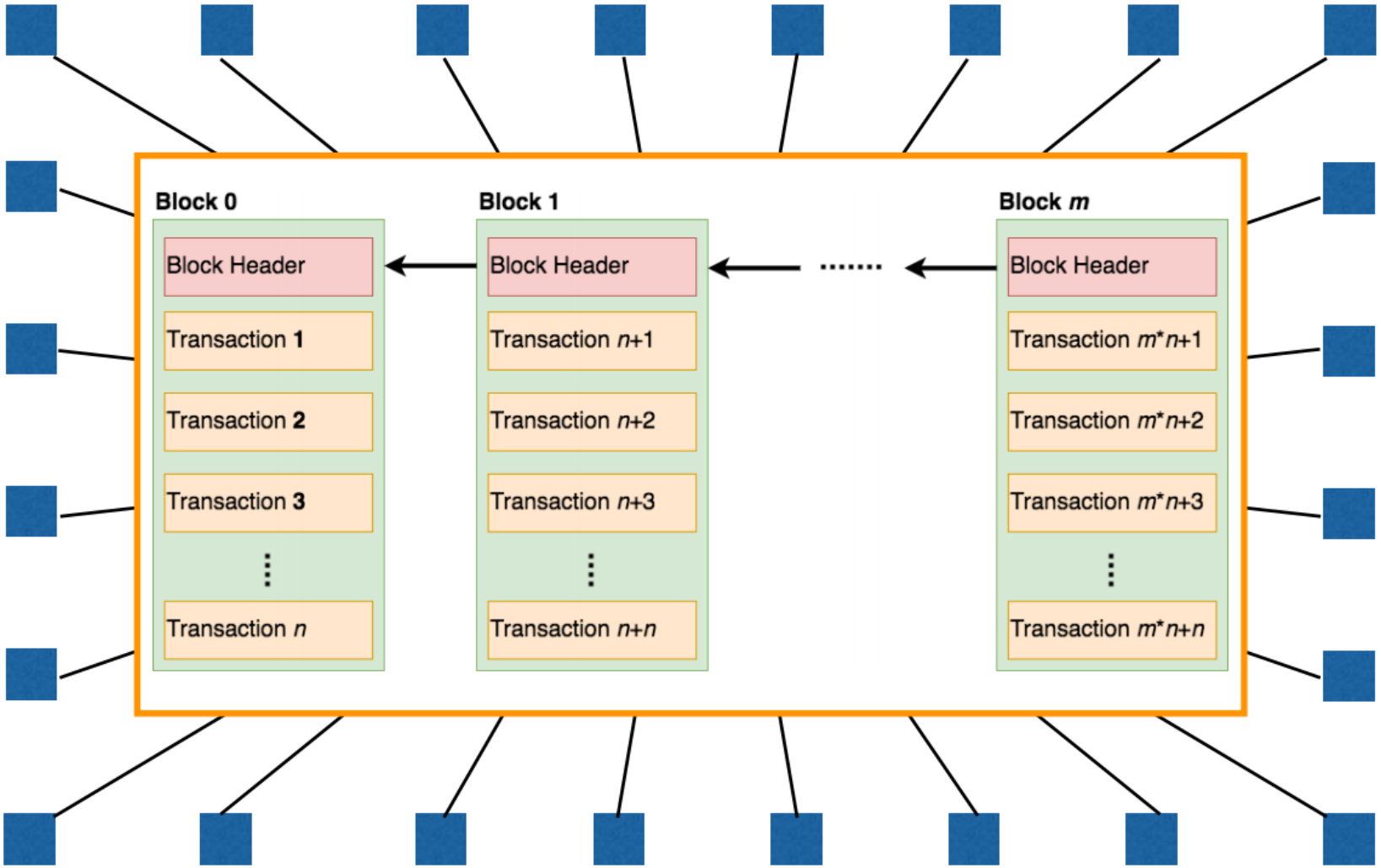
About Me

- I am Sebastian Raba. I joined crypto space in 2017.
- Bachelors in Computer Science with Management in King's College London.
- Joined Web3 Labs a year and a half ago.
- Started off developing Web3j and Web3js support for Quorum interactions. Currently working on Epirus's backend.

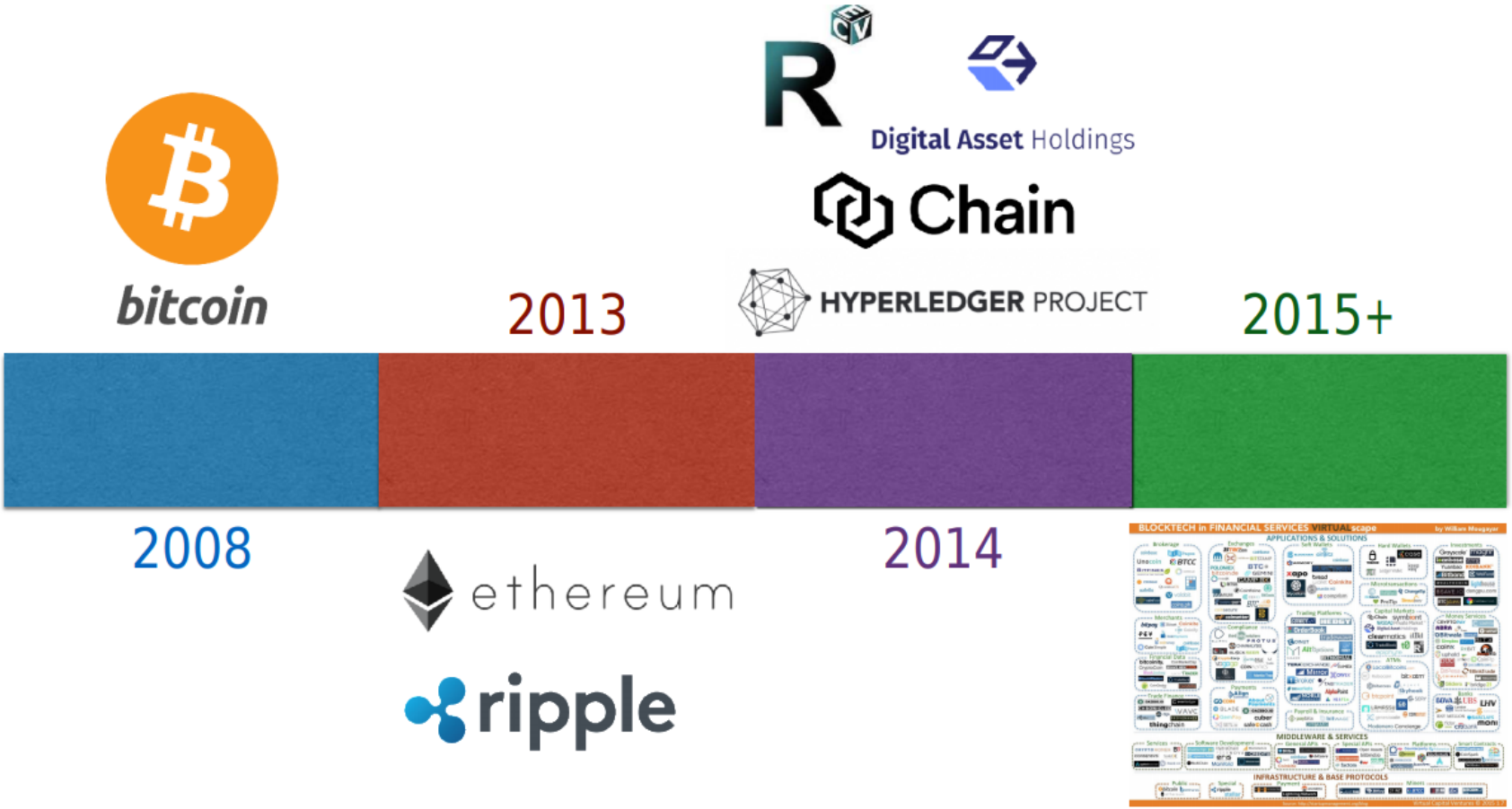
Outline

Outline

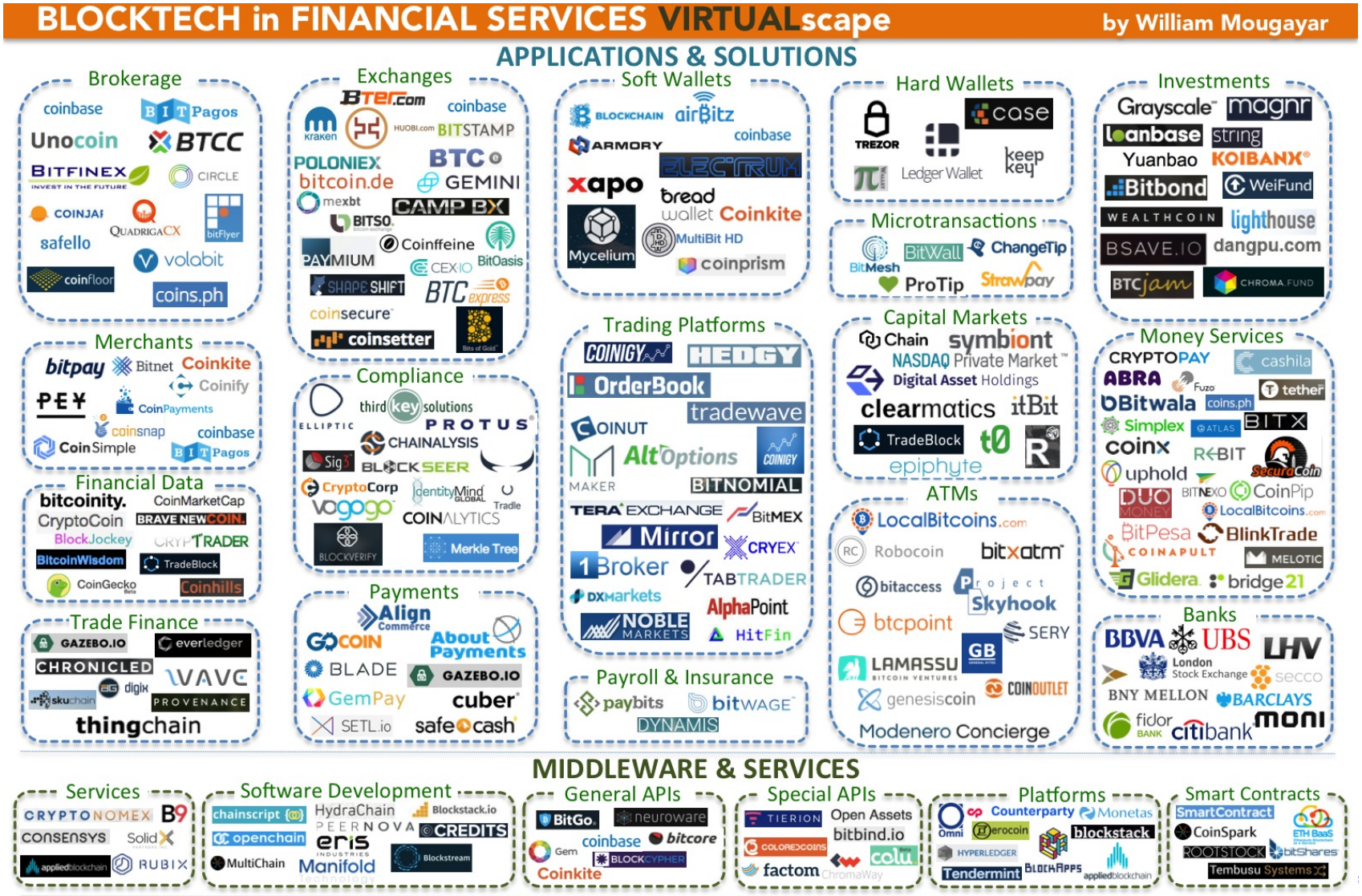
Blockchain


Block 0
Block Header
Transaction 1
Transaction 2
Transaction 3
Transaction n
Block 1
Block Header
Transaction n+1
Transaction n+2
Transaction n+3
Transaction n+n
Block m
Block Header
Transaction m*n+1
Transaction m*n+2
Transaction m*n+3
Transaction m*n+n

Blockchain


bitcoin
2013
HYPERLEDGER PROJECT
2015+
2008
ethereum
2014
ripple
Digital Asset Holdings
Chain
BLOCKTECH in FINANCIAL SERVICES VIRTUALscape
APPLICATIONS & SOLUTIONS
MIDDLEWARE & SERVICES
INFRASTRUCTURE & BASE PROTOCOLS

Blockchain


BLOCKTECH in FINANCIAL SERVICES VIRTUALscape
by William Mougayar
APPLICATIONS & SOLUTIONS
Brokerage
coinbase
BitPagos
Unocoin
BTCC
BITFINEX
CIRCLE
COINJAR
QUADRIGACX
bitFlyer
safello
volabit
coinfloor
coins.ph
Exchanges
BTer.com
coinbase
kraken
HUOBI.com
BITSTAMP
POLONIEX
BTC-e
bitcoin.de
GEMINI
mexbt
CAMP BX
BITSO
Coinffeine
PAYMIUM
CEX.IO
BitOasis
SHAPE SHIFT
BTC express
coinsecure
coinsetter
Soft Wallets
BLOCKCHAIN
airBitz
ARMORY
coinbase
ELECTRUM
xapo
bread
wallet
Coinkite
Mycelium
MultiBit HD
coinprism
Hard Wallets
TREZOR
case
Ledger Wallet
keepkey
Microtransactions
BitMesh
BitWall
ChangeTip
ProTip
Strawpay
Investments
Grayscale
magnr
loanbase
string
Yuanbao
KOIBANX
Bitbond
WeiFund
WEALTHCOIN
lighthouse
BSAVE.IO
dangpu.com
BTCjam
CHROMA.FUND
Merchants
bitpay
Bitnet
Coinkite
PEY
Coinify
CoinPayments
coinsnap
coinbase
CoinSimple
BitPagos
Compliance
third key solutions
ELLIPTIC
PROTUS
CHAINALYSIS
Sig3
BLOCKSEER
CryptoCorp
vogogo
identityMind GLOBAL
Tradle
COINALYTICS
BLOCKVERIFY
Merkle Tree
Trading Platforms
COINIGY
HEDGY
OrderBook
tradewave
COINUT
MAKER
AltOptions
COINIGY
BITNOMIAL
TERA EXCHANGE
BitMEX
Mirror
CRYEX
1Broker
TABTRADER
DXmarkets
AlphaPoint
NOBLE MARKETS
HitFin
Capital Markets
Chain
symbiont
NASDAQ Private Market
Digital Asset Holdings
clearmatics
itBit
TradeBlock
t0
R
epiphyte
Money Services
CRYPTOPAY
cashila
ABRA
Fuzo
tether
Bitwala
coins.ph
Simplex
ATLAS
BITX
coinx
RIPPLE
uphold
SecureCoin
DUO MONEY
BITNEXO
CoinPip
LocalBitcoins.com
BitPesa
BlinkTrade
COINAPULT
MELOTIC
Glidera
bridge21
Financial Data
bitcoinity.
CoinMarketCap
CryptoCoin
BRAVE NEWCOIN
BlockJockey
CRYPTRADER
BitcoinWisdom
TradeBlock
CoinGecko
Coinhills
ATMs
LocalBitcoins.com
Robocoin
bitxatm
bitaccess
Project Skyhook
btcpoint
SERY
LAMASSU
GB
genesiscoin
COINOUTLET
Modenero Concierge
Payments
Align Commerce
GOCOIN
About Payments
BLADE
GAZEBO.IO
GemPay
cuber
SETL.io
safecash
Payroll & Insurance
paybits
bitWAGE
DYNAMIS
Banks
BBVA
UBS
LHV
London Stock Exchange
secco
BNY MELLON
BARCLAYS
fidor BANK
citibank
moni
Trade Finance
GAZEBO.IO
everledger
CHRONICLED
WAVE
digix
skuchain
PROVENANCE
thingchain
MIDDLEWARE & SERVICES
Services
CRYPTONOMEX
B9
CONSENSYS
Solid
applied blockchain
RUBIX
Software Development
chainscript
HydraChain
Blockstack.io
PEERNOVA
openchain
CREDITS
eris INDUSTRIES
MultiChain
Manifold
Blockstream
General APIs
BitGo
neuroware
Gem
coinbase
bitcore
BLOCKCYPHER
Coinkite
Special APIs
TIERION
Open Assets
bitbind.io
COLOREDCOINS
factom
ChromaWay
Platforms
Counterparty
Monetas
Omni
erocoin
blockstack
HYPERLEDGER
Tendermint
BLOCKAPPS
applied blockchain
Smart Contracts
SmartContract
CoinSpark
ETH BaaS
ROOTSTOCK
bitShares
Tembusu Systems

Outline

Ethereum

- Very big distributed computer.
- Turing-complete virtual machine.
- Public blockchain (mainnet & testnet).

Ether

- Fuel of the blockchain.
- Massive market capitalization.
- Economic incentive to participate in consensus.
- Obtained buy mining/trading.
- Associated with an address 0x.... and a wallet file.

Smart Contract

- Computerized contract.
- Code + data that lives on the blockchain at an address.
- Transactions call functions => state transition.

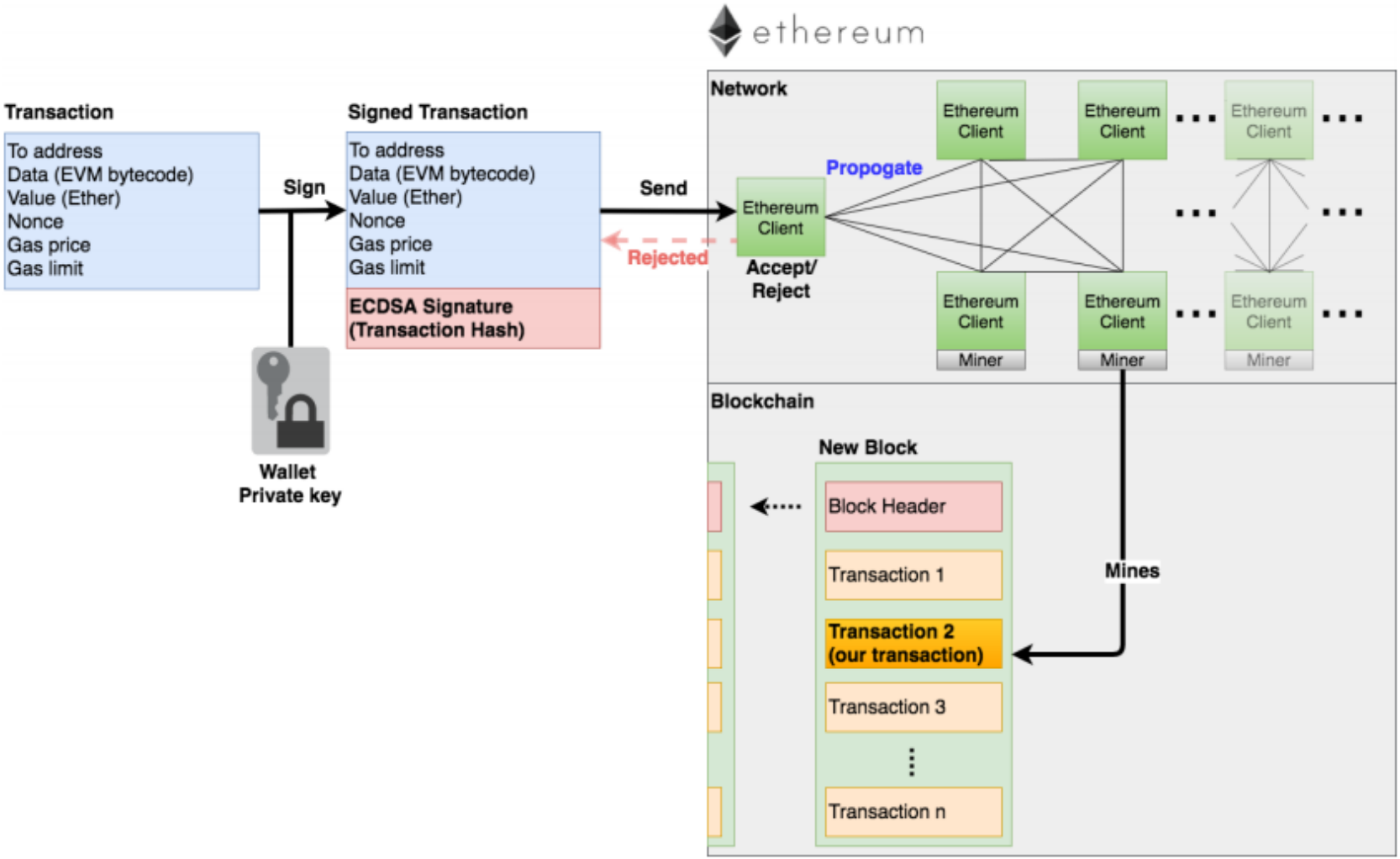
Greeter Contract

```
1  pragma solidity ^0.4.2;
2
3  contract mortal {
4      /* Define variable owner of the type address*/
5      address owner;
6
7      /* this function is executed at initialization
8         and sets the owner of the contract */
9      function mortal() { owner = msg.sender; }
10
11     /* Function to recover the funds on the contract */
12     function kill() { if (msg.sender == owner) suicide(owner); }
13 }
14
15 contract greeter is mortal {
16     /* define variable greeting of the type string */
17     string greeting;
18
19     /* this runs when the contract is executed */
20     function greeter(string _greeting) public {
21         greeting = _greeting;
22     }
23
24     /* main function */
25     function greet() constant returns (string) {
26         return greeting;
27     }
28 }
```

Transactions

- Transfer Ether.
- Deploy a smart contract.
- Call function of a smart contract.

Transaction



Integrating with Ethereum

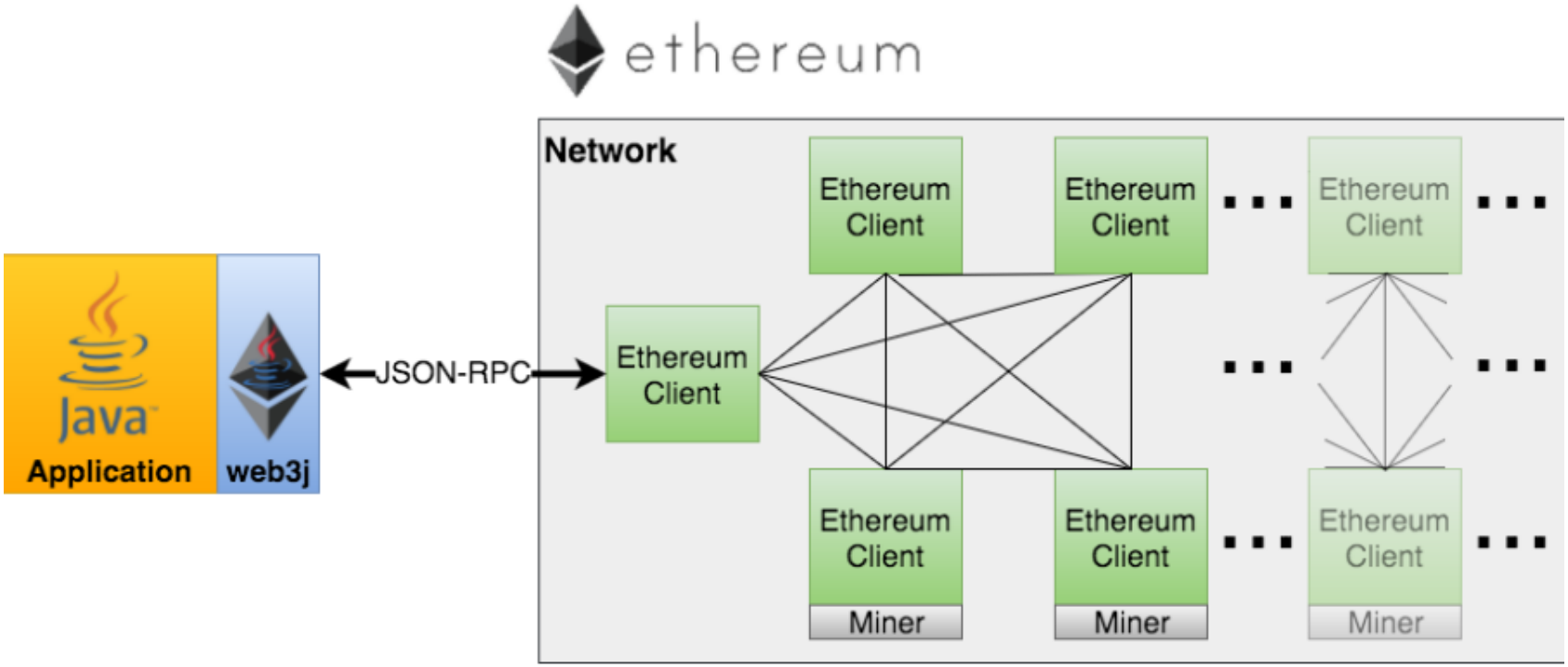
- Smart contract application binary interface encoders/decoders
- 256 bit numeric types
- Multiple transaction types
- Wallet management
- ...

Transaction

Questions?

Outline

Web3j


ethereum
Network
Ethereum Client
Ethereum Client
Ethereum Client
Ethereum Client
Ethereum Client
Ethereum Client
Miner
Miner
Miner
Java
Application
web3j
JSON-RPC

Web3j Features

- Complete Ethereum JSON-RPC implementation
- Ethereum wallet support
- Smart contract wrappers
- Command line tools
- Android compatible

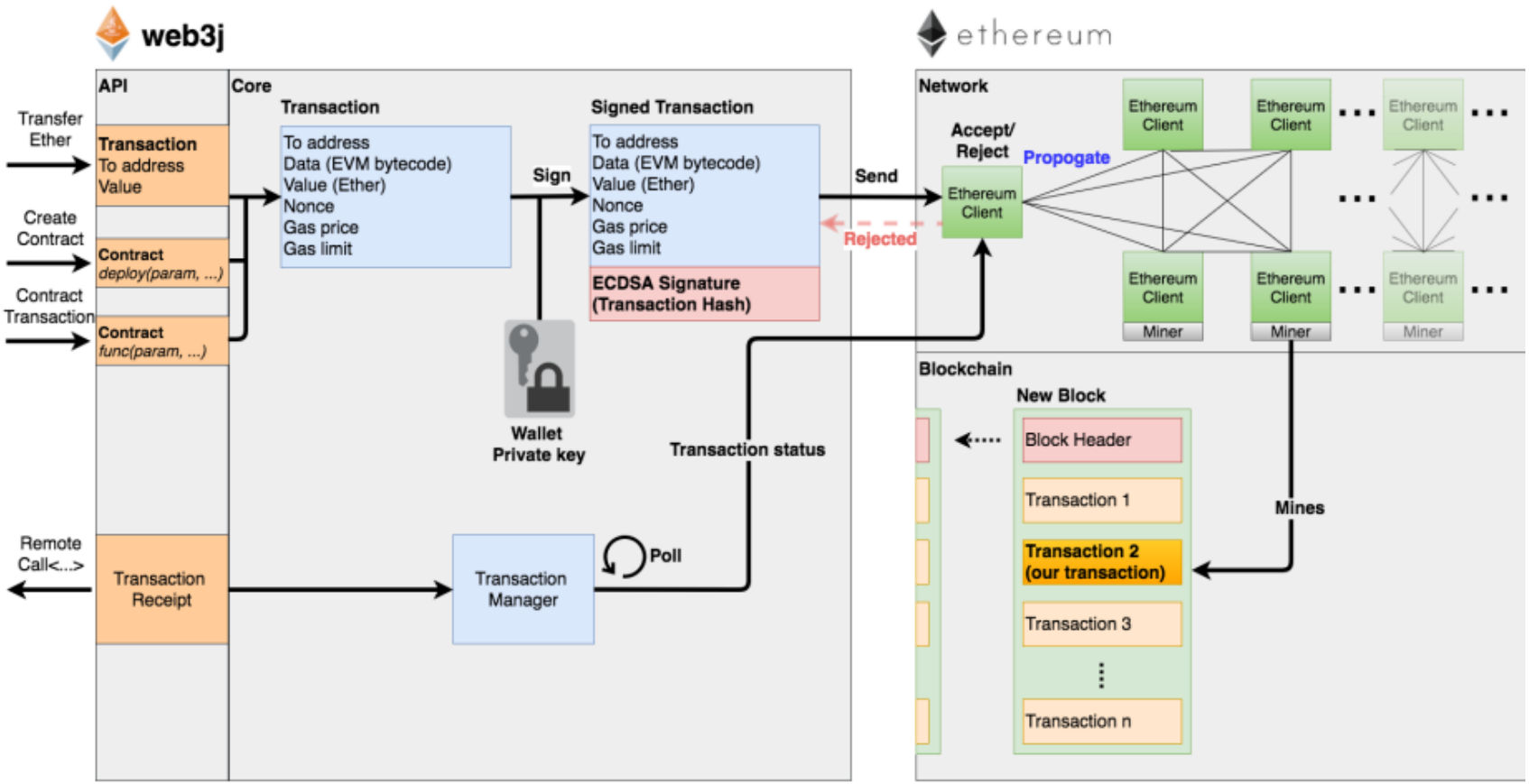
Web3j v3.x

- Modular
- Sync/async & RX Observable API
- ENS support (new!)
- Truffle support (new!)

Modules

- utils
- rlp
- abi
- tuples
- core
- codegen
- console (command-line tools)
- geth
- parity
- infura

Web3j Transaction



Questions

Questions?

Outline

Workshop

- 1. Download Web3j
- 2. Clone workshop repository
- 3. Deploy smart contract
- 4. Register event listener on smart contract
- 5. Send transaction to a friend's smart contract

Summary

mates

- Recap on Ethereum.
- Introduction to Web3j.
- Feedback for workshop?

Further Reading

Web3 Labs
Web3j docs.
https://web3j.readthedocs.io/en/latest/

OpenZeppelin.
OpenZeppelin Solidity library.
https://openzeppelin.org/api/docs/open-zeppelin.html

Web3 Labs
Web3j Gitter.
https://gitter.im/web3j/web3j