

INTRODUCING

NEUROWARE & BLOCKCHAINS

PRESENTED TO SCM - JUNE 2016 BY



neuroware

WE ARE A TECHNOLOGY STARTUP FOUNDED BY TECHNOLOGISTS



Mark Smalley - CEO

Living in Malaysia for 19 Years
1st MongoDB Master in South East Asia
Award Winning OpenSource Developer
Building Blockchains Applications for 5 Years



Ruben Tan - CTO

Consulting Startups for 10 Years
Helped Develop MyTeksi & OnApp
5 Years Experience Exploring Consensus
Community Leader of Several User Groups

WE ARE BACKED BY A TRUSTED TEAM OF VESTED ADVISORS



Colin Charles
MariaDB Founder



Adam Giles
Ex Standard Chartered



Hanson Goh
Axiata / Ex Google



David Barton Grimley
Sapient Nitro



Johnny Mayo
Forbes 30 Under 30



Wu Han Ngeow
Maxis



Gabey Goh
Campaign Asia-Pacific



Gareth Davies
Mindvalley

WITH THE HELP OF EXPERIENCED INTERNATIONAL INVESTORS



Neuroware was the first Malaysian based team to attend the illustrious 500 Startups accelerator in Mountain View, where we received our initial pre-seed investment and incubation



CoinSilium are the world's first blockchain investment company to IPO on a stock market (with COIN on their ticker), they invested in our later seed round and are based in Europe

WE'VE BEEN WORKING WITH AND TRAINING LEADING BRANDS



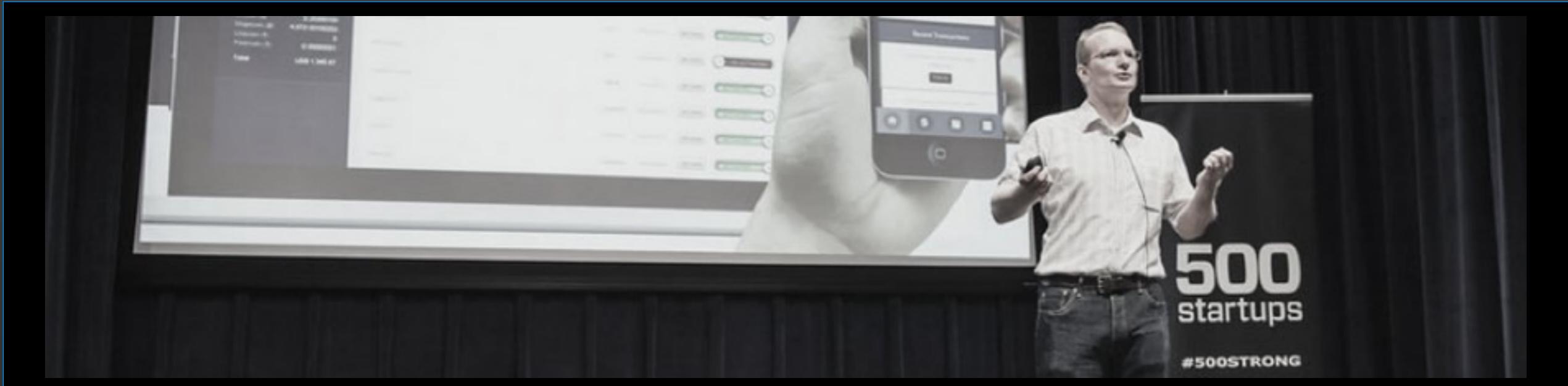
Suruhanjaya Sekuriti
Securities Commission
Malaysia



BANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIA



WE ARE EXPERIENCED INNOVATORS IN AN EARLY ECOSYSTEM



- Only Malaysian Company to Graduate from 500 Startups in Mountain View
- 1st Company in Asia Providing Public Blockchain APIs & Developer Toolkits
- 1st in The World to Develop Non-Financial Blockchain Agnostic Protocols
- Over 20 Years of Collective Blockchain Development Experience
- Only VC-Backed Blockchain Solutions Provider in South East Asia**

WHAT IS A BLOCKCHAIN...?
NOT JUST MAGIC INTERNET MONEY

BITCOIN

VS

BLOCKCHAINS



DOGECOIN

VS

RIPPLE



ETHEREUM

VS

PRIVATE CHAINS



WHAT'S THE DIFFERENCE BETWEEN PUBLIC & PRIVATE CHAINS?



WHAT ARE THE BENEFITS OF DISTRIBUTED PUBLIC LEDGERS?

- They provide an immutable tamper-proof audit-trail of the truth
- Data can be easily shared and independently verified by third-parties
- Vastly increased security that is much less vulnerable to attack or outage
- Programmable contracts that can radically reduce human errors and costs



“While Fintech Disrupts Banks,
the Blockchains Disrupt Fintech”

INTERESTING BITCOIN BLOCKCHAIN FACTS TO REMEMBER

- Bitcoin blockchain released in January 2009 by Satoshi Nakamoto
- We do not know who Satoshi is, or what their religion or political views are
- However, the bailout of 2008 was cited as primary catalyst for its creation
- US\$13 per coin in 2013 (which is when we bought) - now US\$640 per coin
- The Bitcoin network is currently processing over 250,000 daily transactions
- The network's market capitalization is currently around US\$10 billion
- 21 million maximum finite supply, decreasingly dispersed every 10 minutes
- **But most importantly of all is the technology behind it...**

BITCOIN AND BLOCKCHAINS HAVE NO NEW TECHNOLOGY



- HASH - Theorized in the 1800s - Coined by IBM in the 1950s
- SHA - Encryption method first introduced by US Navy in 1993
- P2P - Peer to peer protocol popularized by Napster in 1999

BLOCKCHAINS ARE SIMPLY A NETWORK OF NODES

- Each member of the network runs their own node and all nodes are equal
- The blockchain becomes more secure as more nodes join the network
- All transactions across the entire network are tracked by each node
- **There are no actual coins** - there is only a ledger of who owns what
- Cryptographic key-pairs represent accounts and passwords
- On the blockchain - no one knows you're a fridge



EVERY ACCOUNT IS MERELY A SET OF KEYS



EACH “ADDRESS” REQUIRES A PRIVATE KEY TO ACCESS IT



SOME ADDRESSES EVEN REQUIRE MULTIPLE KEYS



WHAT'S IN A BITCOIN TRANSACTION?

- Multiple unspent inputs are used in order to form the total value sent
- Cannot send proportions of inputs, must use all and send the change back
- Because a single transaction can send multiple values to multiple outputs
- Fees are based upon the total size (inputs and outputs) rather than value
- Paying these fees is done by forgetting to send some value to someone
- Transaction scripts can contain complex variables (multi-sig & timed locks)



ALICE CAN'T SEND WHAT SHE DOESN'T HAVE AND BOB WANTS 5

ALICE'S UNSPENT INPUTS

10



3



2



THE TX
SIGN OUTPUTS

5

4

RELAY HEX TO NETWORK

BOB GETS 5

5

CHANGE MINUS FEE

4

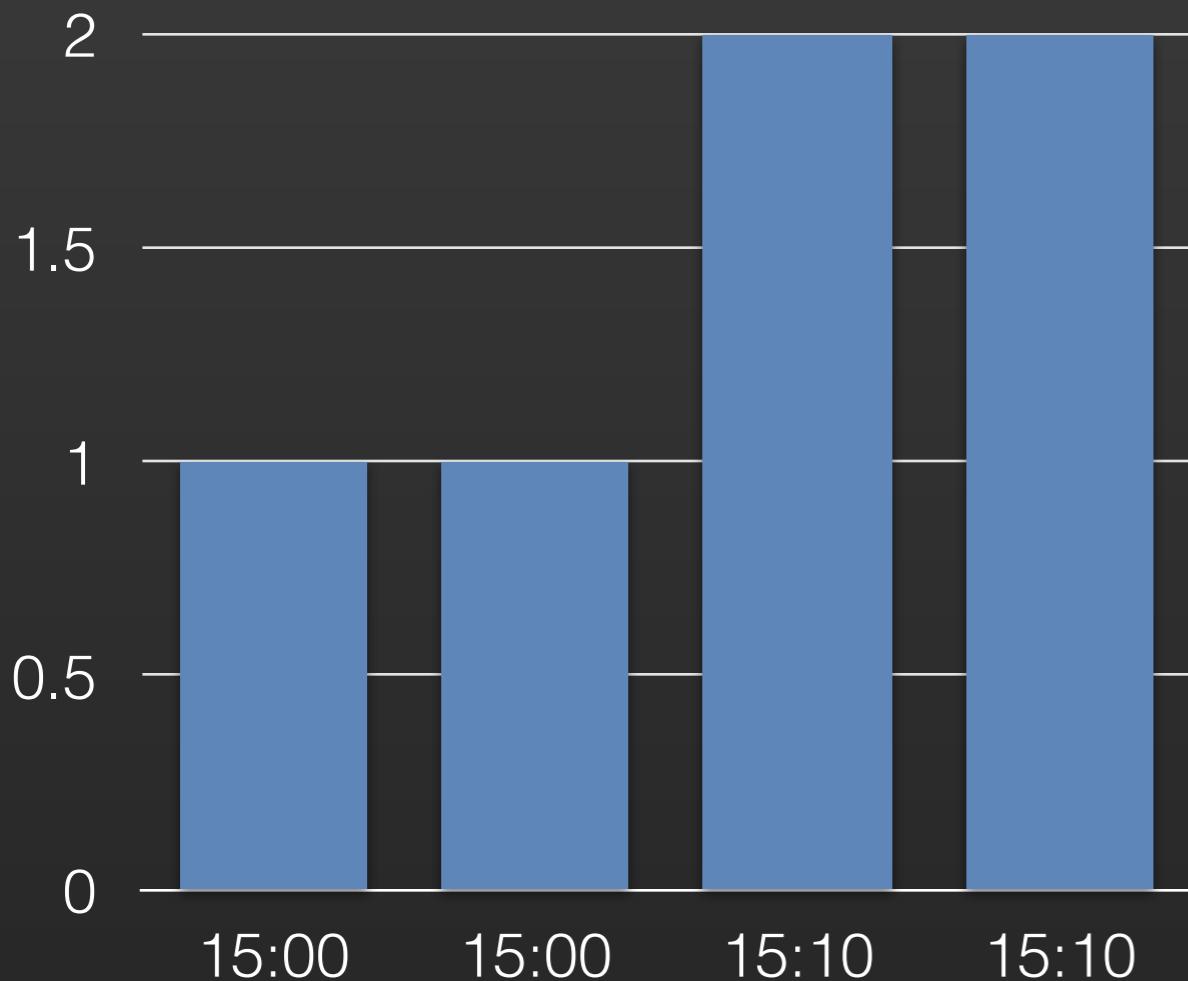
PUTTING THE BLOCK INTO BLOCKCHAINS

- Transactions are batched into blocks every ten minutes (with Bitcoin)
- The block is added to the chain with a link to the previous block
- With the block added to the chain, its transactions are then confirmed
- As soon as a new block has been added linking to that original block, the transactions from the first block then have 2 confirmations
- It is recommended that large physical transactions wait for 6 confirmations
- Whereas digital downloads may require no confirmations at all

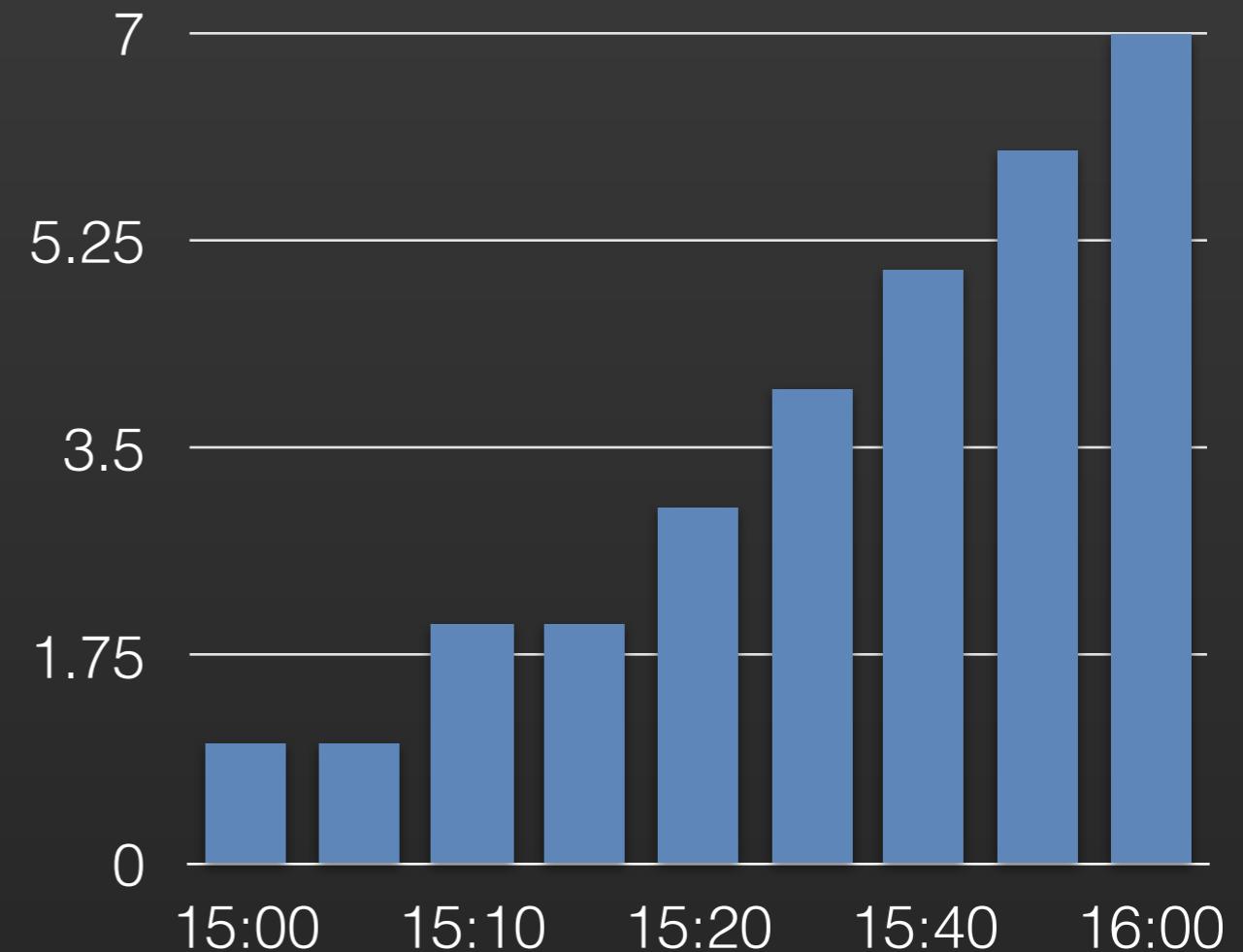


REALTIME VS TRUTH

Block Heights



Block Heights



BITCOIN ISN'T EVERYTHING
BILLIONS INVESTED IN BLOCKCHAINS

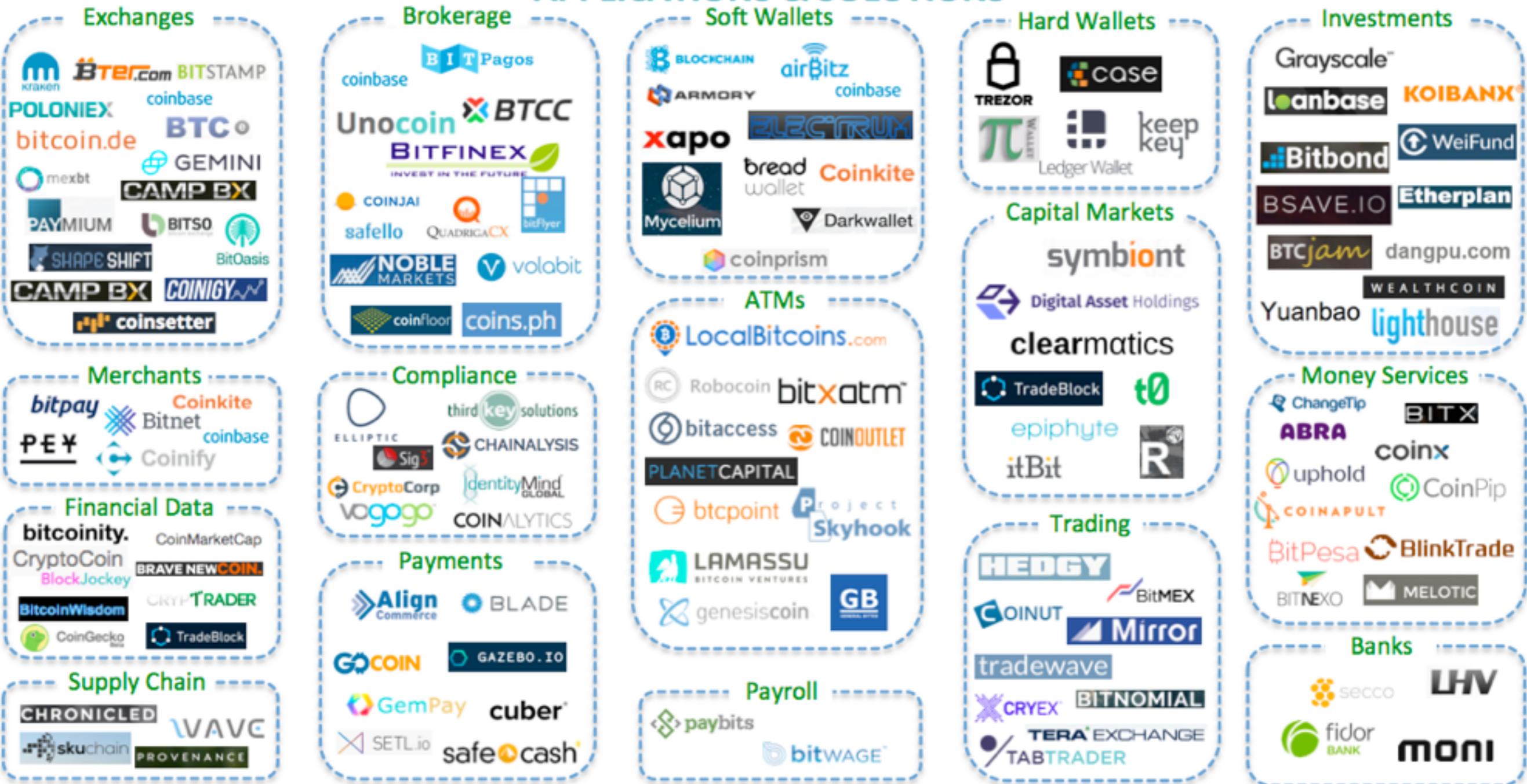
BANKS ARE MOVING FAST DUE TO ECOSYSTEM MATURITY

As of January 2016, more than 60 banks and leading financial institutions have made statements confirming that they are actively working on blockchain projects.



BLOCKTECH in FINANCIAL SERVICES Landscape

APPLICATIONS & SOLUTIONS



MIDDLEWARE & SERVICES



INFRASTRUCTURE & BASE PROTOCOLS



SOME OF THE INSTITUTIONS LEADING THE WAY



Custom blockchain
for settlements



Standard
Chartered



Blockchain based
trade finance platform

Blockchain based
loyalty platform

Blockchain based
remittance platform



multiple blockchains for cross-
border payments and loyalty

Deutsche Bank



Exploring KYC and AML
via the blockchains



Patented a blockchain
based wire transfer system



NASDAQ®

IBM

STOCK EXCHANGES ARE QUICKLY CATCHING-ON TOO

Australian Stock Exchange Confirms Upcoming Blockchain For Settlements

© 22/01/2016  Samburaj Das  0

 Bitcoin Technology, Blockchain News, FinTech News, News

KOREA ARE BUILDING PROTOTYPES TOO



Korean Securities Exchange is Building Blockchain Trading Platform

⌚ 01/03/2016 💬 0

≡ Bitcoin & Blockchain Investments, Bitcoin Technology, Blockchain News, News

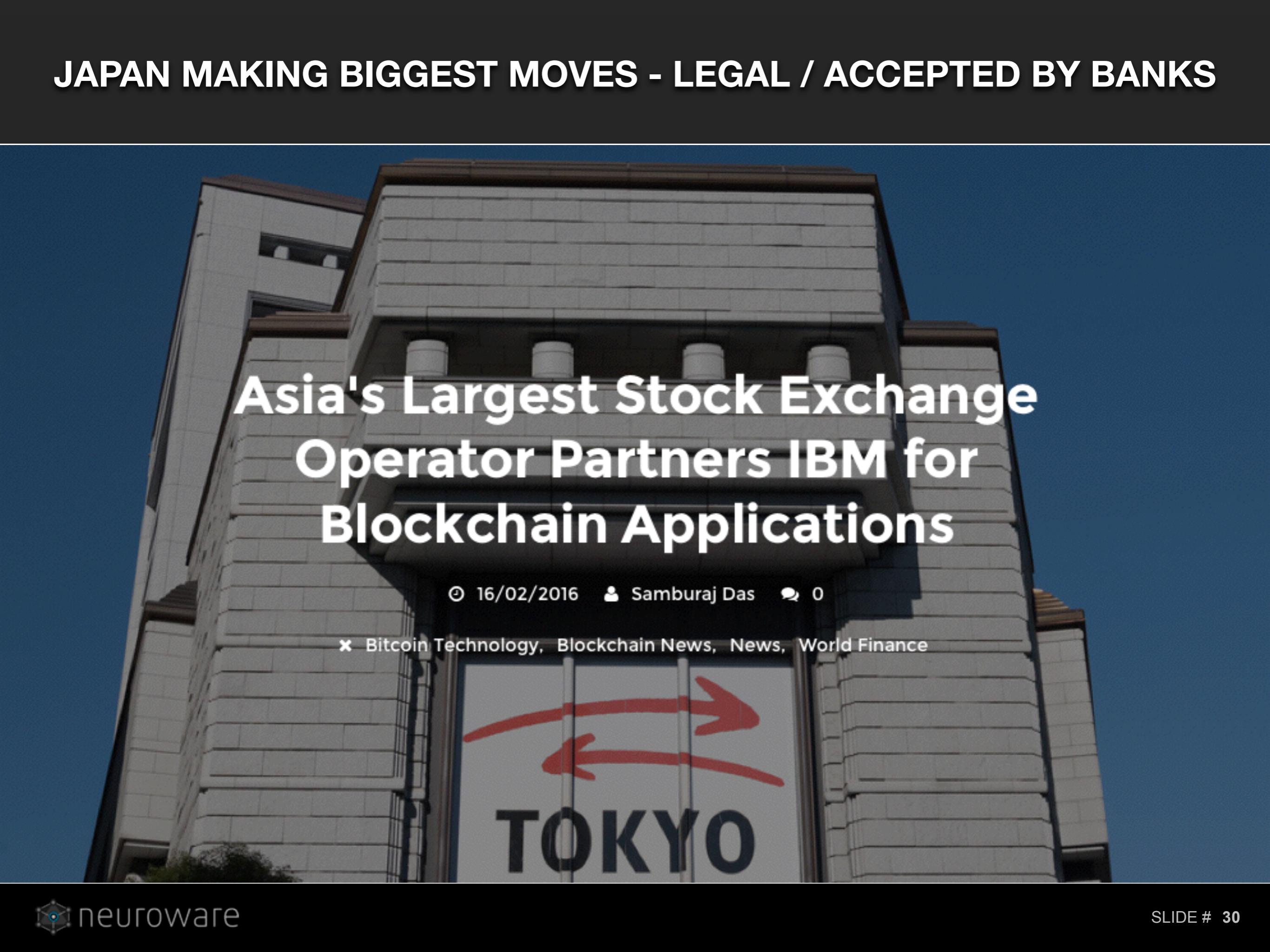
HONG KONG WERE QUICK TO FOLLOW

Hong Kong Bitcoin Exchange ANX Touts ‘Easy As Email’ Blockchain Service

© 17/05/2016 • Elliot Maras • 0

≡ Blockchain News, FinTech News, News

JAPAN MAKING BIGGEST MOVES - LEGAL / ACCEPTED BY BANKS



Asia's Largest Stock Exchange Operator Partners IBM for Blockchain Applications

⌚ 16/02/2016 🚩 Samburaj Das 💬 0

✖ Bitcoin Technology, Blockchain News, News, World Finance



IMITATION IS THE BEST FORM OF FLATTERY



- 1st Generation of Alt-Coins forked each other with minor tweaks
- Basic breakout alt-coin successes included Litecoin and Dogecoin
- Dash (previously known as DarkCoin) worth noting due to governance
- See the Malaysian-Based **CoinGecko** for a better list!

BLOCKCHAIN 2.0 - BUILT FROM SCRATCH

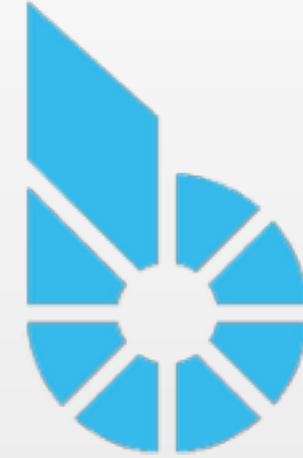


RIPPLE*



NXT GENERATION
OF CRYPTOCURRENCY

NXT



BITSHARES

- Ripple has most interest from banks due to their pre-mined walled-garden
- NXT is the most realized (fully-featured) of all the ambitious projects
- Bitshares coined the phrase DACs (distributed autonomous corporations)
- We now have a blockchain for everything from songs to logistics & coffee

* Not an actual blockchain

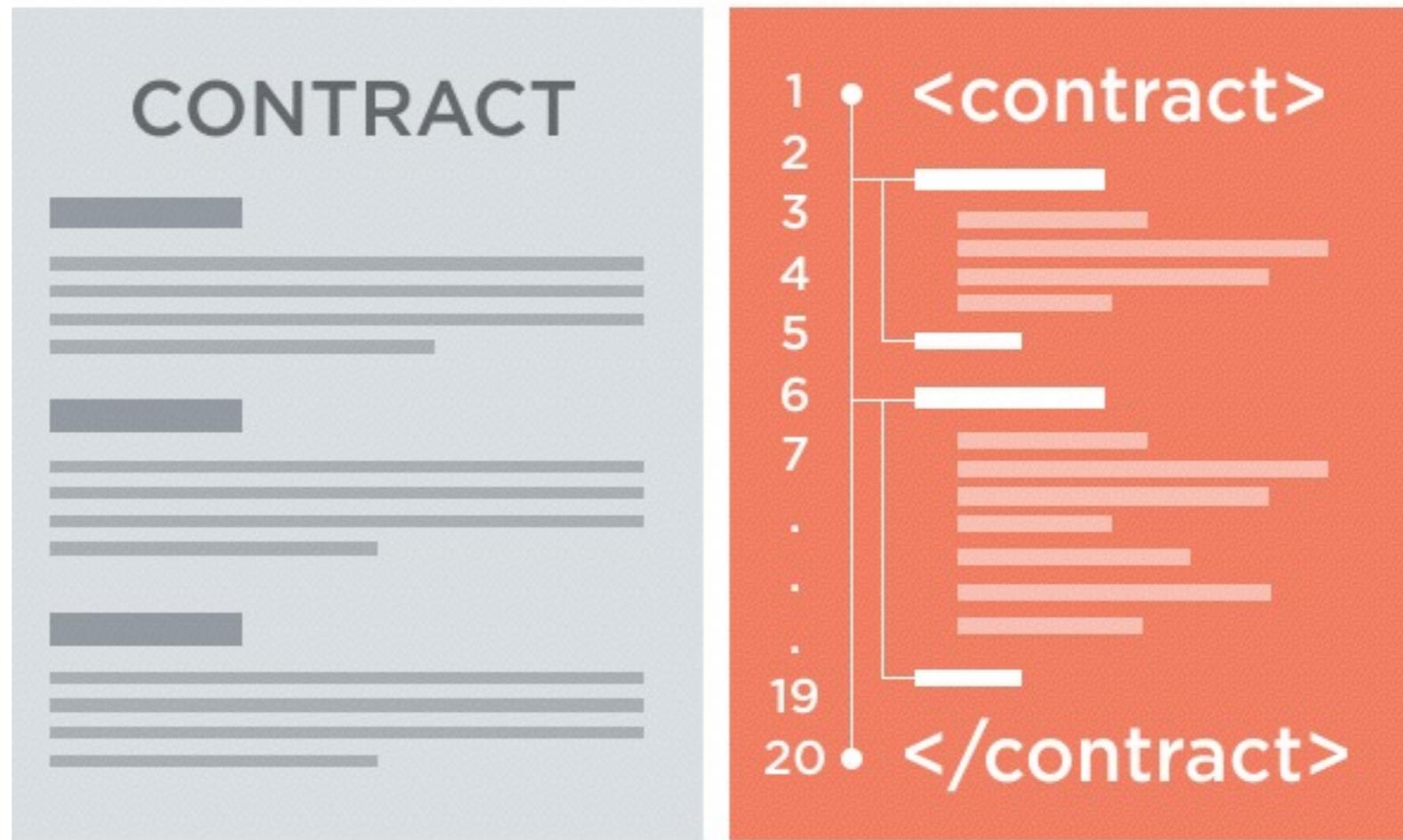
ETHEREUM TAKES THINGS ONE STEP FURTHER



THE WORLD'S SUPER COMPUTER...?

- Raised US\$15 Million in crowd-funding when launching their Ether currency
- Aiming to be the first turing complete blockchain, they have almost achieved it
- Heavily supported by Microsoft & also being used by IBM for their IoT platform
- Recently raised US\$150 Million in crowd-funding their own venture fund
- However, the more moving parts a system has - the more likely it is to break

SMART CONTRACTS ARE EVERYWHERE



- Even Bitcoin utilizes basic smart contracts (with over 100 script functions)
- Smart contracts are snippets of code stored and executed by the network
- They can perform transactional based events if defined conditions are met

WHAT'S REALLY IN A TRANSACTION?

CO-FOUND... BLOCKSTR... Blockstrap msmalley/f... Everstore ATA-Plus A... Legality of ... bitcoin tran... mining bitc... Mining Bitcoin i... BlockAuth http://...0fd21

api.blockcypher.com/v1/btc/test3/txs/235a88e9853c1c116ef47f795f13ce200c2e1bf37667e99973e1c829f95t

bitcoin transaction script

```
{ "block_hash": "00000000009f30c59abf2f8556c0949c79b54764f4cbb223ca43527394d3ee2f", "block_height": 847281, "block_index": 24, "hash": "235a88e9853c1c116ef47f795f13ce200c2e1bf37667e99973e1c829f95b95f7", "addresses": [ "mpNENnsFcL8a5hPxwfPrYPkZqAkbbFpxLF", "mq7tNFrbi3E3fsuUbsTsA7keoeYL6gYzv2" ], "total": 86124000, "fees": 10000, "size": 339, "preference": "medium", "relayed_by": "", "confirmed": "2016-05-16T07:51:20Z", "received": "2016-05-16T07:51:20Z", "ver": 1, "lock_time": 0, "double_spend": false, "vin_sz": 2, "vout_sz": 1, "confirmations": 19557, "confidence": 1, "inputs": [ { "prev_hash": "bb4cef4d48dba1916c73552342b660be00535c43ad47462abf43a402cc2a61a1", "script": "4730440220618bd76a683d2603edb570e66b851f85dd594abd7a3c25a2b29064b01695907502201edeac4cd777e04a393cf1bca0d7ba5916e3fc8c67efa33268a936bf96b9a7e012103530d0cbdfcd448b8d96ac9c1cbdc88a2f60e05a7f16e7ab321185afb0523e9fc", "sequence": 4294967295, "addresses": [ "mpNENnsFcL8a5hPxwfPrYPkZqAkbbFpxLF" ], "script_type": "pay-to-pubkey-hash" }, { "prev_hash": "42662b2544a7f59a1abd004a8e15c714f108f553f1dd3f0617982eb5b8ac468c", "script": "483045022100f7ab281bcb605550098f62a097b6dbef79a9f35261aae9dc01aec54a08e8212b02201261b2d0f44545a551fe54f1777597e747523f0a66b7cf74521828c67f23887012103530d0cbdfcd448b8d96ac9c1cbdc88a2f60e05a7f16e7ab321185afb0523e9fc", "output_value": 7555000, "sequence": 4294967295, "addresses": [ "mpNENnsFcL8a5hPxwfPrYPkZqAkbbFpxLF" ], "script_type": "pay-to-pubkey-hash" } ], "outputs": [ { "value": 86124000, "script": "76a914695469844938fd58e5cf59987f4cc063d4d657a788ac", "addresses": [ "mq7tNFrbi3E3fsuUbsTsA7keoeYL6gYzv2" ] } ] }
```

DECODING SCRIPT HEXES

- 80% of transactions are known as **standard transactions**
 - OP_DUP OP_HASH160 <pubKeyHash> OP_EQUALVERIFY OP_CHECKSIG
- Approximately 1% of transactions contain **OP>Returns**
 - OP_RETURN <hexedData> - can you find Gandhi?
- There are even a few hidden puzzles on the blockchain...

OP_HASH256

6fe28c0ab6f1b372c1a6a246ae63f74f931e8365e15a089c68d6190000000000

OP_EQUAL

ETHEREUM MAKES SMART CONTRACTS DEVELOPER FRIENDLY

```
contract MyToken {  
  
    /* Public variables of the token */  
    string public standard = 'Token 0.1';  
    string public name;  
    string public symbol;  
    uint8 public decimals;  
    uint256 public totalSupply;  
  
    /* Allow interface to create tokens */  
    function MyToken( ... )  
  
    /* Send coins */  
    function transfer( ... )  
  
    /* Allow another contract to spend some tokens in your behalf */  
    function approveAndCall( ... )  
  
    /* A contract attempts to get the coins */  
    function transferFrom( ... )  
}
```

CURRENCIES CAN BE MANY THINGS - EQUITY OR VOTING RIGHTS

- Symbol = %
- Decimals = 2
- Name = Equity

Contracts can also be linked, which allows governance contracts (DAOs) to then be able to vote and control upon custom currency transfers...

THE DAO - LARGEST CROWDFUNDING INITIATIVE EVER

The time has come to breathe life into The DAO
A One Time Only Event

1123.85 M

DAO TOKENS CREATED

11.35 M

TOTAL ETH

151.67 M

USD EQUIVALENT

1.30

CURRENT RATE
ETH / 100 DAO TOKENS

5 hours

NEXT PRICE PHASE

7 days

LEFT
ENDS 28 MAY 09:00 GMT



REASONS TO USE BLOCKCHAINS FOR EQUITY CROWDFUNDING

- Introduce programmable contracts for equity ownership and transfer
- Multi-signature arbitration and escrow with every transactional record
- Instant authorized settlement of deposits & withdrawals in digital currencies
- Optional introduction of localized dollar-to-digital token or national reserve
- Interconnect with other networks to develop a global secondary market
- **Create a tamper-proof audit-trail of every event within the network**



INTRODUCING THE NOTION OF NEUROWARE NODE TYPES

PARTNER NODES

THESE DO THE HEAVY LIFTING

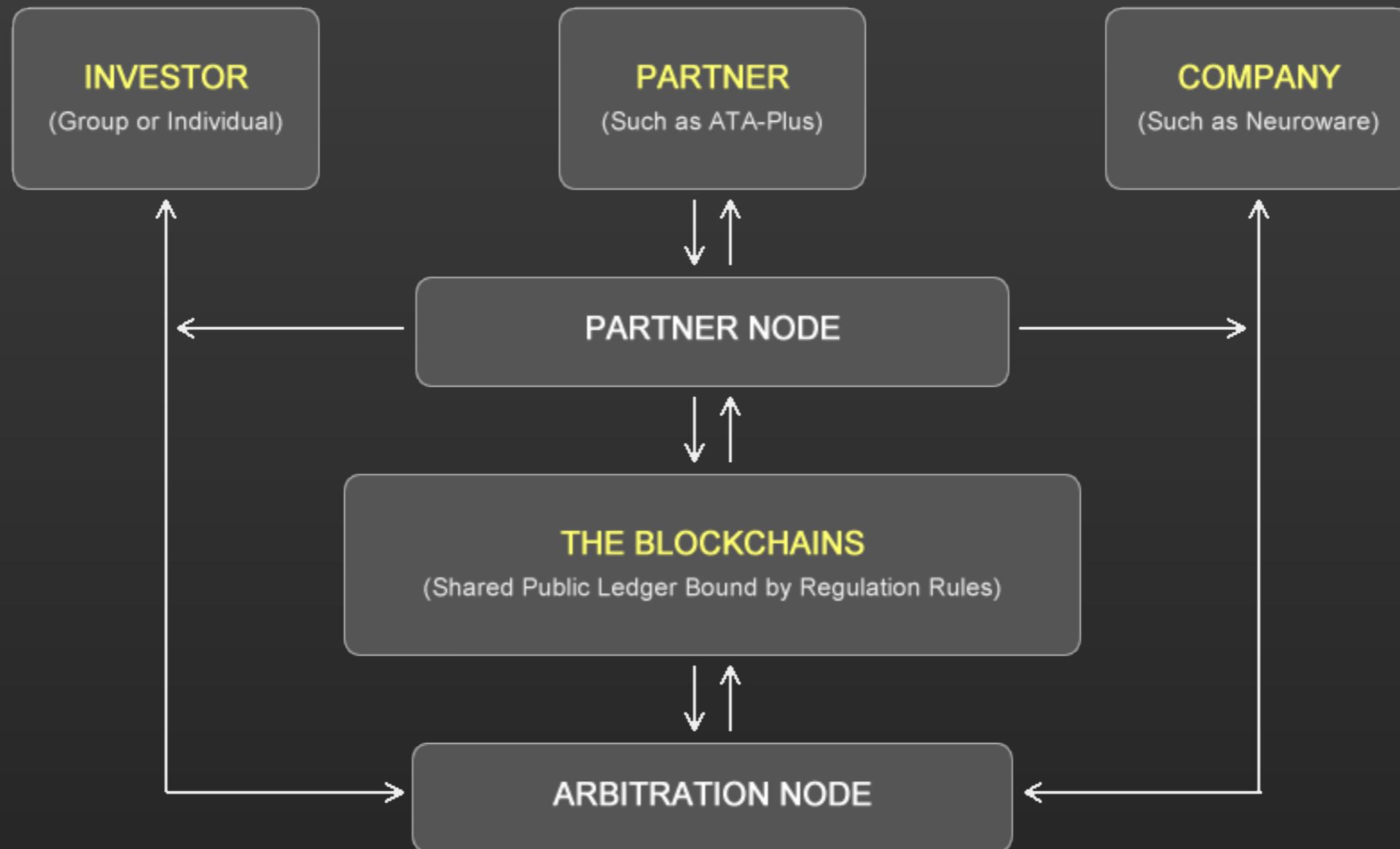
(hosted by licensed partners)

ARBITRATION NODES

THESE SIMPLY SET AND GOVERN RULES

(hosted by national regulators)

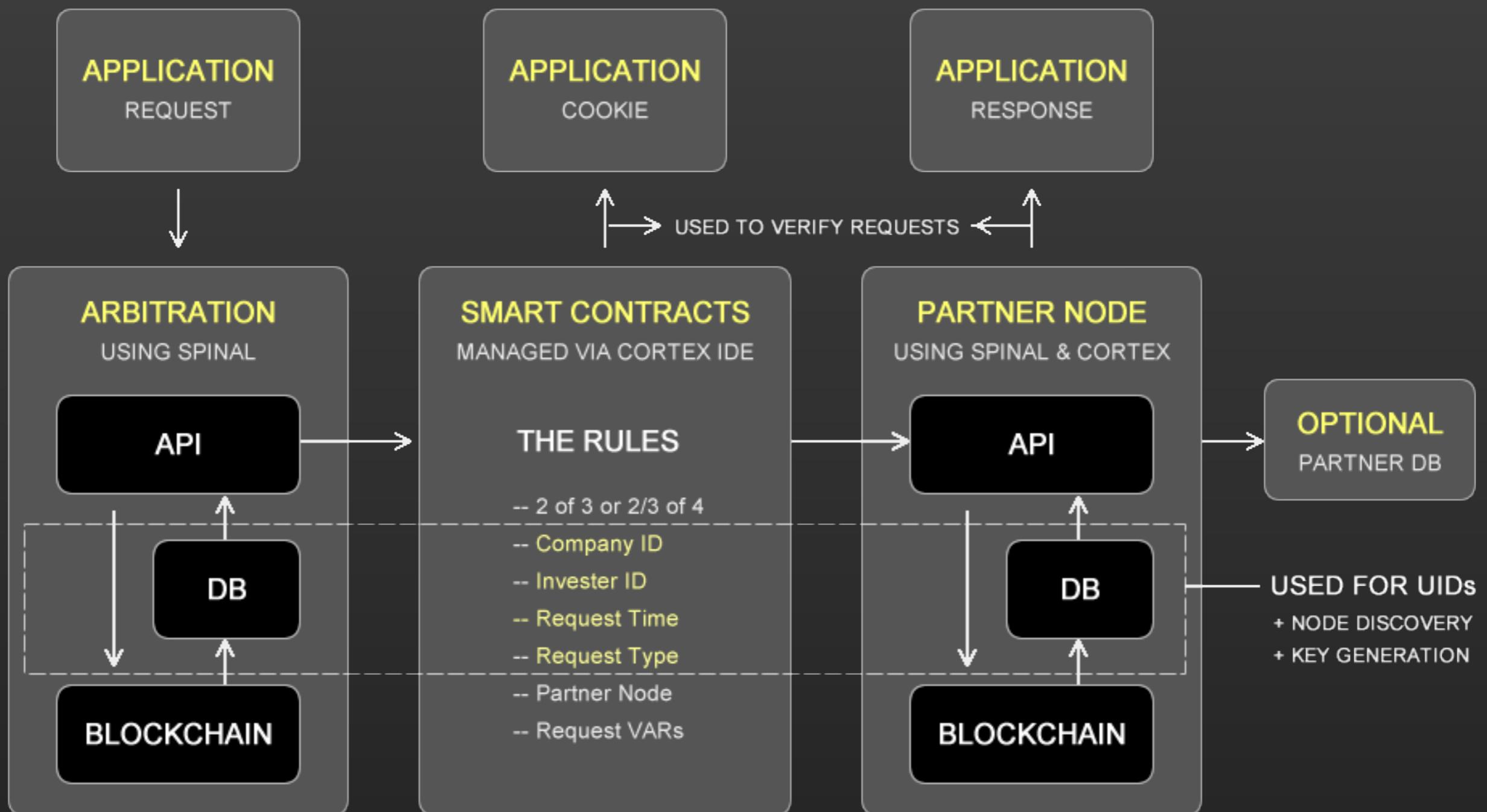
USING THE BLOCKCHAINS TO OUTSOURCE TRUST



THE RESPONSIBILITIES OF THE ARBITRATION NODES

- Arbitrators receive and relay requests for each contractual addition or edit
- It issues 2 of 3 multi-signature escrow smart contracts to each investor
- These contracts can also allow for optional deposits within digital currencies such as Bitcoin & Ether, and are relayed via the partner nodes
- Upon successful relay and fulfillment, contracts can then be settled directly
- Upon settlement, the creation of optional tokens representing one of the three keys can then be issued to and traded within secondary markets
- By controlling one of three keys where two keys are required for transfers allows for regulatory nodes to provide judgment in disputes, and also the ability to recover all transactions and control with approval from either side

CREATING ARBITRATION CONTRACTS USING SPINAL AND CORTEX

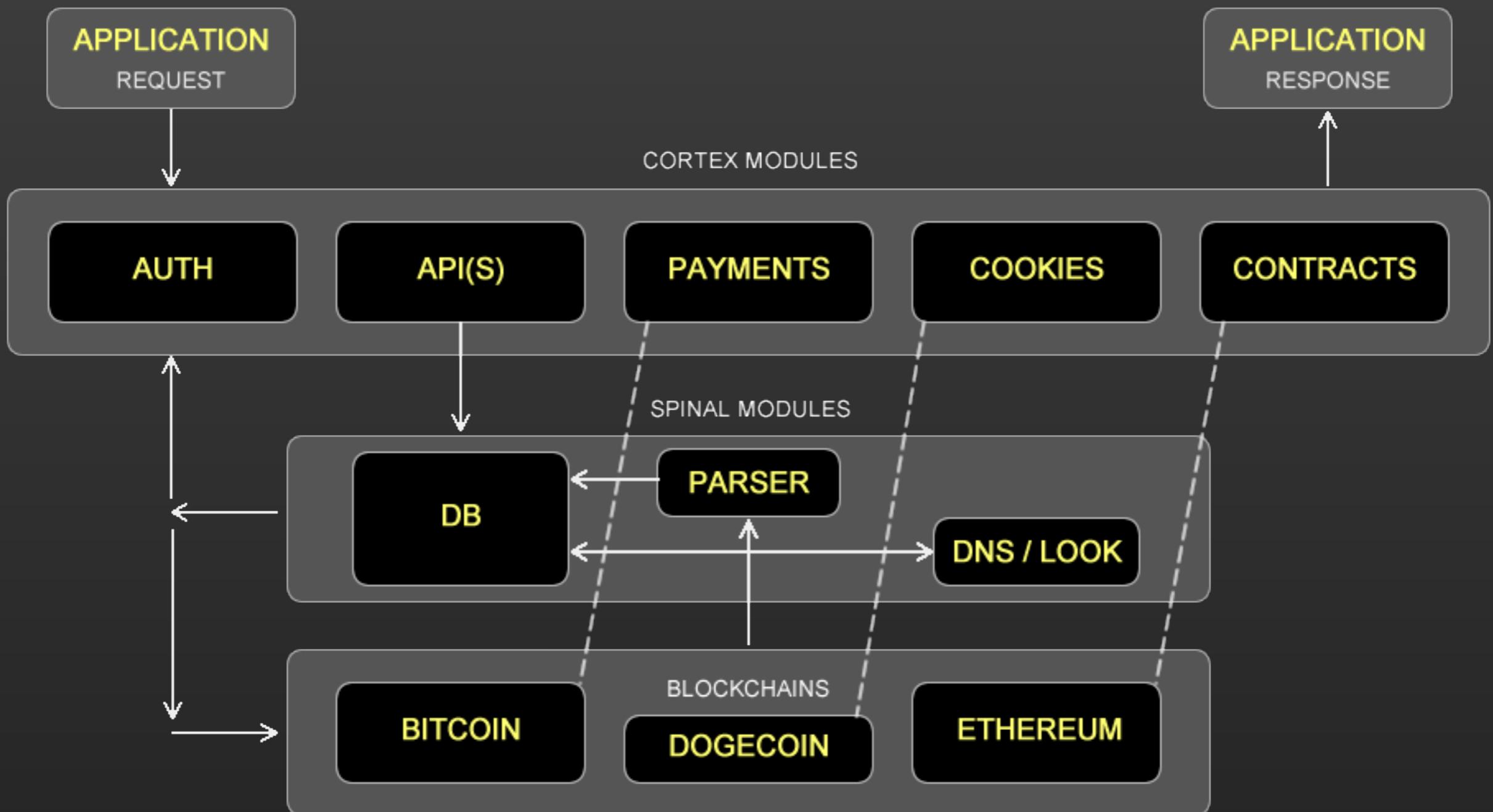


THE RESPONSIBILITIES OF THE PARTNER NODES

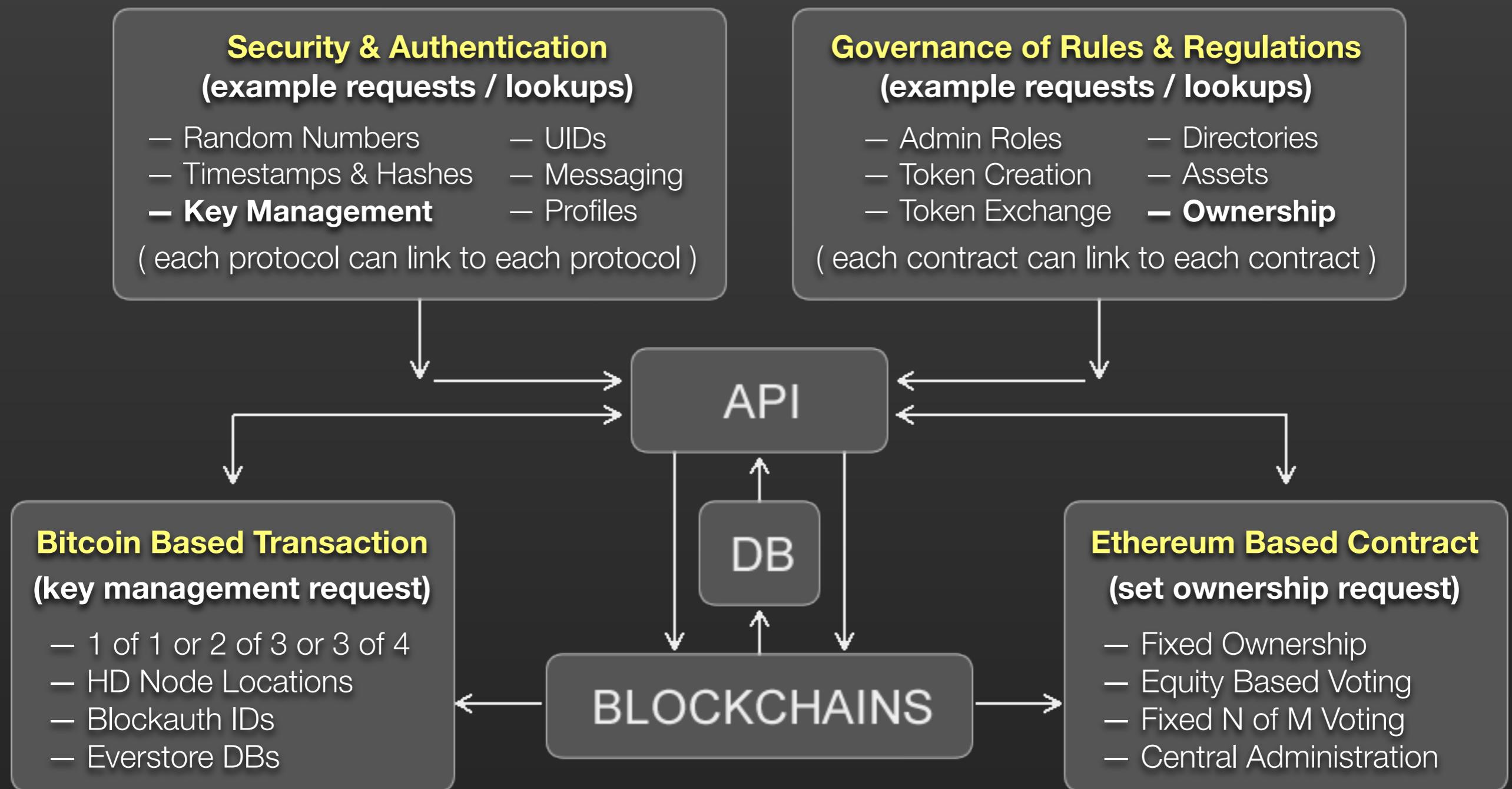
- Designed to conduct the most work and have the biggest and most accessed databases (from all of the application polling & final settlements)
- Licensed partners provide their users with branded customized experiences governed by network rules, regulations and automatically audited accounts
- Approved partners could issue their own tokens pegged to national reserve
- Approved investors could trade directly, or issue approved equity funds
- Partners can then choose to create local secondary markets directly with each other and their respective users (based upon their approved features)



THE ANATOMY OF AN ECF / P2P PARTNER NODE



MULTI-SIGNATURE PROCESSING PER FUNCTION PER PARTNER

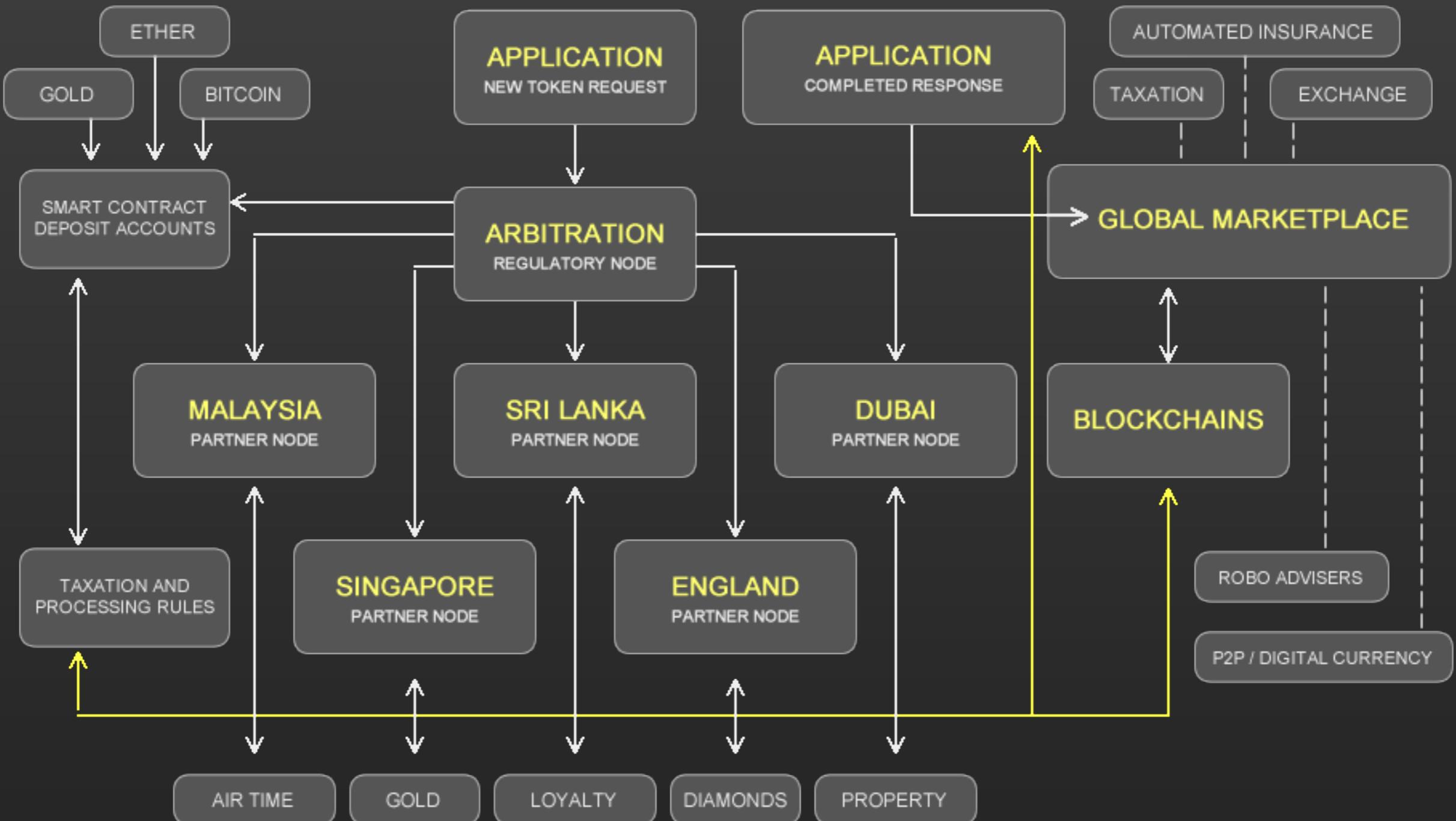


CREATING A GLOBAL NETWORK OF SECONDARY MARKETS

- With each regional market connected to locally regulated digital securities, this could enable global participants to deposit, withdraw or transfer value and (or) ownership within any approved currency and (or) global location
- Regulatory nodes would automatically receive and relay the appropriate regional and global taxation and processing fees by controlling reserves
- Partner nodes provide the consumer applications, solutions and services
- As new digital-licenses emerge (such as P2P, Digital Currencies, etc) the broader the interconnected marketplace and ecosystem becomes...



REGULATING A GLOBAL NETWORK OF SECONDARY MARKETS



MORE ABOUT NEUROWARE

OPEN PROTOCOLS AND PRODUCTS

THESE ARE SOME OF THE SERVICES NEUROWARE PROVIDE

- We provide company-wide education, training and blockchain workshops
- We provide self-hosted blockchain agnostic parsers, developer APIs & tools
- We provide consultancy and implementation services utilizing blockchains
- We've developed several open-source blockchain-based applications
- We've built platforms combining Ethereum contracts with Bitcoin security
- We've developed the following non-financial blockchain agnostic protocols

BLOCKCHAIN-AGNOSTIC PROTOCOLS WORK ON ANY LEDGER

EVERSTORE

DISTRIBUTED STRUCTURED DATA

By using a combination of Hierarchical Key Generation and standardized OP_Return methodology, we are able to store an almost unlimited amount of structured data on any blockchains or ledgers that support OP_Returns or an equivalent API accessible arbitrary data-storage field within their HD-compatible transaction streams.

 **blockauth**

DECENTRALIZED ID AND AUTHENTICATION

By introducing Hierarchical roles and privileges using a similar methodology to Everstore, BlockAuth is able to verify and transmit secure messages and independent authorization to and from other BlockAuth enabled individuals and services. Store avatars and social media profiles to remove the need for repetitive form filling & choose who gets what.

 **dnkey**

KEY LOGISTICS & BROADCASTING

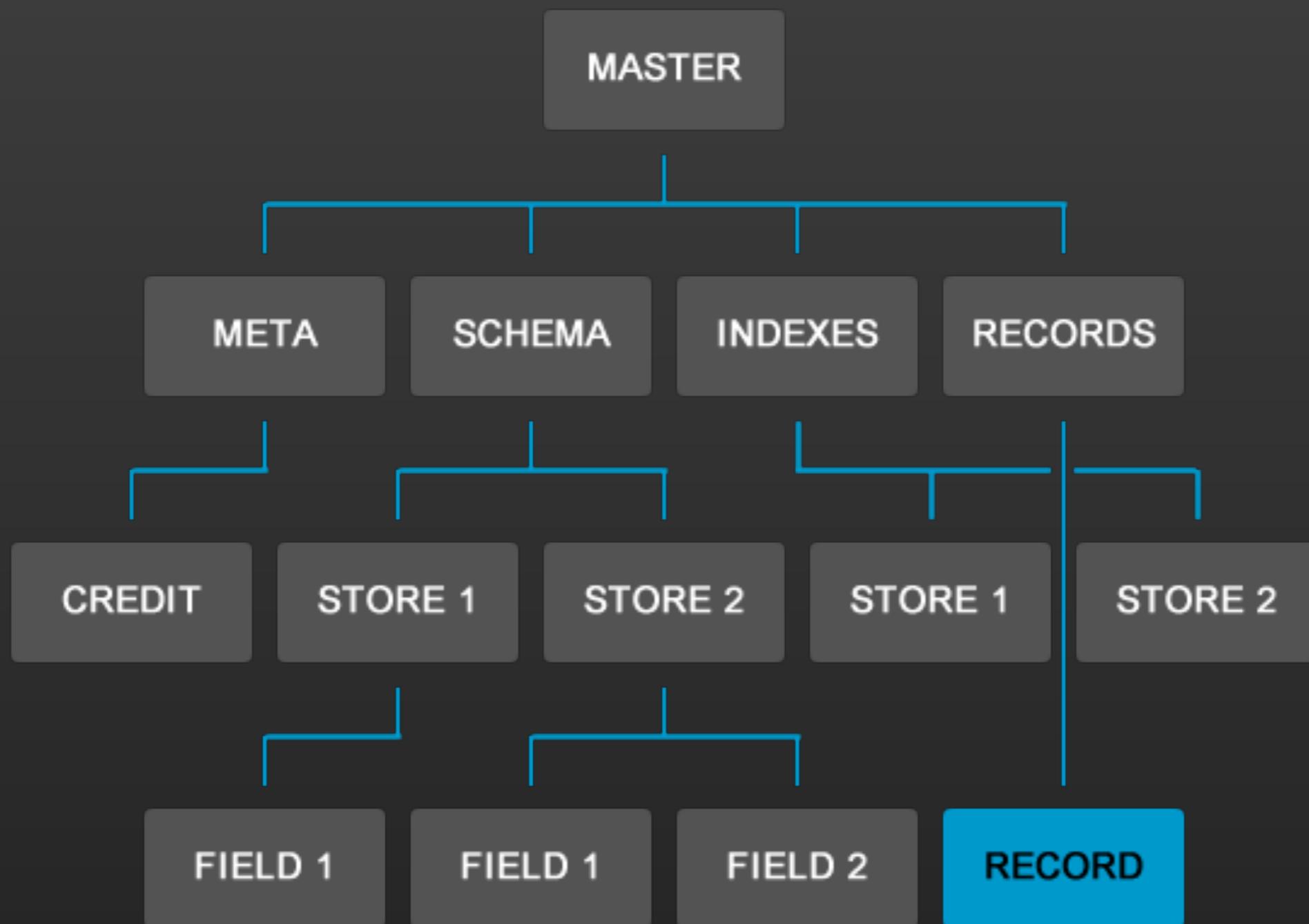
DNKey not only enables basic key-aliasing, which allows other systems, services and users to replace long complicated public keys with memorable domain based identities, which in-turn allows for easier key sharing, it can also enable revocation abstraction layers - but also provides advanced methods for generating vast amounts of secure deterministic key-pairs.

THE PRIMARY EVERSTORE FEATURES USED BY OUR PRODUCTS

- Create, Read, Update and Delete Structured Data on Any Blockchain
- Supporting 20 field types (strings, numbers, geo-objects, images and more)
- Support for Indexes, Relationships and internal Look-Ups and Selects
- Integrated server-less self-generating interface for browsers in place
- With one click export functionality to move entire data sets to other chains
- Hierarchical data-storage methods allow for limitless extensibility in the future
- Can be integrated with BlockAuth and DN-Key to allow for user roles



AN ABSTRACT VIEW OF EVERSTORE HIERARCHAL DATA STORAGE



WITH CORTEX AS A SINGLE INTERFACE FOR ALL BLOCKCHAINS

CORTEX

Current location: Dashboard

Currently logged-in as **Mark Smalley** [LOGOUT](#)

Dashboard

DNKeys

BlockAuth

Everstore

API

Explorer

Settings

YOUR PROFILE

Name: **Mark Smalley**
Title: Co-Founder & CEO
Company: Neuroware
URL: twitter.com/m_smalley

CURRENT USAGE

Category	Status
Domains	3 / 10
Sub-Domains	21 / 100
User Accounts	1 / 10
Teams / Groups	1 / 100
Everstore Instances	12 / 100
Configured Blockchains	3 / 8
Active API Functions	22 / 22
Active Modules	2 / 7
Active Protocols	3 / 8

RECENT ACTIVITY

Updated DNKey on mark.neuroware.io 12 minutes ago by **Mark Smalley**

Added new user johnny.neuroware.io 1 hour ago by **Mark Smalley**

Updated Everstore instance team.neuroware.io 12 minutes ago by **Mark Smalley**

Updated DNKey on mark.neuroware.io 12 minutes ago by **Mark Smalley**

Added new user johnny.neuroware.io 1 hour ago by **Mark Smalley**

Updated Everstore instance team.neuroware.io 12 minutes ago by **Mark Smalley**

ADD NEW MODULE
(drag-and-drop to sidebar or click to install)

WALLET

EVENTS

VOTING

INVOICES

EXCHANGE

REQUEST

ADD NEW PROTOCOL
(drag-and-drop to sidebar or click to install)

OPEN ASSETS

LIGHTNING NETWORK

ONENAME

MULTI-SIG

OP RETURNS

REQUEST

AND SPINAL AS THE ON-PREMISE API SOLUTION POWERING IT



blocks status

search for block, transaction or address...

connections 8 - height 403,742

BTC ▾

Error!

Can't connect to bitcoind to get live updates from the p2p network. (Tried connecting to bitcoind at localhost:8333 and failed.)

X

Welcome

Blockchains.io is a blockexplorer that is currently tracking Bitcoin, Dogecoin, Ethereum and their relevant testnets. It is maintained by Neuroware.io

X

latest blocks

SEE ALL BLOCKS

Daily Transactions

Last 12 Months

Height	Age	Transactions	Mined By	Size
403716	4 hours ago	783	Discus Fish	399714
403716	4 hours ago	783	Discus Fish	399714
403716	4 hours ago	783	Discus Fish	399714
403716	4 hours ago	783	Discus Fish	399714
403716	4 hours ago	783	Discus Fish	399714



latest transactions

SEE ALL TRANSACTIONS

US Dollar

currency calculator

Hash	Ins	Outs	Value Out
43d0f429e3773455a15cf1134d47ece776c9b4e6 ...	7	2	0.325 BTC

1.00000000

BTC

=

US\$ 412.42

THANK YOU

FOR YOUR TIME AND INTEREST

contact us directly - founders@neuroware.io

LEARN MORE ABOUT



neuroware

<http://neuroware.io>