

BLOCKCHAIN

MASTERCLASS - Q2 - 2017

presented by



neutoware

INTRODUCING THE NEUROWARE FOUNDER



ONLY MSC BLOCKCHAIN COMPANY



SUPPORTED BY MDEC & MOF

Mark Smalley - CEO

Living in Malaysia for the past 20 Years

Building FinTech Applications for 15 Years

Spent 10 Years Building Tech Communities

Building Blockchain Apps for 5 Years

Ruben Tan - CTO

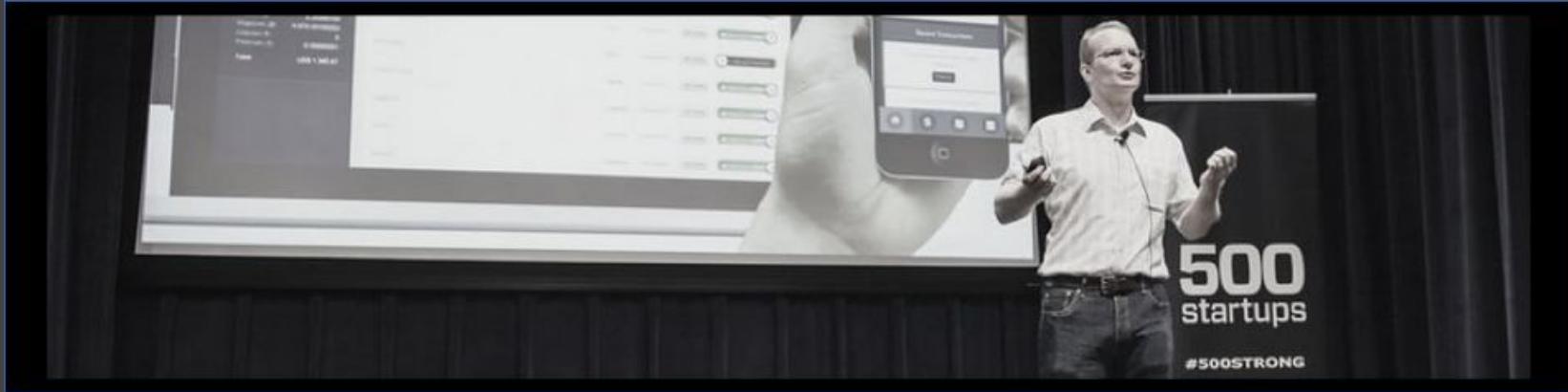
Building Web Applications for 10 Years

Active Community Evangelist & Presenter

Early Developer at MyTeksi and OnApp

Studying Distributed Consensus for 5 Years

EXPERIENCED INNOVATORS IN AN EARLY ECOSYSTEM

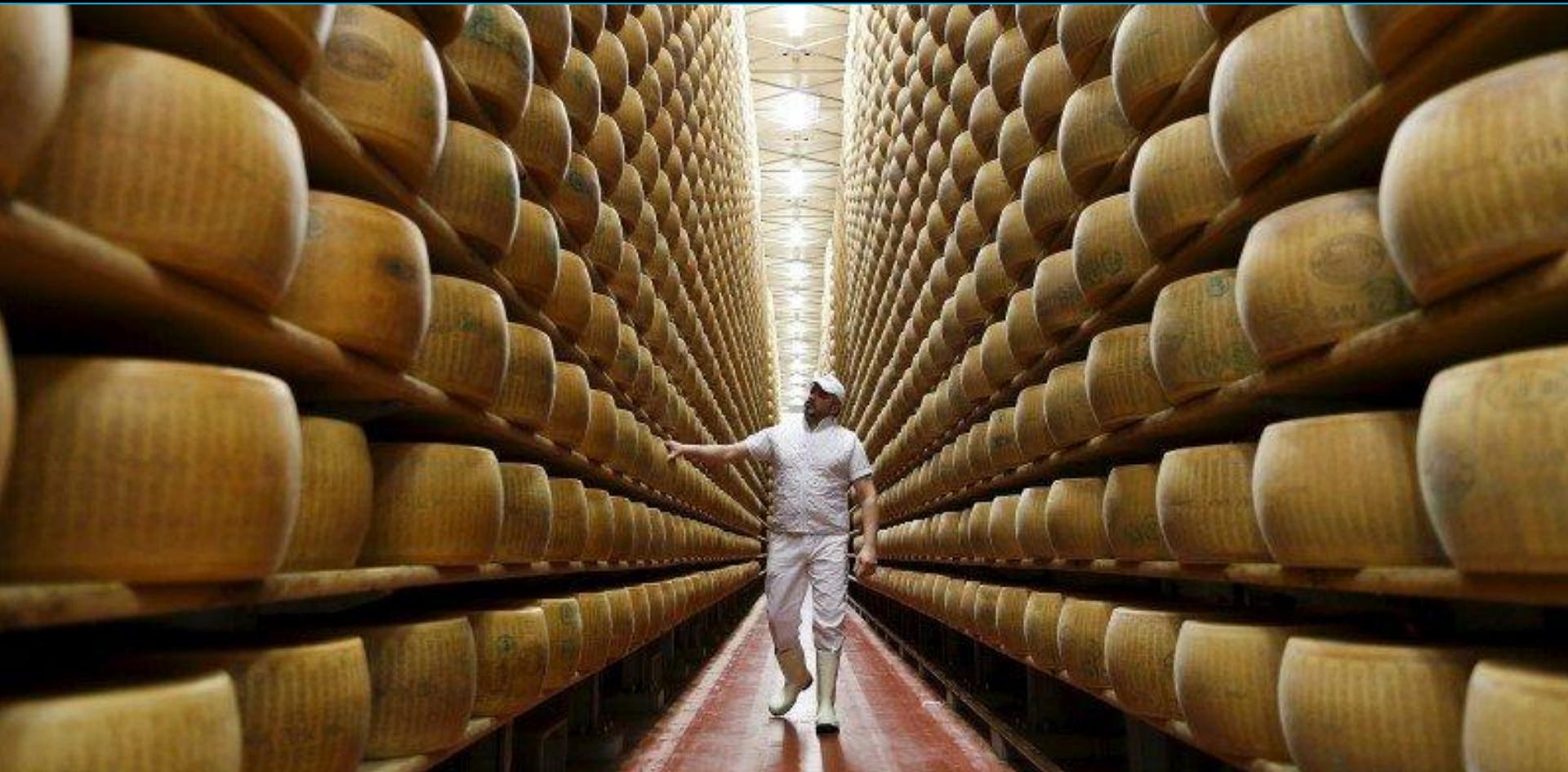


- 1st Malaysian Company to Graduate from 500 Startups in Silicon Valley
- 1st Company in Asia Providing Public Blockchain APIs & Developer Toolkits
- 1st in The World to Develop Non-Financial Blockchain Agnostic Protocols
- Helped Organize World's 1st Bank-Backed Blockchain Hackathon (DBS)
- Over 15 Years of Collective Blockchain Development Experience

A BRIEF HISTORY OF MODERN MONEY

WHERE NO IDEA IS A NEW IDEA

THERE'S BEEN EDIBLE CURRENCIES



EVEN ONES YOU CAN DRINK



BUT NONE AS RELEVANT AS THE RAI STONES OF YAP



SHOPPING WAS NOT EASY



SO THEY CREATED THE WORLD'S FIRST PUBLIC LEDGER



UPDATES REQUIRED GROUP CONSENSUS - STILL USED TODAY



- Size wasn't everything
- The history of each stone determined its individual value
- Conducting transactions quite literally involved a song & dance
- This required the majority of people from the village to be present

IT COULD NOT SCALE SO THEY EVENTUALLY SWITCHED TO US\$



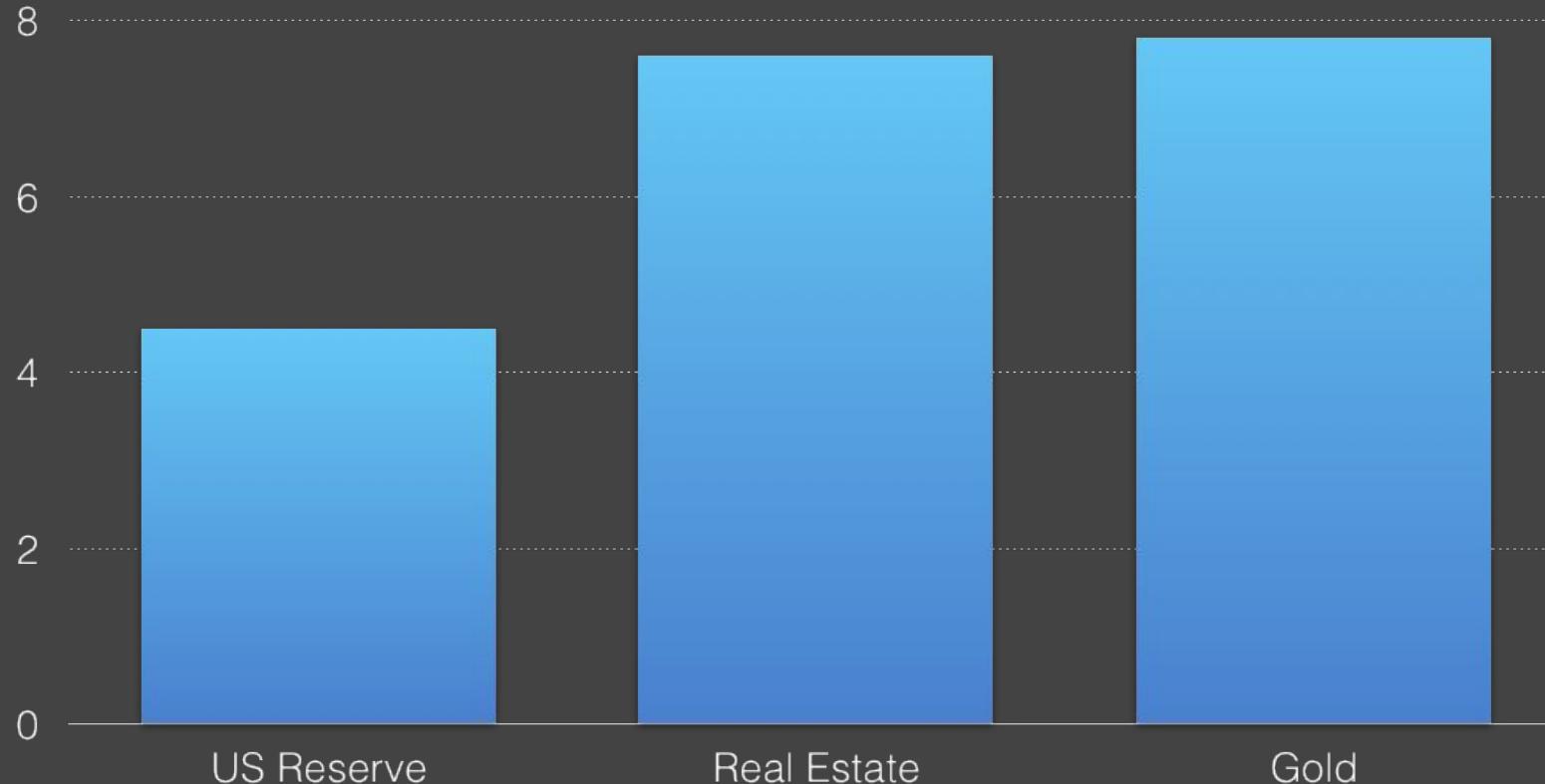
SETTING THE GOLD STANDARD



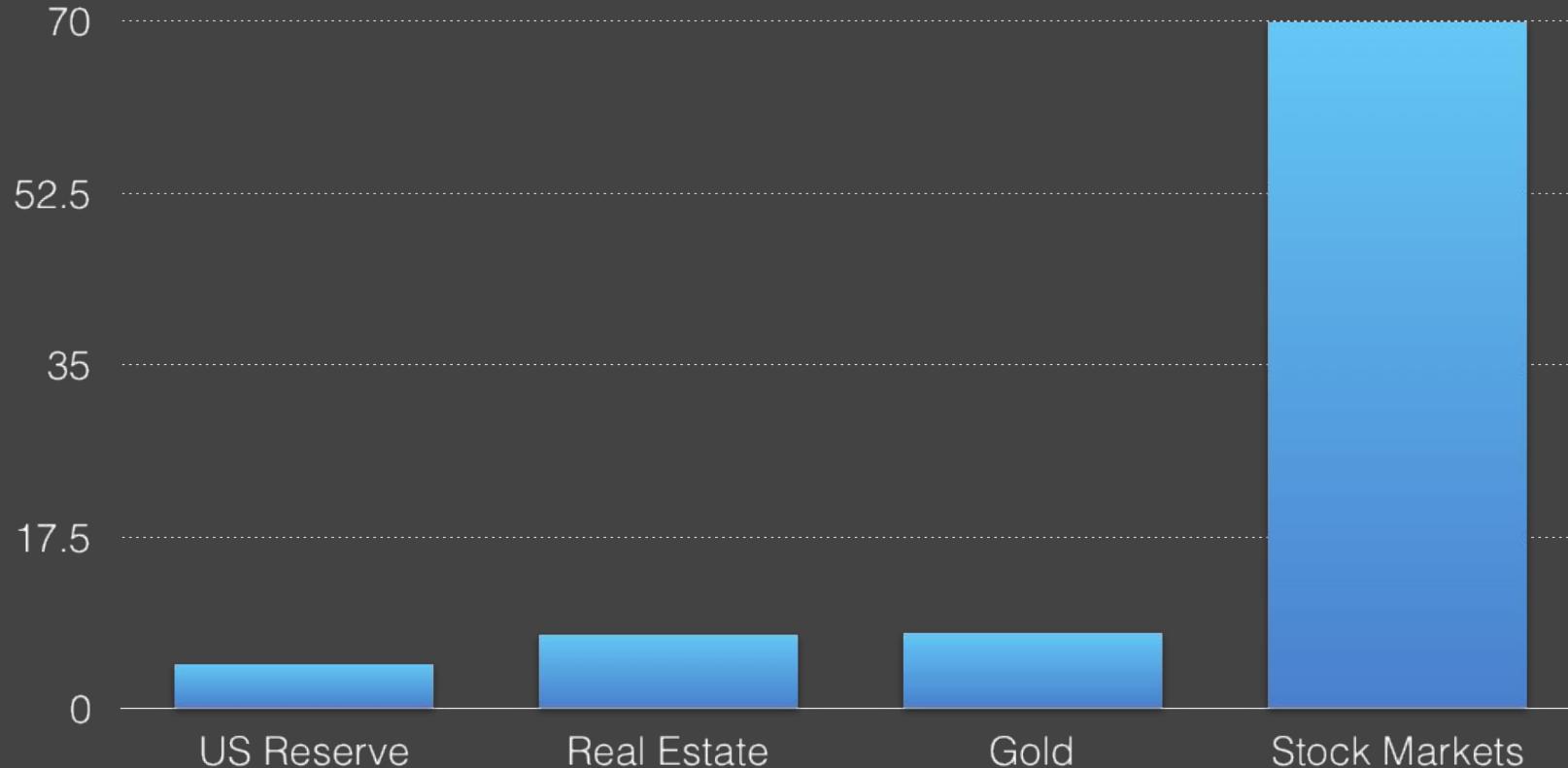
THE END OF AN ERA

- 1873 to 1914 - All major worldwide currencies were 100% backed by gold
- After WW1 ended the USA switched to Fractional Reserve Banking
They Printed US\$50 for every US\$20 deposited in gold
- During WW2 the USA accumulated 2/3rd's of all gold, forcing all currencies to switch to fiat-systems pegged to US\$, which was pegged to gold
- 1971 - Richard Nixon ended the gold standard, introducing petrodollars

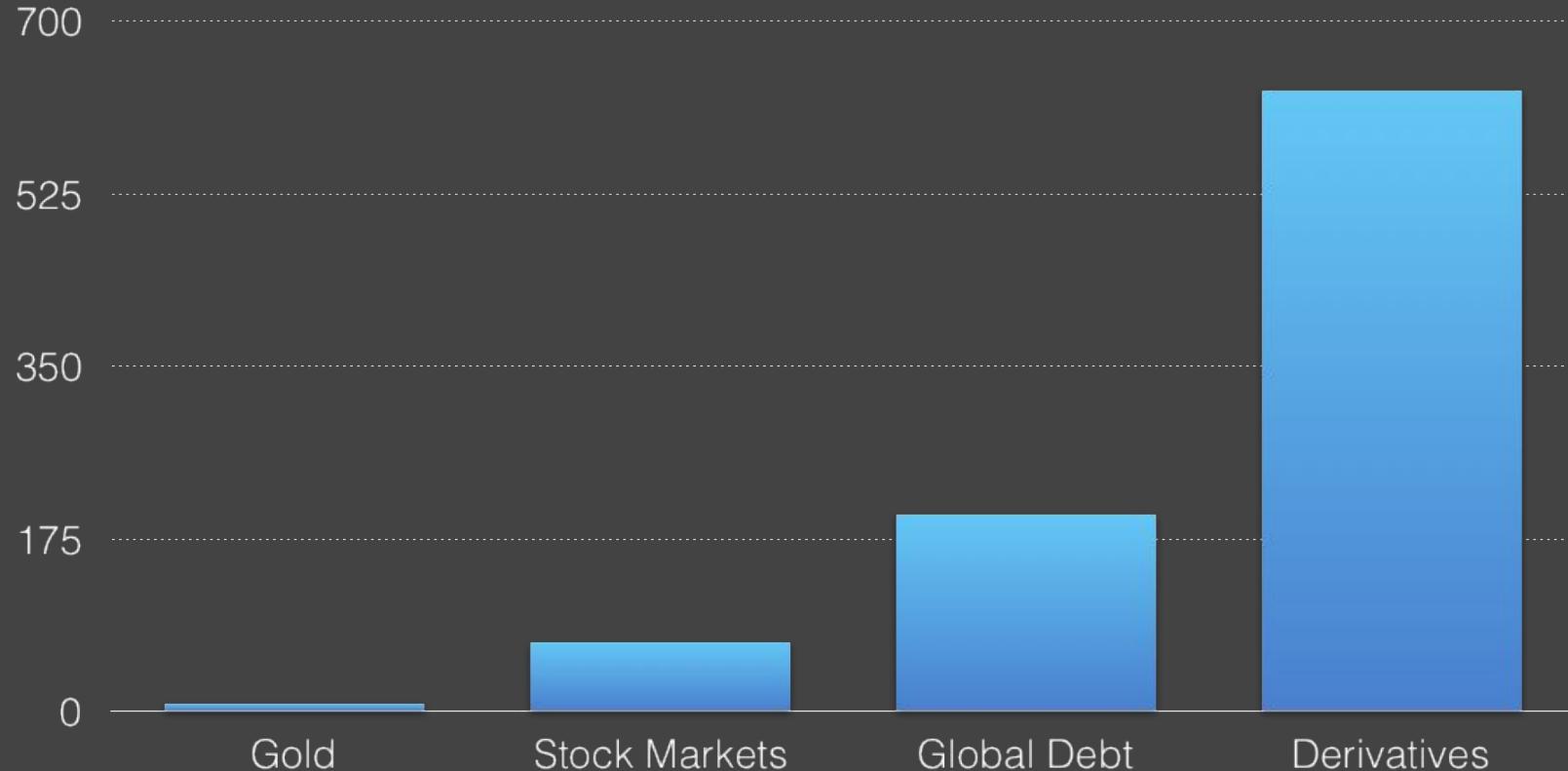
US\$20+ TRILLION IN GLOBAL PHYSICAL ASSETS



THEN CAME WALL STREET & CENTRALIZED DIGITAL ASSETS



THEN CAME THE RE-INVENTION OF DEBT



IT ALL ENDS IN TEARS (512 US BANKS CLOSED SINCE 2008)



NOTHING LASTS FOREVER



- Average lifespan of individual currencies is 27 years
- Every 30 or 40 years the reigning monetary system fails
- Over 3,800 fiat currencies worldwide have failed
- 15 of which happened in just the past 25 years

THE RECENT FAILURE OF FIAT

COUNTRY	YEAR	PROBLEM
Angola	1991-1999	1 New Kwanza = 1,000,000,000
Belarus	1994-2002	50,000 = 100,000,000 2000 Rublei
Bosnia	1993	Massive hyperinflation
Ecuador	2000	Pegged to USD after 70-80% drop in its dollar
Georgia	1995	1 new lari = 1,000,000 laris
Krajina	1993	Country folded became part of Croatia
Mexico	1993-1994	Defaulted in 1982 1 Nuevo Peso = 1,000 Old Pesos
Poland	1990-1993	1 new Zloty = 10,000 old Zlotych
Romania	2000-2005	1 new Leu = 10,000 old Lei
Russia	1992-1994	100 Rubels = 1 US\$ in 1991 30,000 Rubels = 1 US\$ in 1999
Turkey	1990-2005	1 New Turkish Lira = 1,000,000 Old Lira
Ukraine	1993-1995	1 Hryvnya = 100,000 Karbovantsivi
Zimbabwe	1999 – 2010	Ongoing mess

TELECOMMUNICATIONS SAVED ZIMBABWE - TIME IS CONSTANT



“ SOFTWARE IS EATING THE WORLD ” - Marc Andreessen



- Uber is the world's largest taxi company, but owns no cars
- AirBnB is the largest accommodation provider, but owns no real estate
- Facebook is the most popular media provider, but creates no content
- Alibaba is the most valuable retailer, but owns no inventory
- Bitcoin is the most valuable digital currency, but there are no coins

DOES ANYONE REMEMBER KODAK?



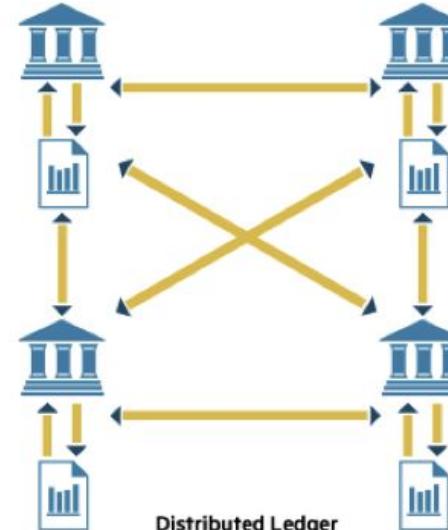
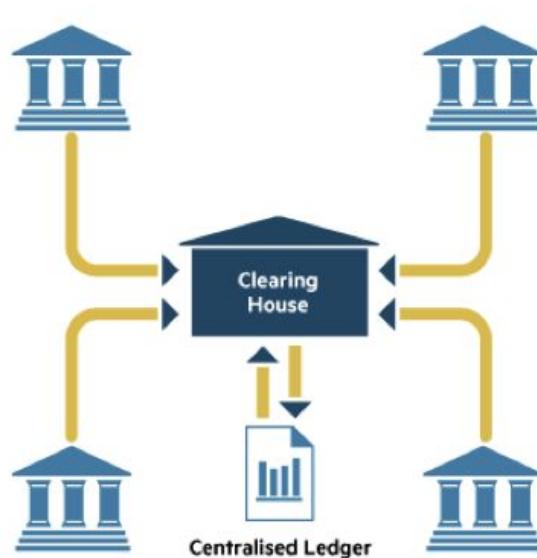
- Founded in 1892
- 90% of film sales in 1976
- 85% of camera sales in 1976
- 4th biggest global brand in 1996
- Removed from S&P 500 in 2010
- Bankrupt in 2012
- And yet...

ARE BANKS HAVING THEIR KODAK MOMENT?



- Founded in 1892
- 90% of film sales in 1976
- 85% of camera sales in 1976
- 4th biggest global brand in 1996
- Removed from S&P 500 in 2010
- Bankrupt in 2012
- They built 1st digital camera in 1975

SANTANDER BANK - FIRST TO ADMIT US\$20B ANNUAL SAVINGS



- Reconciling Multiple Central Ledgers Vs Auto-Audited Distributed Ledgers?
- Batch Processing CSVs every 24 Hours Vs Really Real-Time Settlement?

BITCOIN

(the first application / popular digital asset)

Vs

BLOCKCHAINS

(underlying tech / shared public ledger)



PUBLIC NETWORKS

(built from the ground-up to be secure)

Vs

PRIVATE NETWORKS

(very similar to traditional databases)



PUBLIC BLOCKCHAINS

(battle tested, secure - able to go anywhere)

Vs

DISTRIBUTED LEDGERS

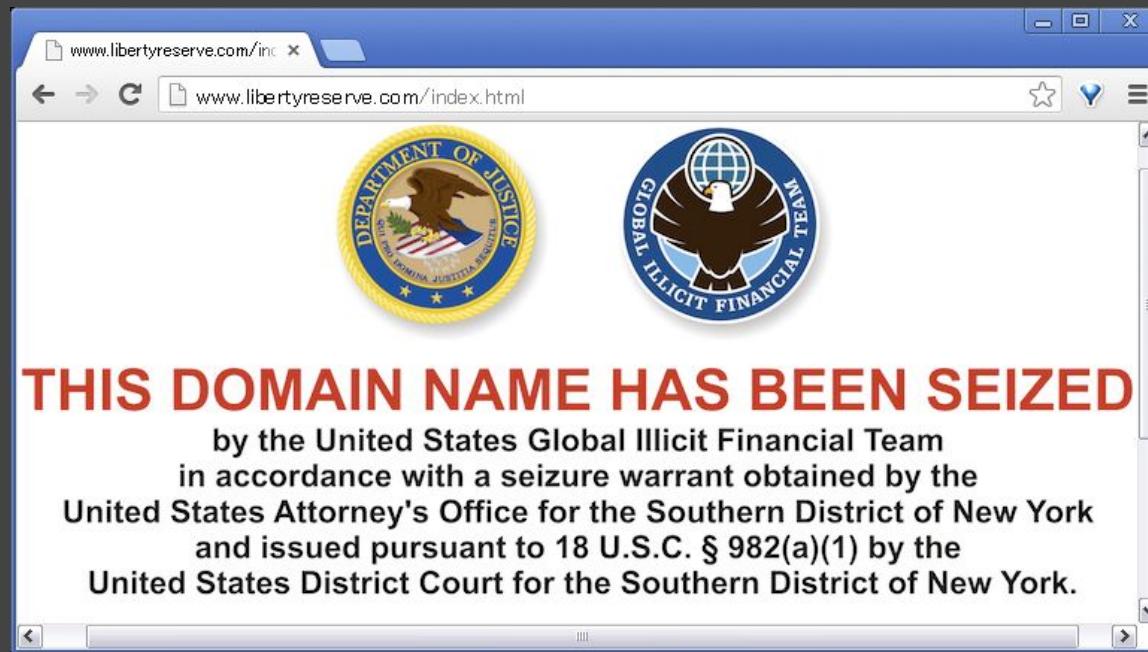
(missing blocks is also missing the point)



CONSENSUS - WHAT MAKES PROOF OF WORK SO SPECIAL ...?



BITCOIN NOT FIRST DIGITAL CURRENCY - 1st DISTRIBUTED ONE



- FLOOZ - Shut down by FED in 2001
- LIBERTY RESERVE - Shut down by FED in 2013

BITCOIN HAS SOME UNIQUE PROPERTIES

Traits of Good Money	Gold	\$\$\$	Private DLTs	Bitcoin
Durability		fragile		
Portability	heavy			
Divisibility	difficult	limited		
Uniformity	if processed		censored	
Limited Supply	theoretically	printed at will	central mint	
Sunnah Money	Commodities	\$\$\$		Bitcoin
Intrinsic Value		representation	none	
Inflation Proof	unknown	debt based	no	
Acceptability	limited		unknown	growing daily
Decentralized		man made	unregulated	

WHAT ARE THE BENEFITS OF PUBLIC BLOCKCHAINS?

- 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 costs and errors



“While Fintech Disrupts Banks,
the Blockchains Disrupt Fintech”

SECTION SUMMARY

WHY DO WE HAVE BITCOIN?

- Currencies are ALWAYS changing
- Lack of regulation led to creation of bitcoin
- Designed to be transparent whilst remaining private
- Feels a lot like gold, but vastly superior - and now more valuable

HOW DOES IT WORK?

BLOCKCHAIN TECHNOLOGY

INTERESTING BITCOIN BLOCKCHAIN FACTS TO REMEMBER

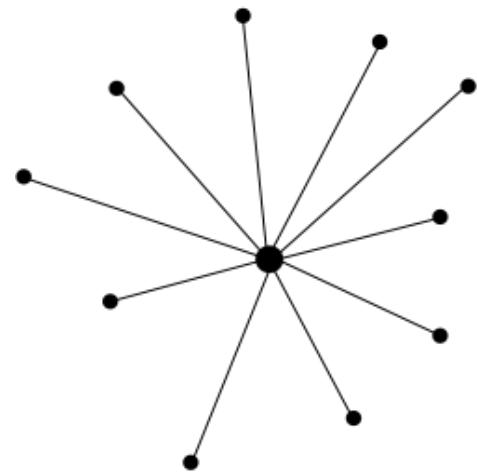
- Bitcoin blockchain released in January 2009 by Satoshi Nakamoto
- US\$13 per coin in 2013 (when we bought) - now US\$1,300+ per coin
- The network is currently processing over 230,000+ daily transactions
- Contributes to over US\$1.5+ billion of daily global crypto-transactions
- The network's market capitalization is currently over US\$20+ billion
- 21 million finite supply, with 16 million coins discovered so far
- Supply is decreasingly dispersed every 10 minutes
- Final coins released on May the 7th, 2140
- **But most important of all is the technology...**

BITCOIN AND BLOCKCHAINS HAVE NO NEW TECHNOLOGY

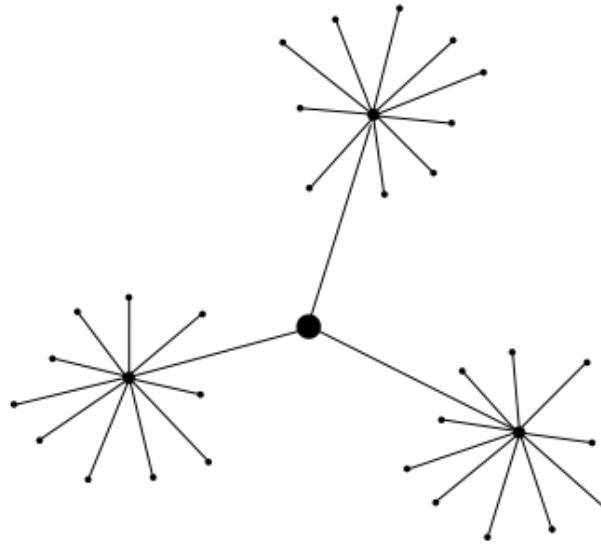


- HASH - Theorized in the 1800s - Coined by IBM in the 1950s
- ECDSA - Digital Signatures using Elliptic Curve Cryptography
- P2P - Peer to peer protocol popularized by Napster in 1999

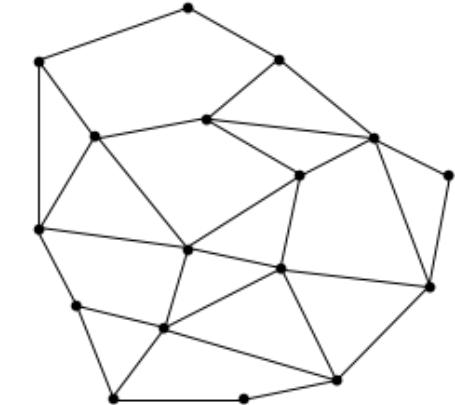
THE EVOLUTION OF NETWORKS



CENTRALIZATION
DATABASE

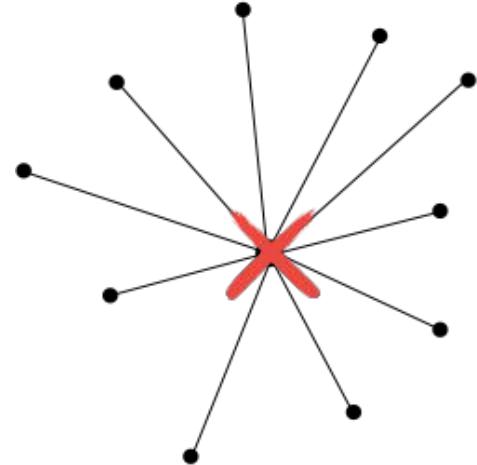


DECENTRALIZATION
THE CLOUD

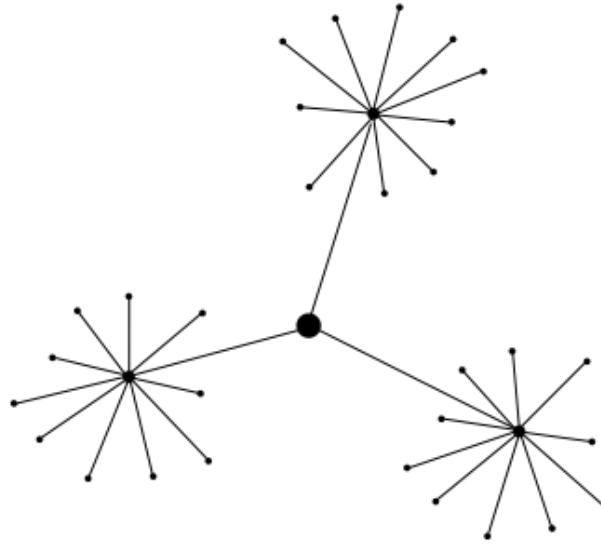


DISTRIBUTION
BLOCKCHAINS

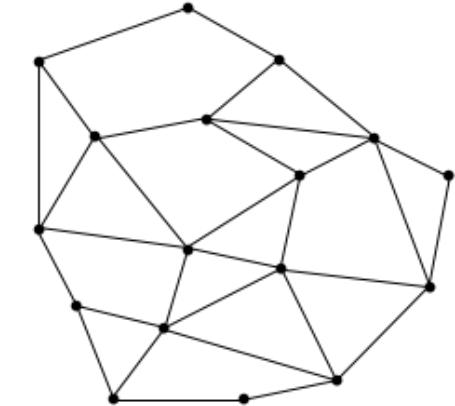
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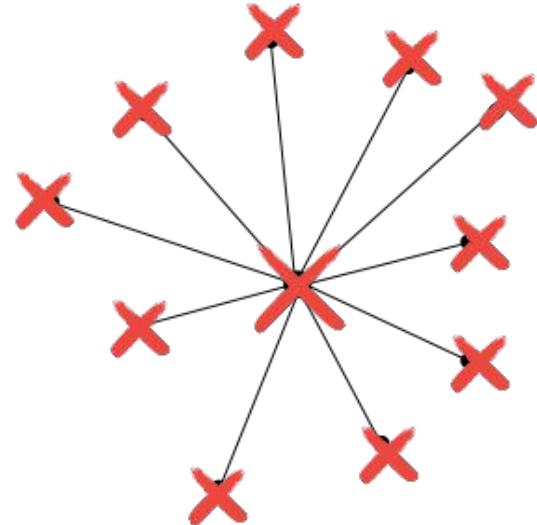


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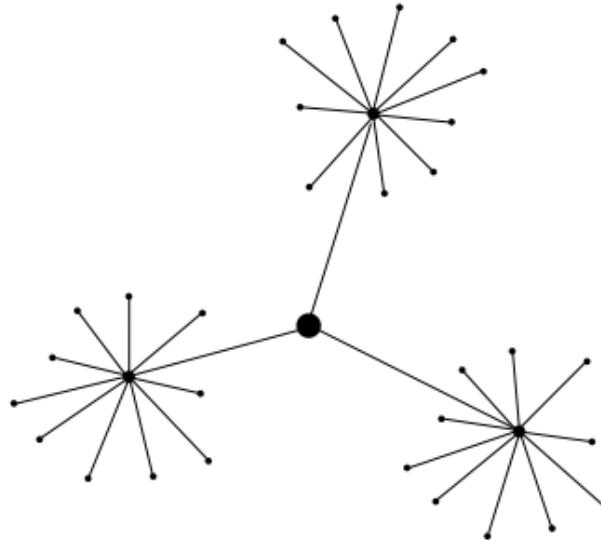


DISTRIBUTION
BLOCKCHAINS

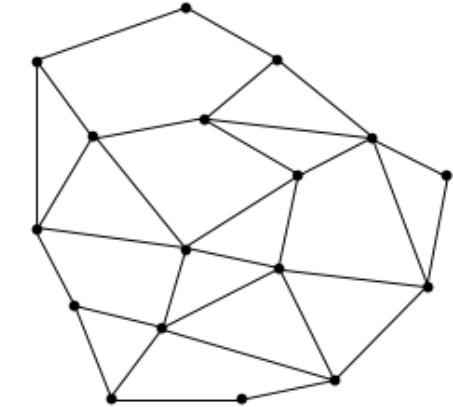
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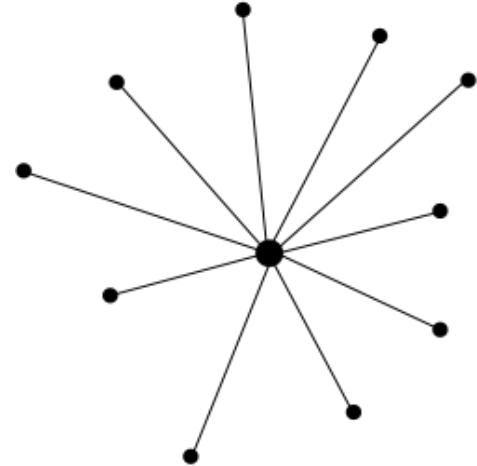


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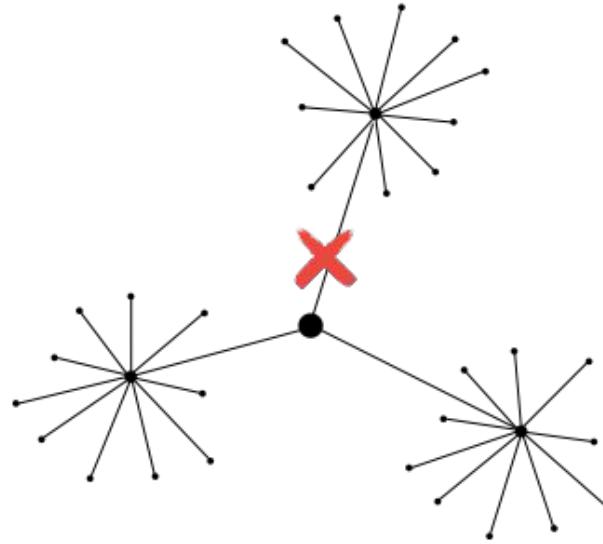


DISTRIBUTION
BLOCKCHAINS

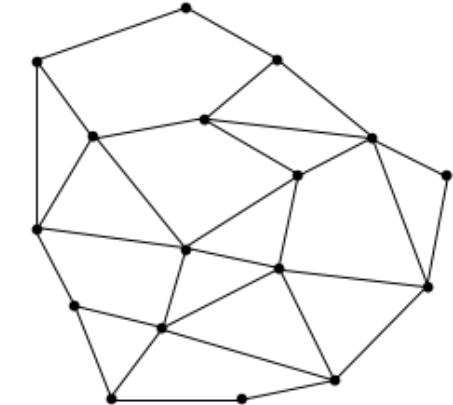
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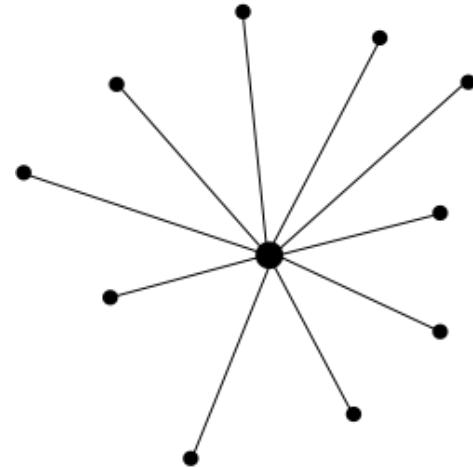


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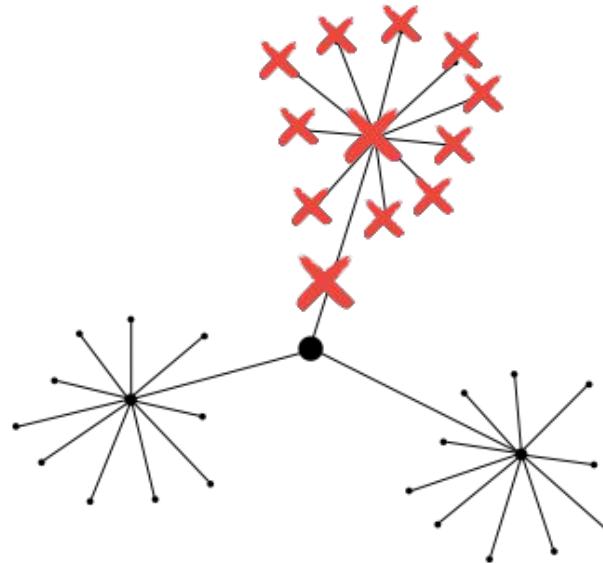


DISTRIBUTION
BLOCKCHAINS

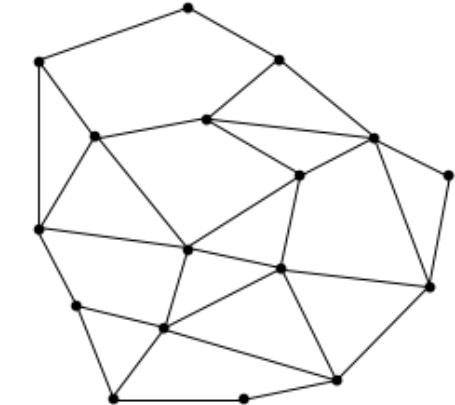
THE EVOLUTION OF NETWORKS



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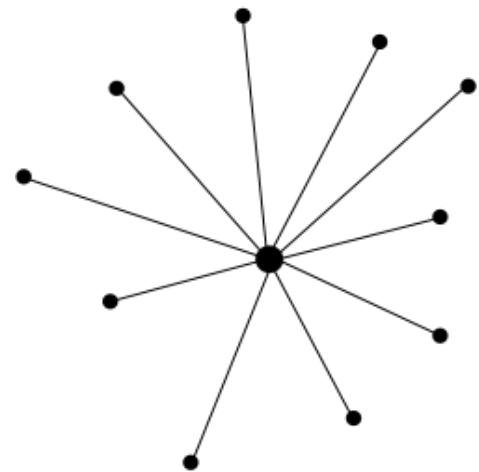


DECENTRALIZATION
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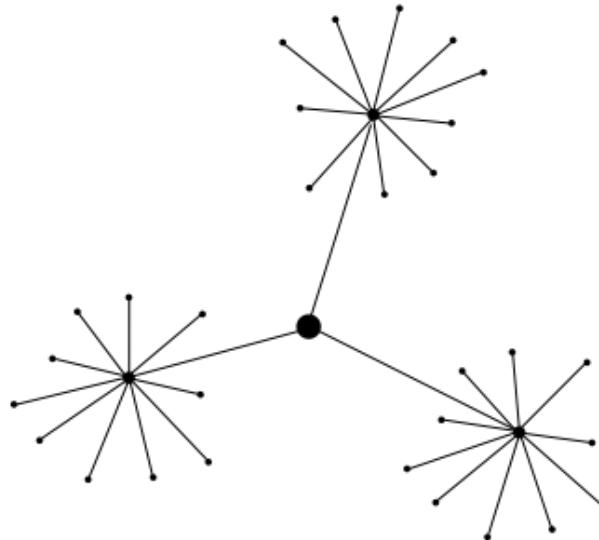


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BLOCKCHAINS

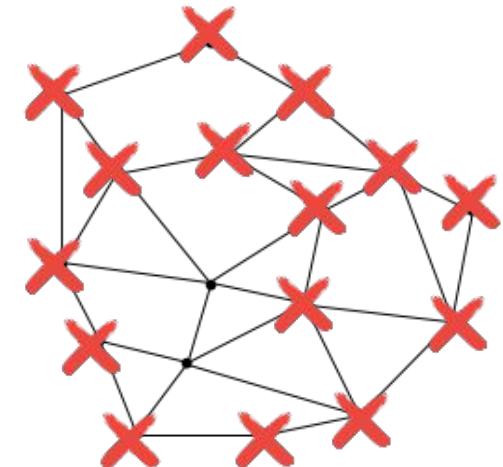
THE EVOLUTION OF NETWORKS



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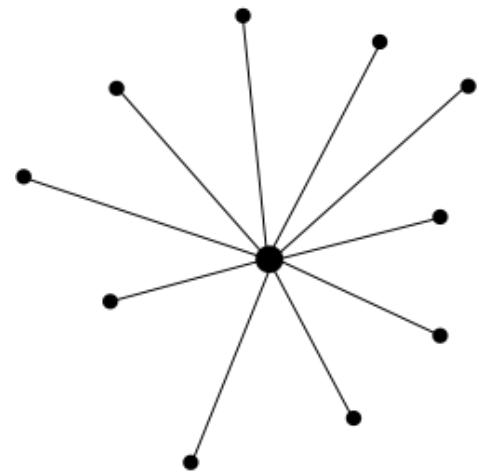


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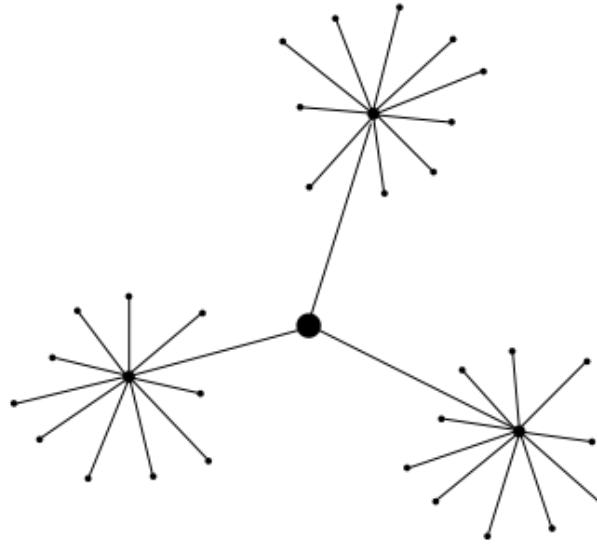


DISTRIBUTION
BLOCKCHAINS

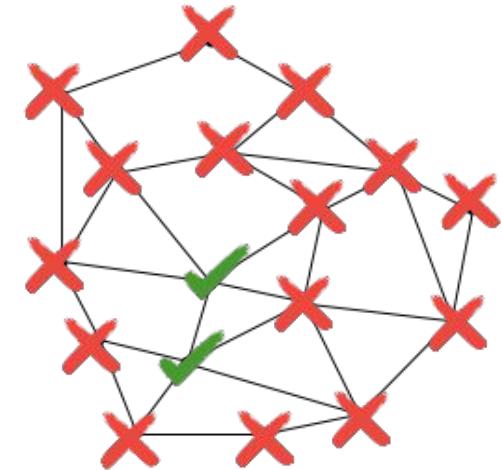
THE EVOLUTION OF NETWORKS



CENTRALIZATION
DATABASE

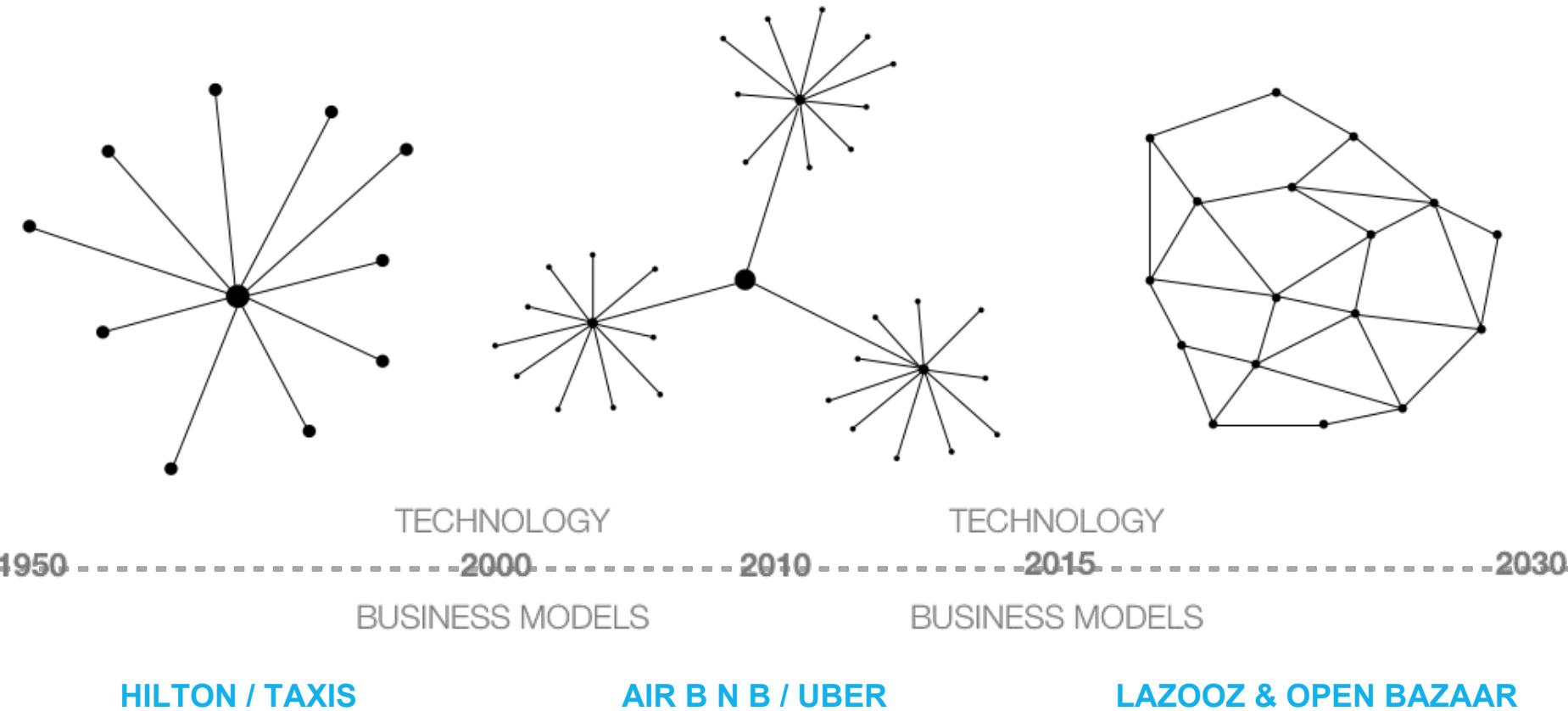


DECENTRALIZATION
THE CLOUD



DISTRIBUTION
BLOCKCHAINS

THE EVOLUTION OF EVERYTHING



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
- On the blockchain - no one knows you're a fridge

ON THE BLOCKCHAINS EVERY ACCOUNT IS A SET OF KEYS



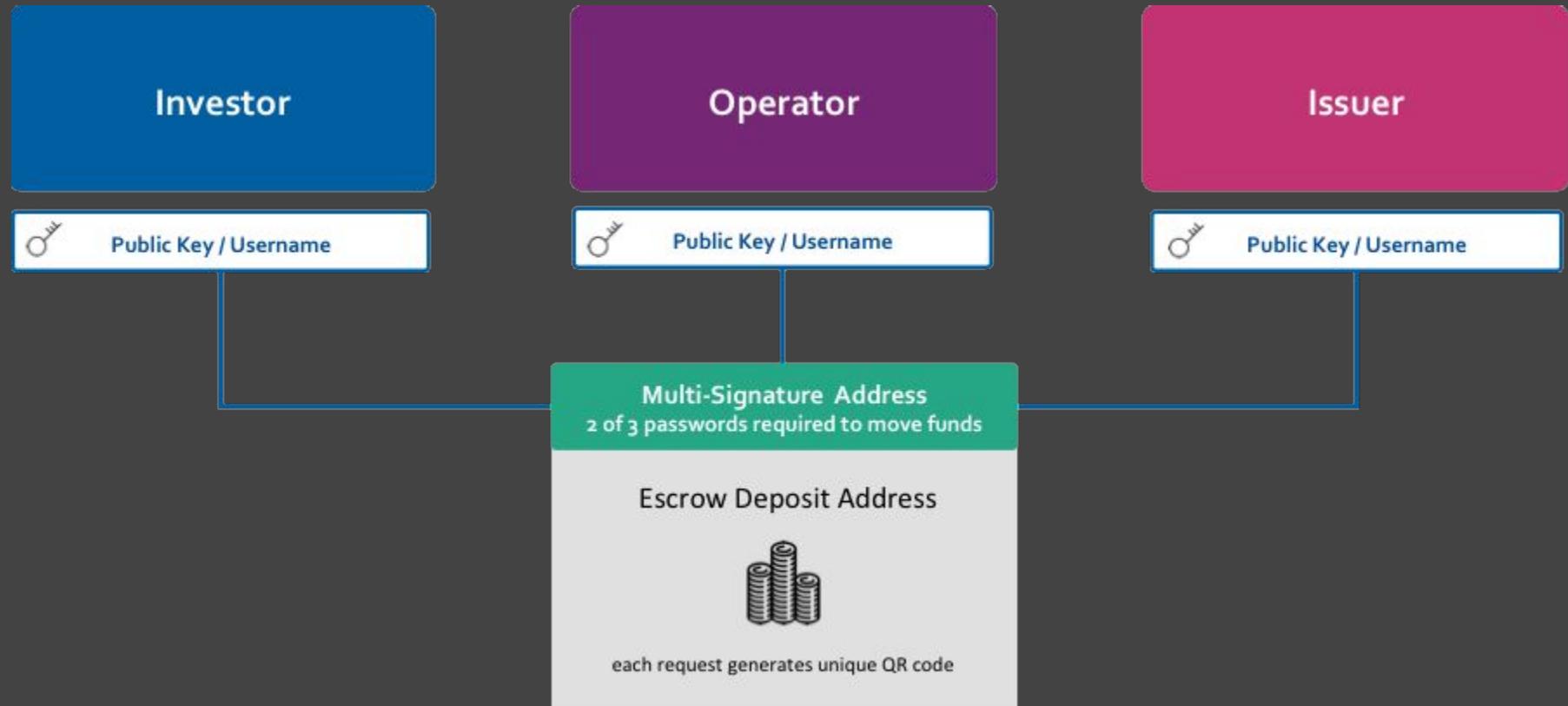
AND EACH “ADDRESS” REQUIRES A PRIVATE KEY TO ACCESS IT



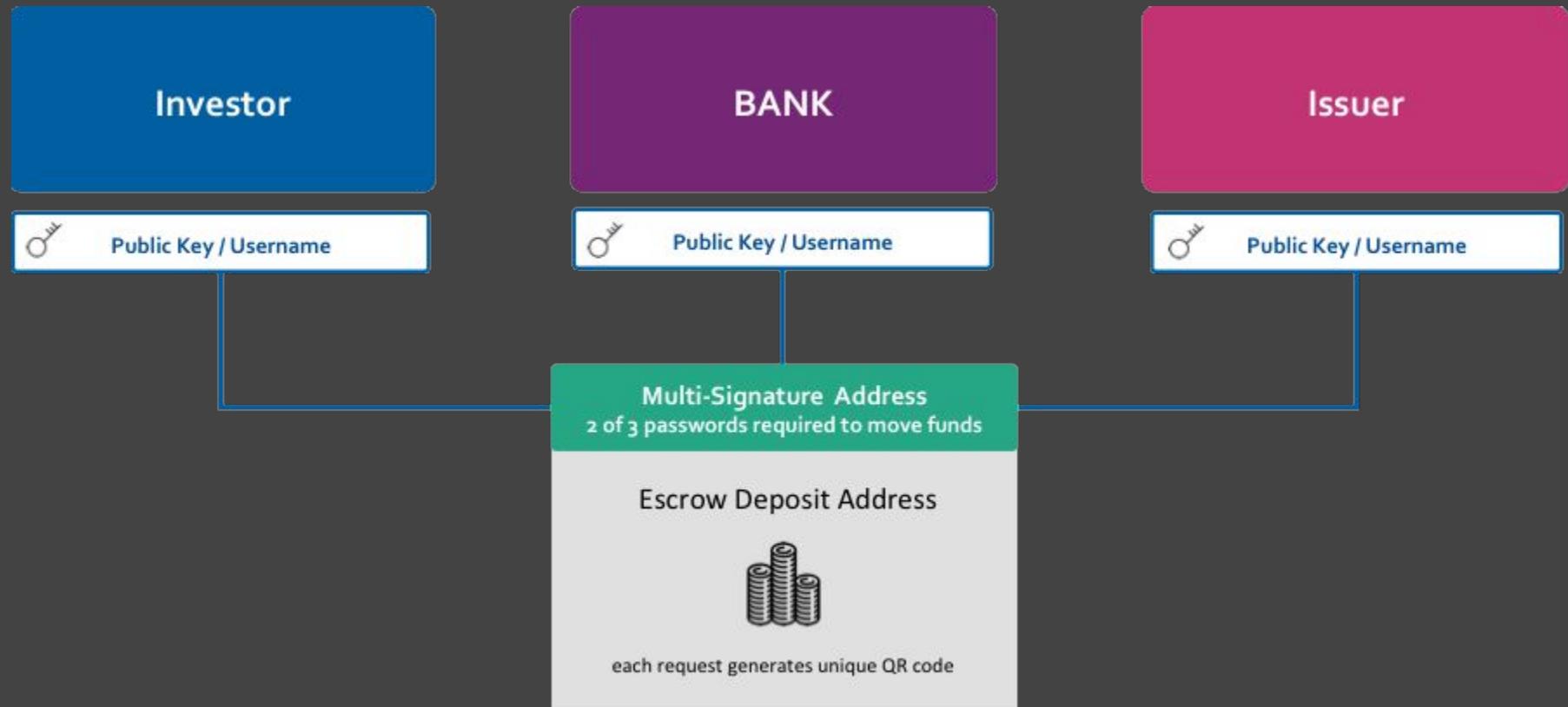
SOME ADDRESSES EVEN REQUIRE MULTIPLE KEYS



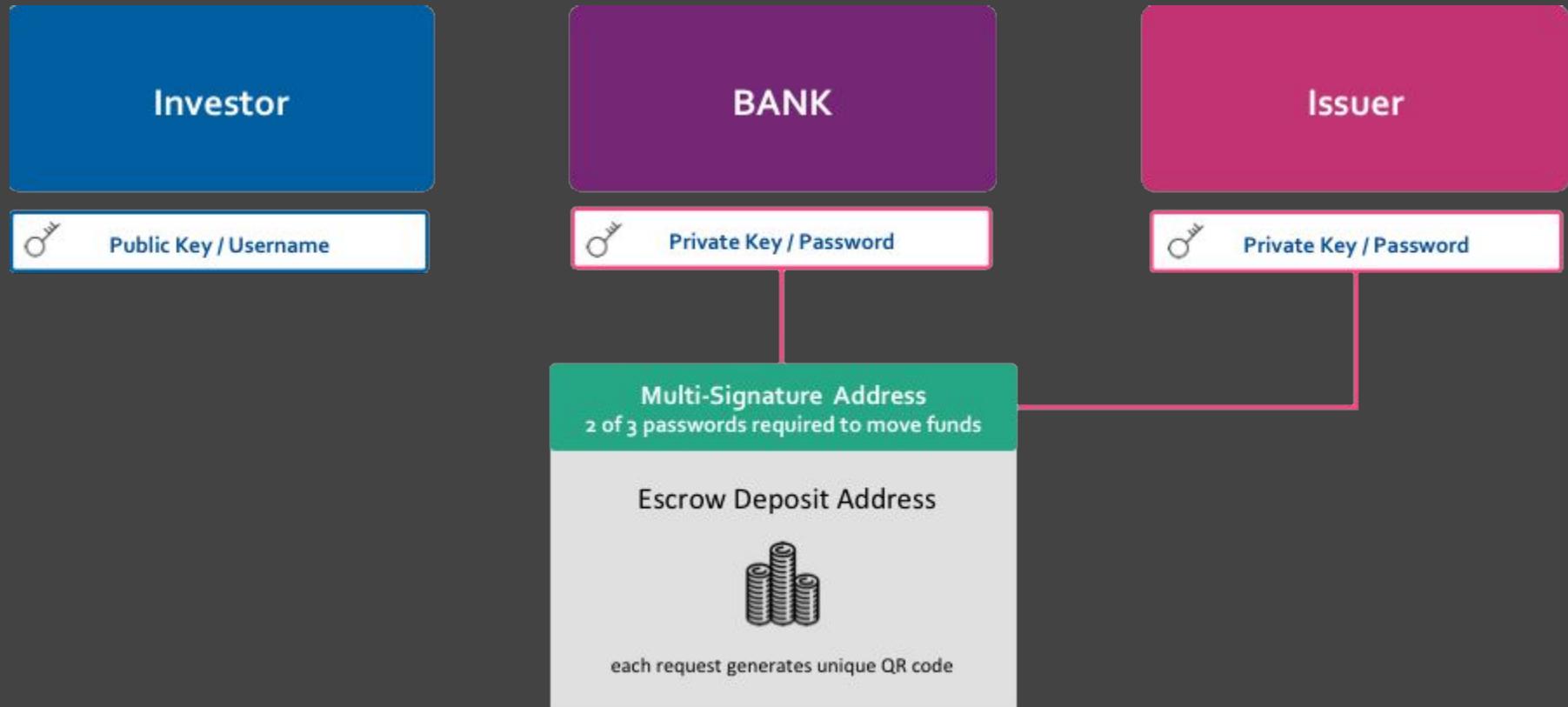
CURRENT MULTI-SIGNATURE BITCOIN SOLUTIONS IN MALAYSIA



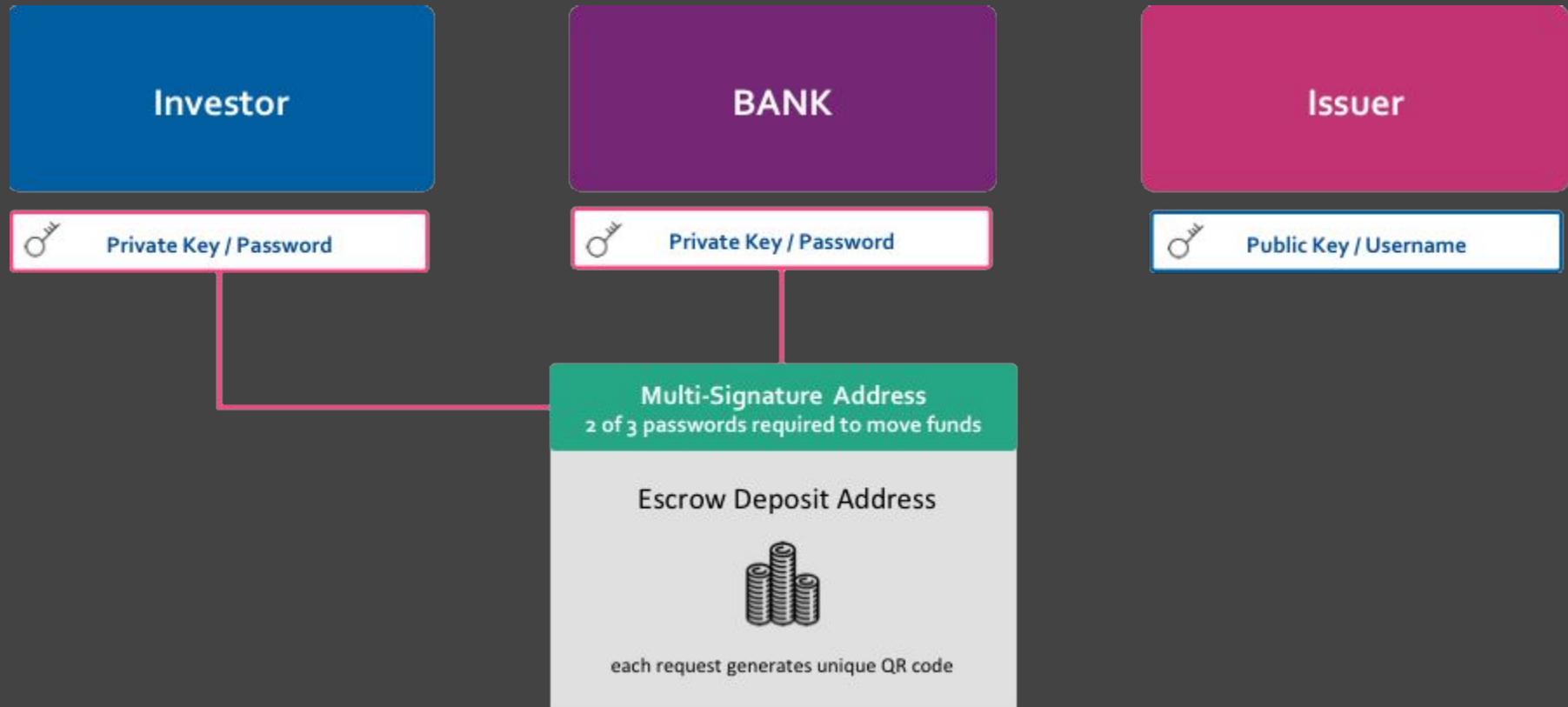
MOVING THE ECF OPERATOR - SANCTIONED BY REGULATORS



COMPLETING AN EQUITY CROWDFUNDED INVESTMENT PROCESS



REJECTING INVESTMENT OR RETURNING FUNDS TO INVESTORS



KEY PAIRS



ONE PUBLIC KEY



MULTIPLY PRIVATE KEYS

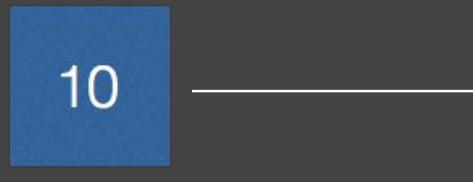
- Example of a Bitcoin public address (derived from the public key):
`1GzBZ7eK6wzNjp1Wt6AxHo73kJL2tzoErq`
- Example of a Bitcoin private key (used to transfer funds from address):
`L1winVkoRmxMdHKbwssx33Z9ZEuXeJ1eP9CVYvnNn4TdYA32GsWY`
- Example of a Bitcoin extended private key (used by HD protocol):
`xprv9s21ZrQH143K2Ywhg9bhZ5nd31t3EbXsg8v28gkKjSm9PA3PiZ89dWW6YKxWZa2pgTuErQ65K46KGVu1xCRBCK3Ppd465QGtH7TmxAEiLv`

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)
- However, they can only contain one OP_Return (38 bytes of arbitrary data)

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

ALICE'S UNSPENT INPUTS



TIME FOR SOME CODE

```
$inputs = [ ];
$bitcoind = new jsonRPCClient("http://un:pw@localhost:8585/");
$unspents = $bitcoind->listunspent(1, 9999999, [$address_to_check]);

foreach($unspents as $unspent)
{
    if($balance >= ($amount_to_send + $required_fee))
    {
        $balance = $balance + intval($unspent['amount'] * 100000000);
        $inputs[ ] = $unspent;
    }
}
```

TIME FOR SOME CODE

```
$outputs = [ {  
    address: $address_to_send_to,  
    value: intval($amount_to_send * 100000000)  
},  
{  
    address: $address_to_send_change_to,  
    value: $total_amount_of_inputs - ($amount_to_send + $fee)  
}];  
  
foreach($outputs as $key => $output)  
{  
    $outputs[$key] = sign_tx($output, $private_key);  
}
```

TIME FOR SOME CODE

```
$raw_transaction = transaction_to_hex($inputs, $outputs);

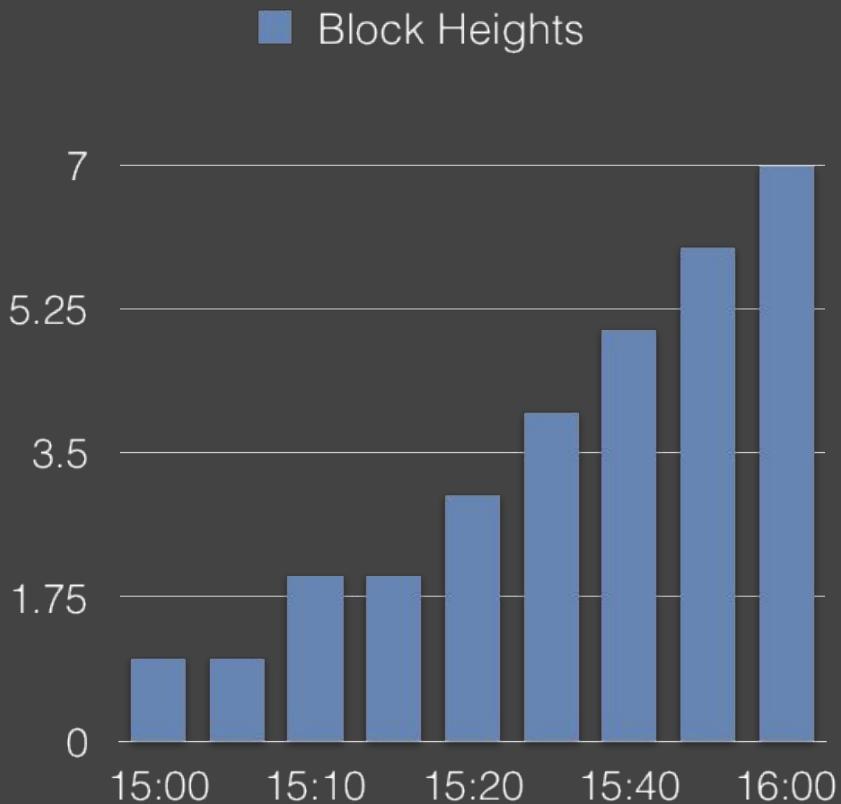
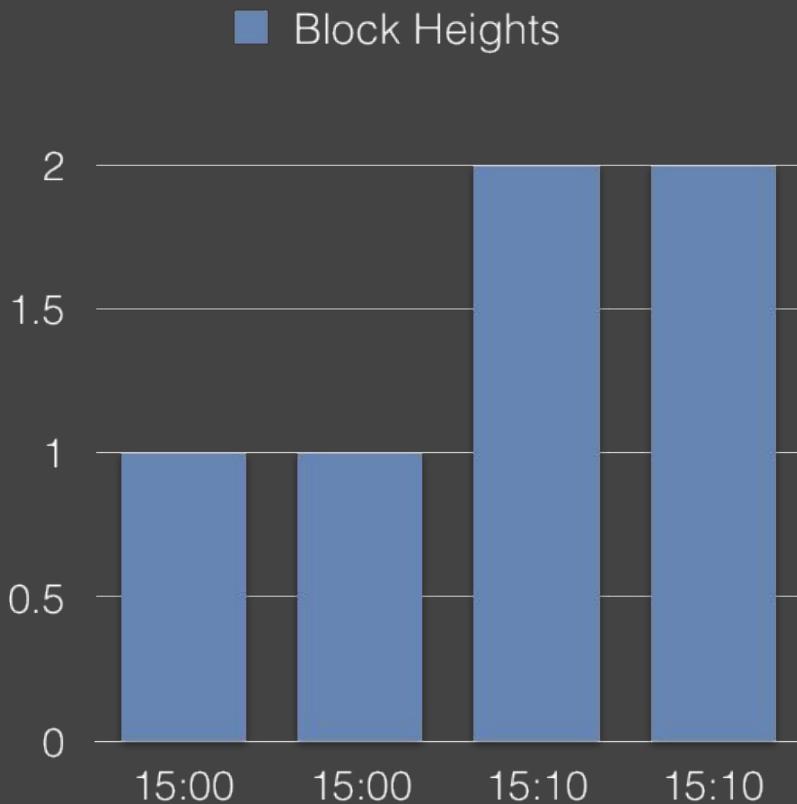
// $raw_transaction_should_equal =
“010000001484d40d45b9ea0d652fca8
258ab7caa42541eb52975857f96fb50cd732c8b48100000008a47304402
202cb265bf10707bf49346c3515dd3d16fc454618c58ec0a0ff448a676c54ff
71302206c6624d762a1fce4618284ead8f08678ac05b13c84235f1654e6a
d168233e8201410414e301b2328f17442c0b8310d787bf3d8a404cfbd070
4f135b6ad4b2d3ee751310f981926e53a6e8c39bd7d3fefd576c543cce493
cbac06388f2651d1aacbfcdfffffff0162640100000000001976a914c8e9099
6c7c6080ee06284600c684ed904d14c5c88ac00000000”;

$txid = relay_raw_transaction($raw_transaction);
```

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

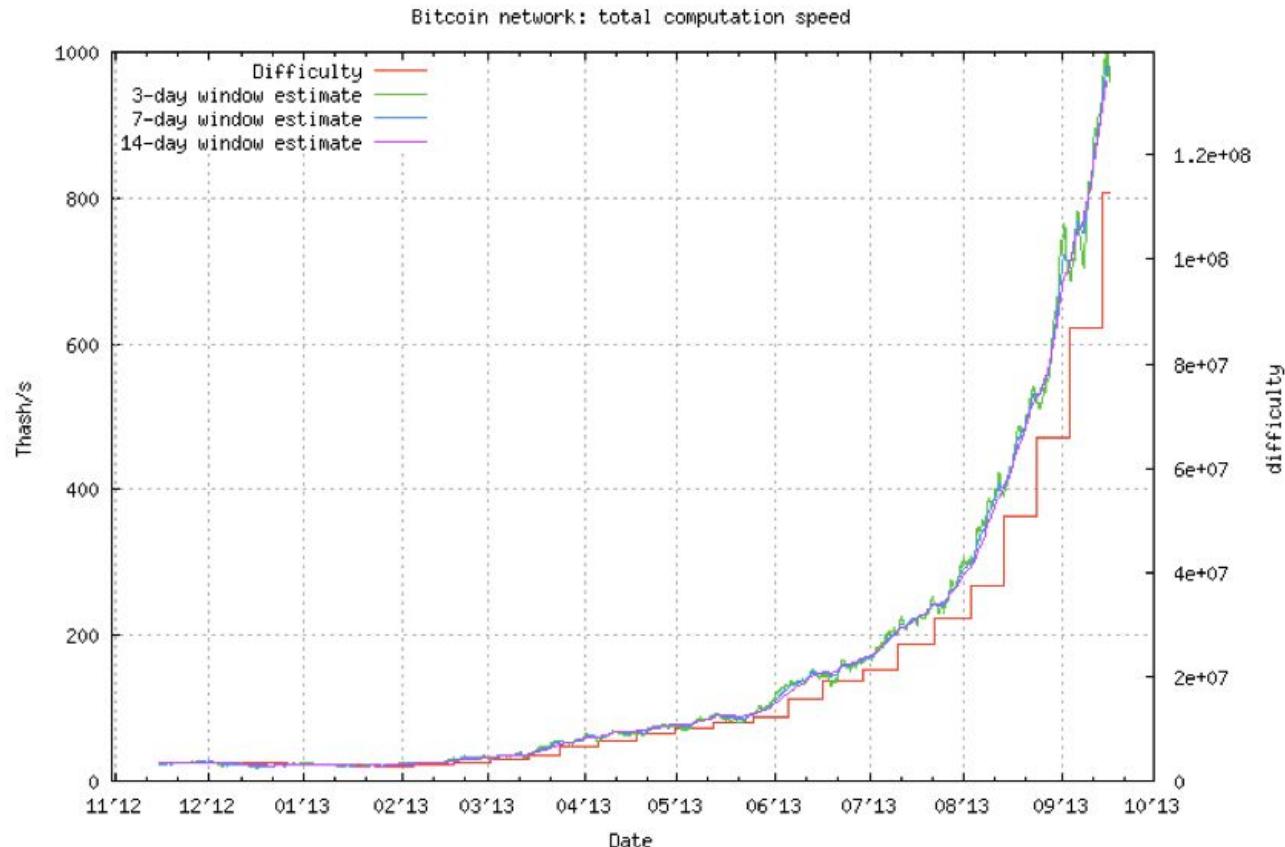
REAL TIME Vs TRUTH



MINING FOR NUMBERS

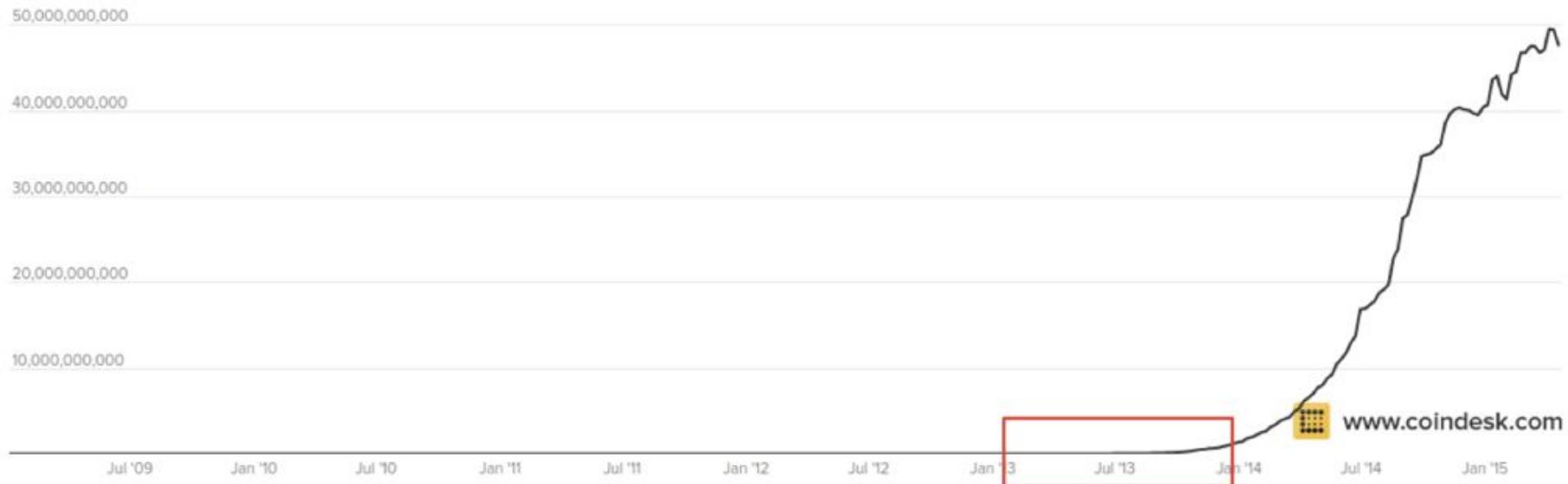
- To reach consensus as to which node has the right to add the next block to the chain, miners compete in a race to solve cryptographic equations
- Miners gather and in-turn verify unconfirmed transactions into blocks
- They then add a nonce (one use number) to the block and hash it
- If the hash has X number of zeros at the beginning it becomes a valid block
- Otherwise the miners increase the nonce and they hash the block again
- Solving these cryptographic equations is becoming increasingly difficult

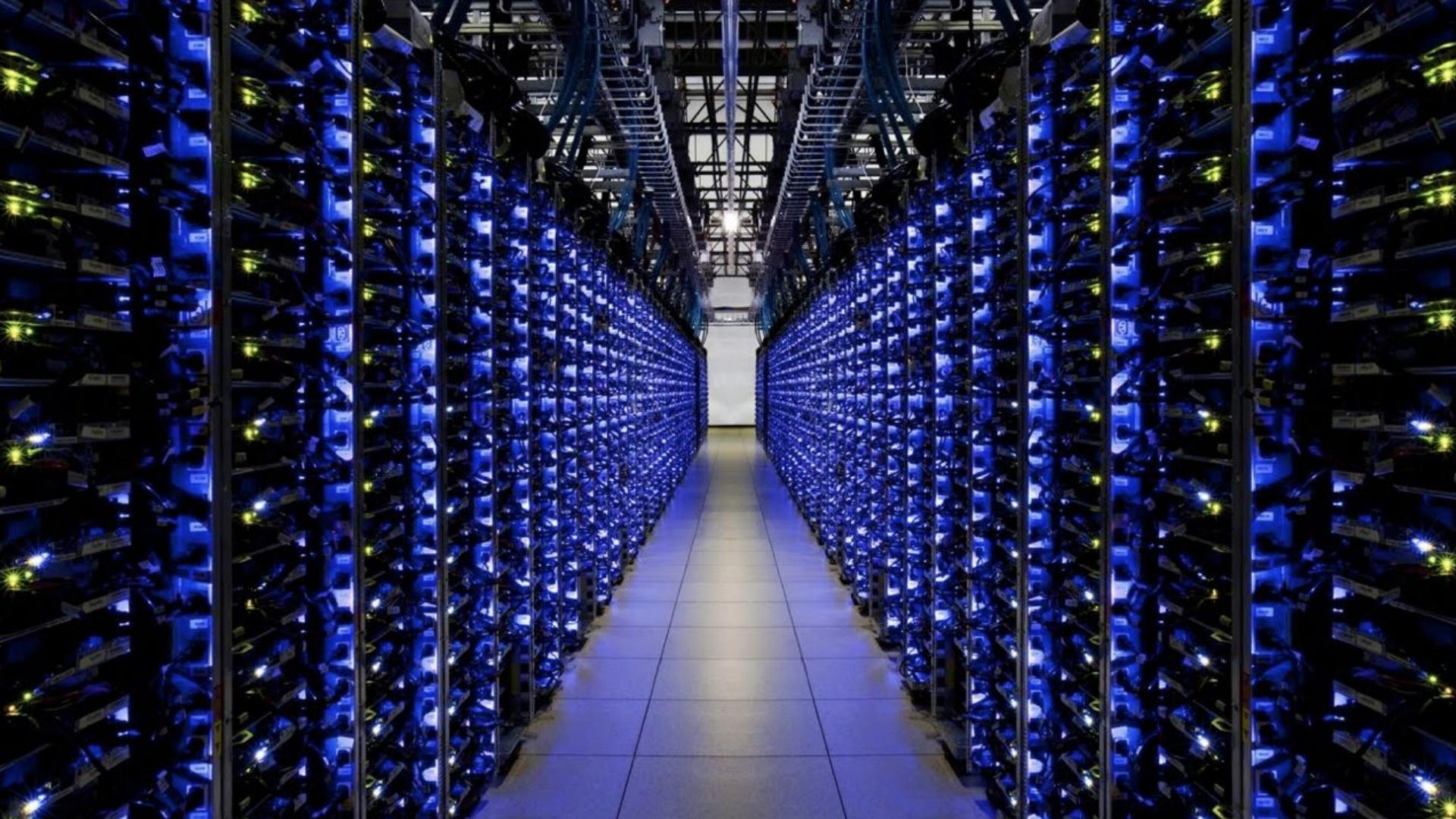
THIS IS THE HASHING POWER OF THE NETWORK IN 2013





2013 to 2015 - MINING IS NOW A BILLION DOLLAR BUSINESS



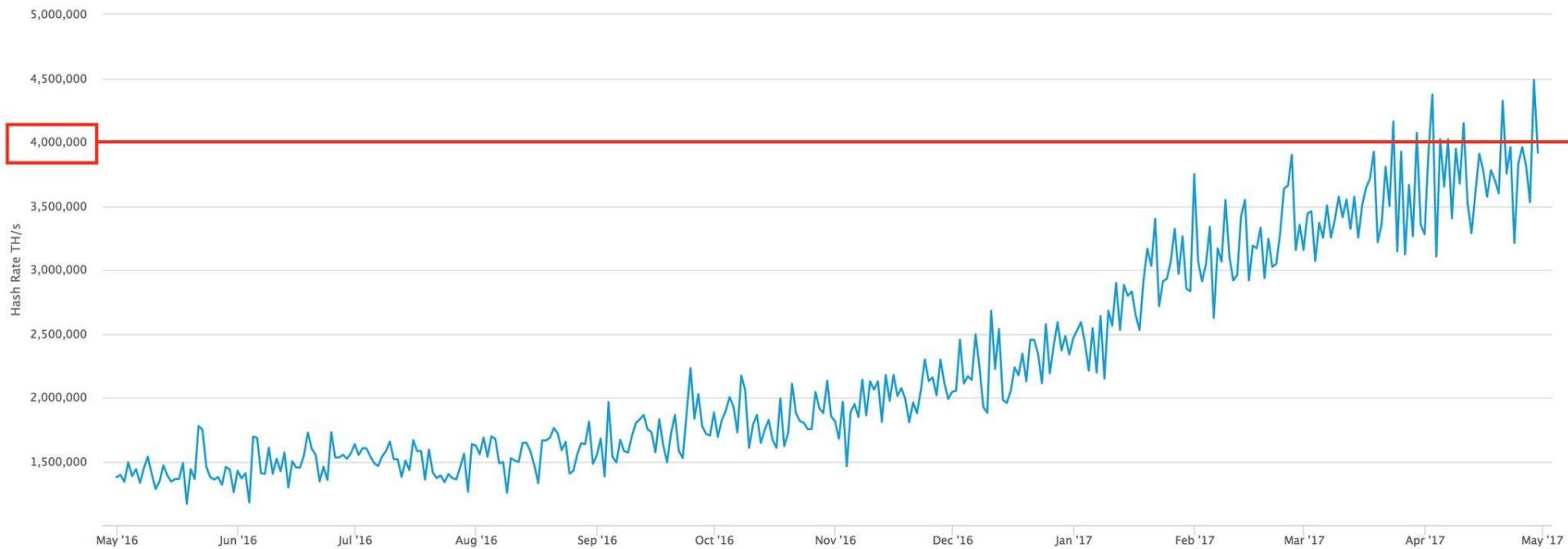


4,000,000 TH/s = US\$500,000+ IN HARDWARE COSTS ALONE

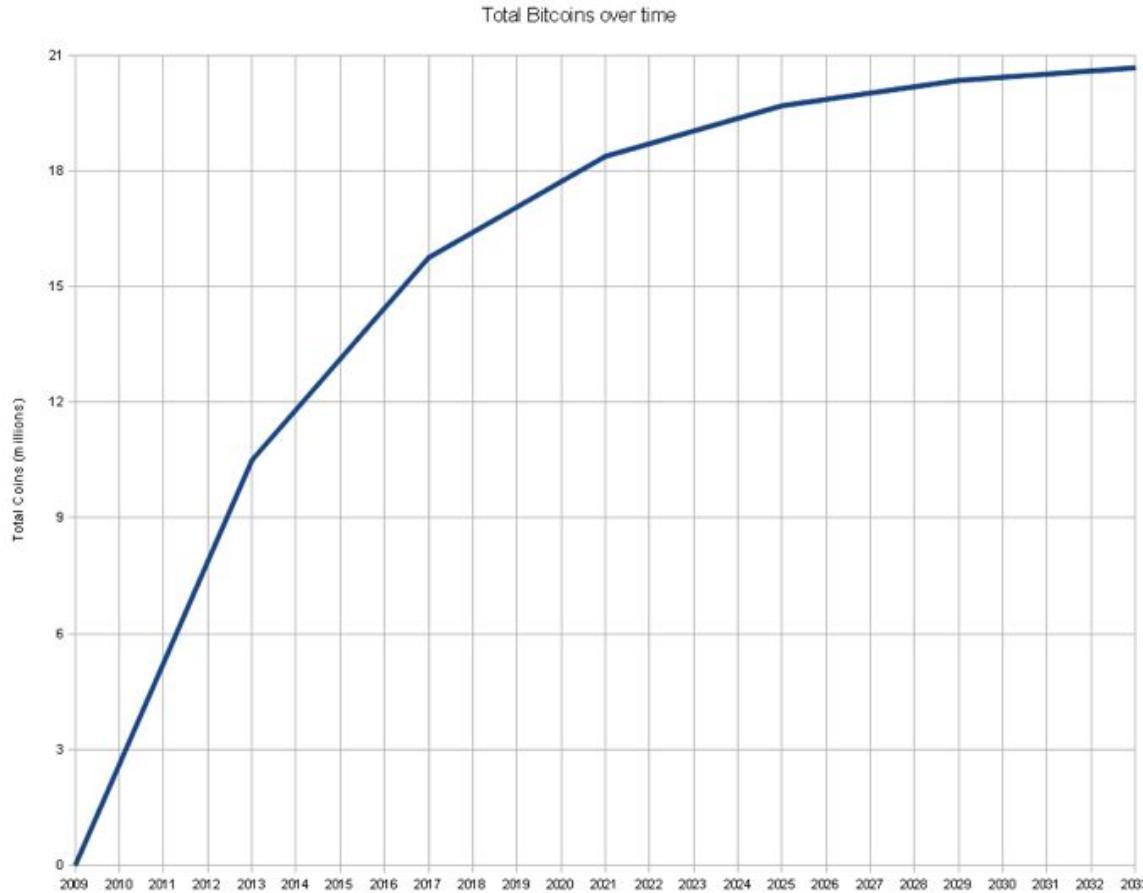
Hash Rate

The estimated number of tera hashes per second (trillions of hashes per second) the Bitcoin network is performing.

Source: blockchain.info



LONG TERM FUNCTION OF MINERS IS NOT TO MINE



THE SELF FUNDED INTERNET OF THINGS

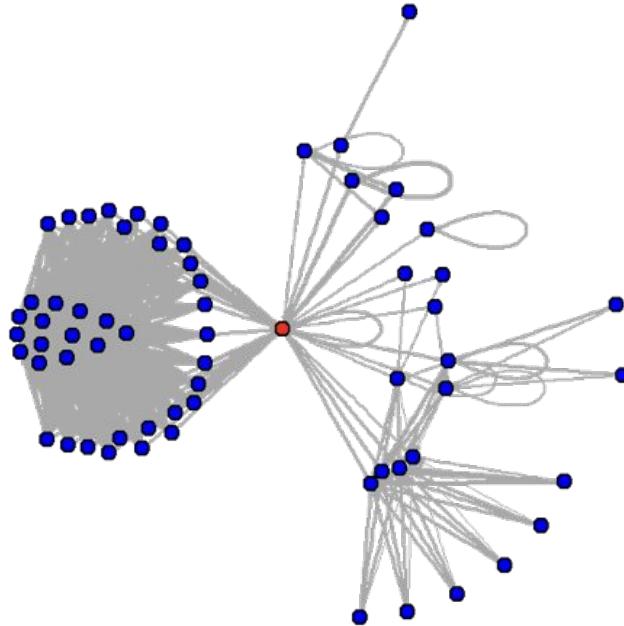


TRUST IS SOLVED VIA TRANSPARENCY - IT'S OPEN TO ALL

```
{  
    "address": "DEHfgFYKL97gFFoYHM7UejXBGKjLFzD4za",  
    "total_received": 1000000000,  
    "total_sent": 800000000,  
    "balance": 200000000,  
    "unconfirmed_balance": 0,  
    "final_balance": 200000000,  
    "n_tx": 4,  
    "unconfirmed_n_tx": 0,  
    "final_n_tx": 4,  
    "txs": [  
        {  
            "block_hash": "e9a38d8fa6b7abcla35a2fad93bfa52e3eb9b1ca5cb2825692db0a3c2f054354",  
            "block_height": 1213596,  
            "block_index": 35,  
            "hash": "3ebaecf042e0dbe20a35c0dd2700c83b13a5a1764e1882c2cc39e4bd81c326cf",  
            "addresses": [  
                "DEHfgFYKL97gFFoYHM7UejXBGKjLFzD4za",  
                "DJHXpkQGcRydRvocWaeUtZir6c2pXHkUn4"  
            ],  
            "total": 400000000,  
            "fees": 100000000,  
            "size": 225,  
            "preference": "high",  
            "relayed_by": "",  
            "confirmed": "2016-05-16T14:13:56Z",  
            "received": "2016-05-16T14:13:56Z",  
            "ver": 1,  
            "lock_time": 0,  
            "script": "OP_DUP OP_HASH160 20:DEHfgFYKL97gFFoYHM7UejXBGKjLFzD4za OP_EQUALVERIFY OP_RETURN"  
        }  
    ]  
}
```

EVERYONE HAS A RECORD OF EVERYTHING - SO BE CAREFUL

BTC transaction network for
1NfRMkhm5vjizzqkp2Qb28N7geRQCa4XqC



SECTION SUMMARY

WHAT MAKES THE BITCOIN BLOCKCHAIN SPECIAL?

- No one is in control
- No new technology
- Uses lots of energy
- Is extremely valuable

BITCOIN ISN'T EVERYTHING

BILLIONS INVESTED IN BLOCKCHAINS

BANKS ARE MOVING FASTER THAN USUAL

In 2016, over 100 banks and leading financial institutions started blockchain projects, with more than US\$1 billion dollars being invested into the ecosystem - in just one year!



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



1st Bank in ASEAN to join an
Asian Blockchain Consortium



Patented a blockchain
based wire transfer system



BIG EXPECTATIONS NOW SET

- Accenture claim investment banks can save US\$12 billion a year
- McKinsey believes financial services will save US\$110 billion in 3 years
- White & Case say banks can reduce infrastructure by \$20 billion a year
- Bank of England says DLT could add 3% to a country's economic output
- 80% of top banks to launch DLT projects by 2017 - World Economic Forum
- IBM reports that 15% of big banks will be using blockchains by 2017
- IBM also reported that 65% of top banks will have blockchain trials by 2020

R3 - WORLD'S LARGEST BLOCKCHAIN CONSORTIUM

- Founded by ex-banking CEOs with their CTO as ex-CIO of IBM
- Over 100 financial institutions joined R3 (with large annual fees)
- Members are then able to engage R3 consultants for pilot projects
- Originally utilizing privately forked Ethereum & Eris solutions
- 15 members trial distributed ledgers for trade finance in 2015
- 10 banks trial blockchain (KYC) identity registry in 2016
- Now heavily promoting Corda (in-house permissioned ledger)
- Opened a lab in Singapore and started working with MAS
- Currently in the process of raising US\$200 Million in funding

NOW OVER 35 BLOCKCHAIN CONSORTIUMS WORLDWIDE

- Accounting Consortium
- B3i
- BlockRx Project
- Blockchain Study Group
- CULedger
- ChinaLedger Alliance
- Digital Asset Holdings
- Dutch Logistics Group
- FCA Sandbox Project
- Financial Blockchain Shenzhen Consortium
- Fundchain
- Global Blockchain Council
- Hashed Health
- Hyperledger
- Hyperledger Healthcare Working Group
- ISITC Blockchain Working Group
- ISO/TC 307
- Kinakuta
- Post-Trade Distributed Ledger Group
- Project Jasper
- Other / No data



IMITATION IS THE BEST FORM OF FLATTERY



- 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

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

FRED EHRSAM'S D-APP STACK - 2014 (20%) TO 2017 (70%)

	Web 2.0	Web 3.0 (dApps)	Status
Scalable computation	Amazon EC2	?	Not started
File storage	Amazon S3	?	Not started
External data	3rd party APIs	?	Not started
Monetization	Ads, selling goods	?	Not started
Payments	Credit Cards, Paypal	Bitcoin	Ready

	Web 2.0	Web 3.0 (dApps)	Status
Scalable computation	Amazon EC2	Ethereum, Truebit	In progress
File storage	Amazon S3	IPFS/Filecoin, Storj	In progress
External data	3rd party APIs	Oracles (Augur)	In progress
Monetization	Ads, selling goods	Token model	Ready
Payments	Credit Cards, Paypal	Ethereum, Bitcoin, state channels, 0x	Ready

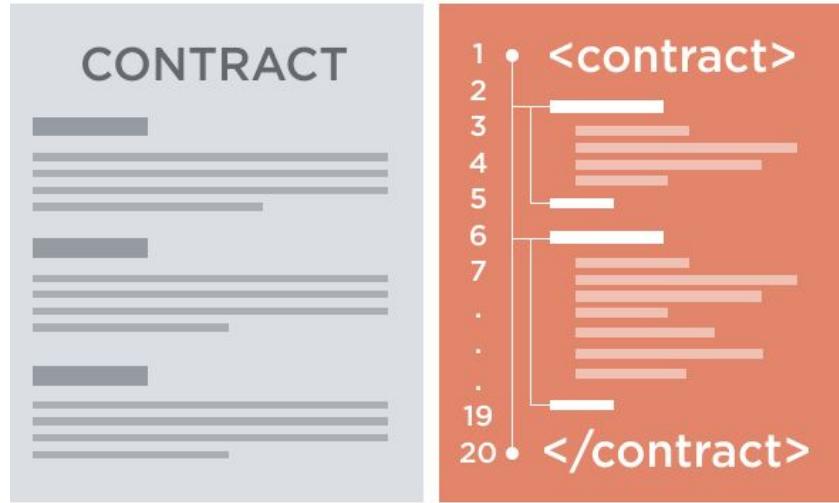
ETHEREUM TAKES THINGS ONE STEP FURTHER



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 and also 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?

```
{
  "block_hash": "00000000009f30c59abf2f8556c0949c79b54764f4cbb223ca43527394d3ee2",
  "block_height": 847281,
  "block_index": 24,
  "hash": "235a88e9853c1c116ef47f795f13ce200c2elbf37667e99973e1c829f95b95f7",
  "addresses": [
    "mpNENnsFcL85hpXwfPrYpKZqAkbbFpxLF",
    "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",
      "sequence": 4294967295,
      "addresses": [
        "mpNENnsFcL8a5hpXwfPrYpKZqAkbbFpxLF"
      ],
      "script": "42662b2544a7f59alabd004a8e15c714f108f553f1dd3f0617982eb5b8ac468c",
      "script_type": "pay-to-pubkey-hash"
    },
    {
      "prev_hash": "483045022100f7ab281bcb60550098f62a097b6dbe79a9f35261aae9dc01aec54a08e8212b02201261b2d0f44545a551fe54f1777597e747523f0a66b7cf74521828c67f23887012103530d0cbdfcd448b8d96ac9c1cbdc88a2f60e05a7f16e7ab321185afb0523e9fc",
      "sequence": 4294967295,
      "addresses": [
        "mpNENnsFcL8a5hpXwfPrYpKZqAkbbFpxLF"
      ],
      "script": "42662b2544a7f59alabd004a8e15c714f108f553f1dd3f0617982eb5b8ac468c",
      "script_type": "pay-to-pubkey-hash"
    }
  ],
  "outputs": [
    {
      "value": 86124000,
      "script": "764914695469844938fd58e5cf59987f4cc063d4d657a788ac",
      "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>

- There are even a few hidden puzzles on the blockchain...

OP_HASH256

6fe28c0ab6f1b372c1a6a246ae63f74f931e8365e15a089c68d6190000000000

OP_EQUAL

ETHEREUM TAKES THINGS ONE STEP FURTHER

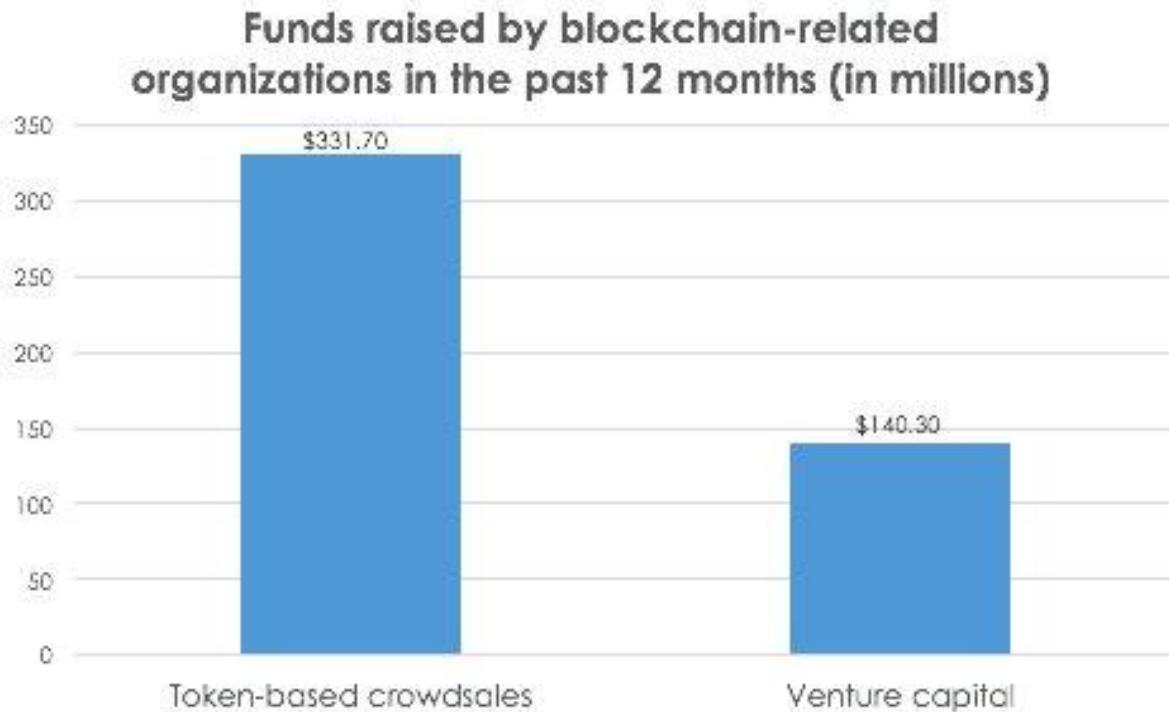
```
contract MyToken {  
  
    string public standard = 'Token 0.1';  
    string public name;  
    string public symbol;  
    uint8 public decimals;  
    uint256 public totalSupply;  
  
    function MyToken( ... )  
    function transfer( ... )  
    function approveAndCall( ... )  
    function transferFrom( ... )  
  
}
```

CURRENCIES CAN BE MANY THINGS - EVEN EQUITY OR 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...

TOKEN SALES - ICOs ARE THE NEW IPOs OF CRYPTO-LAND



LARGEST CROWDFUNDED PROJECT EVER - US\$150M

THE DAO IS AUTONOMOUS. |

1071.36 M

DAO TOKENS CREATED

10.73 M

TOTAL ETH

116.81 M

USD EQUIVALENT

1.10

CURRENT RATE
ETH / 100 DAO TOKENS

15 hours

NEXT PRICE PHASE

11 days

LEFT
ENDS 28 MAY 09:00 GMT



COSMOS - RAISED \$16M+ IN 28 MINUTES

CØSMOS

Blog Plan FAQ Whitepaper About GitHub 

 Fundraiser



INTERNET OF BLOCKCHAINS

The Cosmos fundraiser raised **\$16.8 million USD** and finished on April 6, 2017 6:28AM PDT.

Subscribe

 Open Fundraiser

 Fundraiser Results

 Contribution Terms

 Discuss on Slack



 BITCOIN
MAGAZINE



 BRAVE NEW COIN.
Digital Currency Insights

 COINALERT
Crypto Currency News 24/7

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news



 Finextra

 forklog

 FORTUNE

 hedgeweek

 International
Business
Times

 LINUX.COM



 ONMSFT



 siliconANGLE



THE
WALL
STREET
JOURNAL



 ZDNet

QTUM - SINGAPORE - RAISED OVER \$15 MILLION IN 5 DAYS

QTUM CrowdSale

CROWDSALE RESULTS

QTUM SOLD

51,000,000 QTUM

TIME SPENT

117 HOURS



11,156.766

BTC

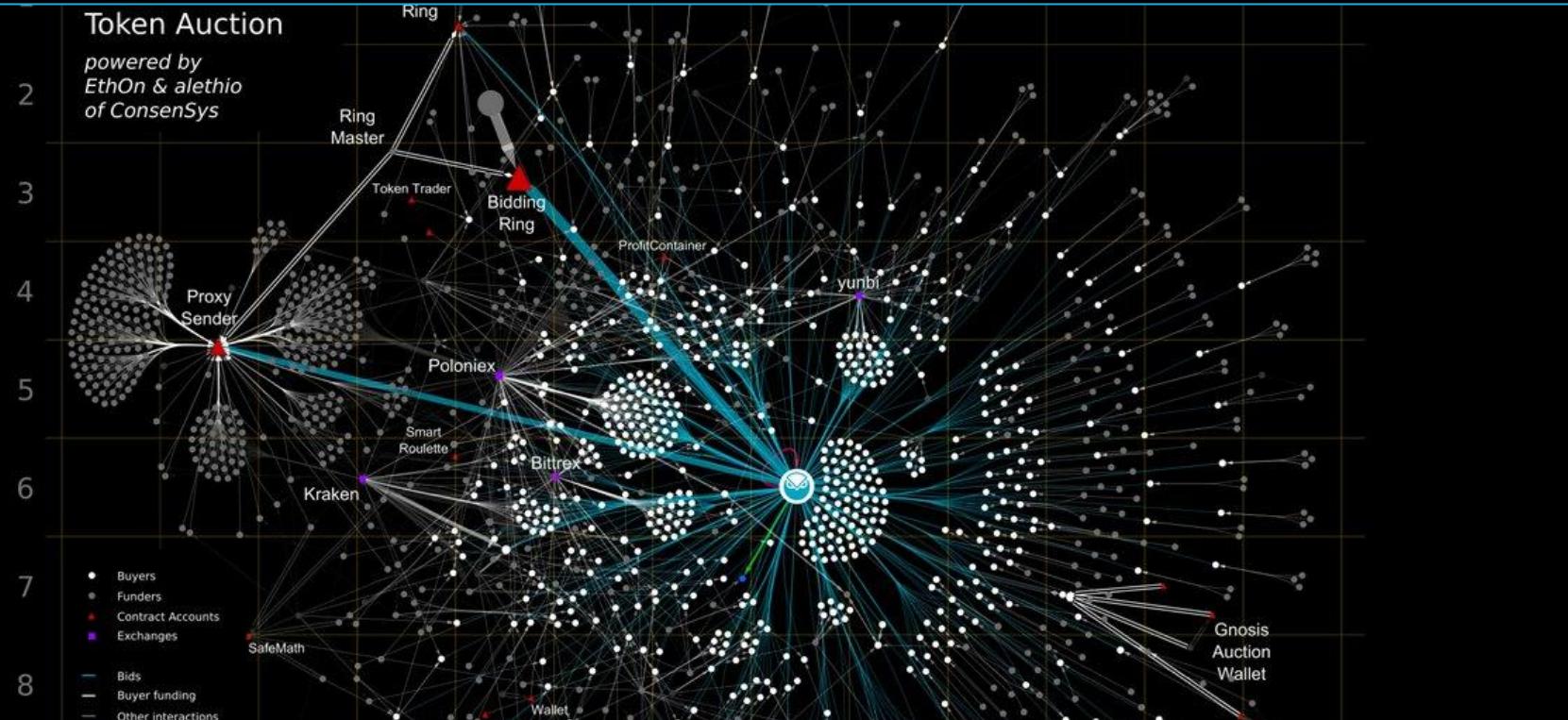


77,081.031

ETH

100.00 %

MOST RECENT - GNOSIS - \$12+ MILLION IN LESS THAN 10 MINUTES



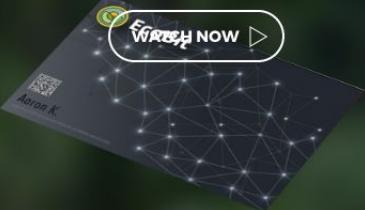
NOW WITH MARKET-CAP OF OVER US\$750 MILLION
(pre-product - let alone pre revenue)

MALAYSIA'S FIRST ICO - US\$ 943,033 AND COUNTING

 EcoBit

HOME ECOBIT ECOLOGY TEAM NEWS FAQ **CONTACT US** ICO LOGIN

ECOBIT ICO : WORLD'S FIRST-EVER GREEN PROJECT ICO
NOW YOU CAN PARTICIPATE FOR A GREENER FUTURE



37 Days **18 Hrs** **12 Mins** **15 Secs**

ICO Ends on June 8, 2017 23:59 UTC

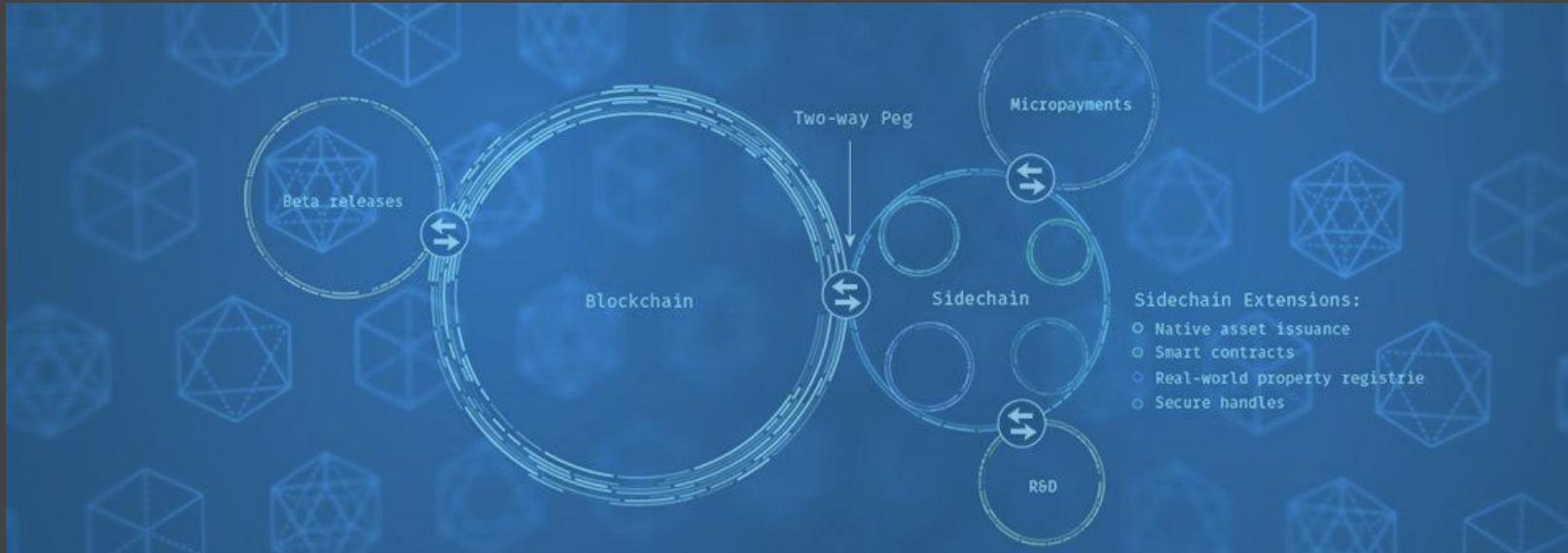
TOTAL ETH 321.6737	PRICE US\$ PER ECOBIT 0.0339	PRICE CHANGE IN 0.79 DAY
TOTAL BTC 685.5079	BACKERS 569 Participants	PRICE INCREMENTAL CHART VIEW MORE


Start, Aquaponic Farm 2,000 BTC, Spirulina Farm 2,000 BTC, Carbon Credit/Offset 5,000 BTC, EcoBit Hotel & Eco Tourism 5,000 BTC, Free Range Farm 2,000 BTC, EcoBit Blockchain Bank 7,000 BTC, Coconut Plantation 2,000 BTC

© EcoBit 2017



EXPANDING THE SCOPE OF EXISTING BLOCKCHAINS



- Funded by LinkedIn founder, sidechains work towards two-way pegging
- Funded by Cornell University, Bitcoin-NG introduces multiple block types
- Funded by Google, Ripple are working on interledger protocols

WE'VE SPENT TWO YEARS DEVELOPING OUR BASE PROTOCOLS

CORTEX

EVERSTORE

DISTRIBUTED
STRUCTURED DATA

 blockauth

DECENTRALIZED ID &
AUTHENTICATION

 dnkey

KEY LOGISTICS &
BROADCASTING

NEUROWARE'S AGNOSTIC PROTOCOLS - DESIGNED TO WORK WITH ANY BLOCKCHAIN

SECTION SUMMARY

BEYOND BITCOIN - WHAT ELSE IS IMPORTANT?

- Thousands of alternatives
- Very few bring anything new
- Ethereum has given birth to ICOs
- What's most important is interoperability

BLOCKCHAINS
AND ASIA

SINGAPORE - LEADING THE PACK

DBS - First bank (globally) to launch a public blockchain competition

DBS & Standard Chartered - first banks (regionally) to use blockchains

OCBC first bank (regionally) to settle intrabank cross border payments

MAS - First regulator (regionally) to issue digital currency on blockchains

QTUM - 1st new blockchain in region to receive over US\$1 million



SINGAPORE - MAKING INTERNATIONAL HEADLINES

Otonomos
@Otonomos

@Otonomos is serving clients from 26 countries as of July! Can't wait to see how many more by the end of the year!

Incorporate online in Singapore, HK, UK, Cayman Islands via blockchains
(in discussions with Delaware)



CHINA - MOST INFLUENTIAL NATION

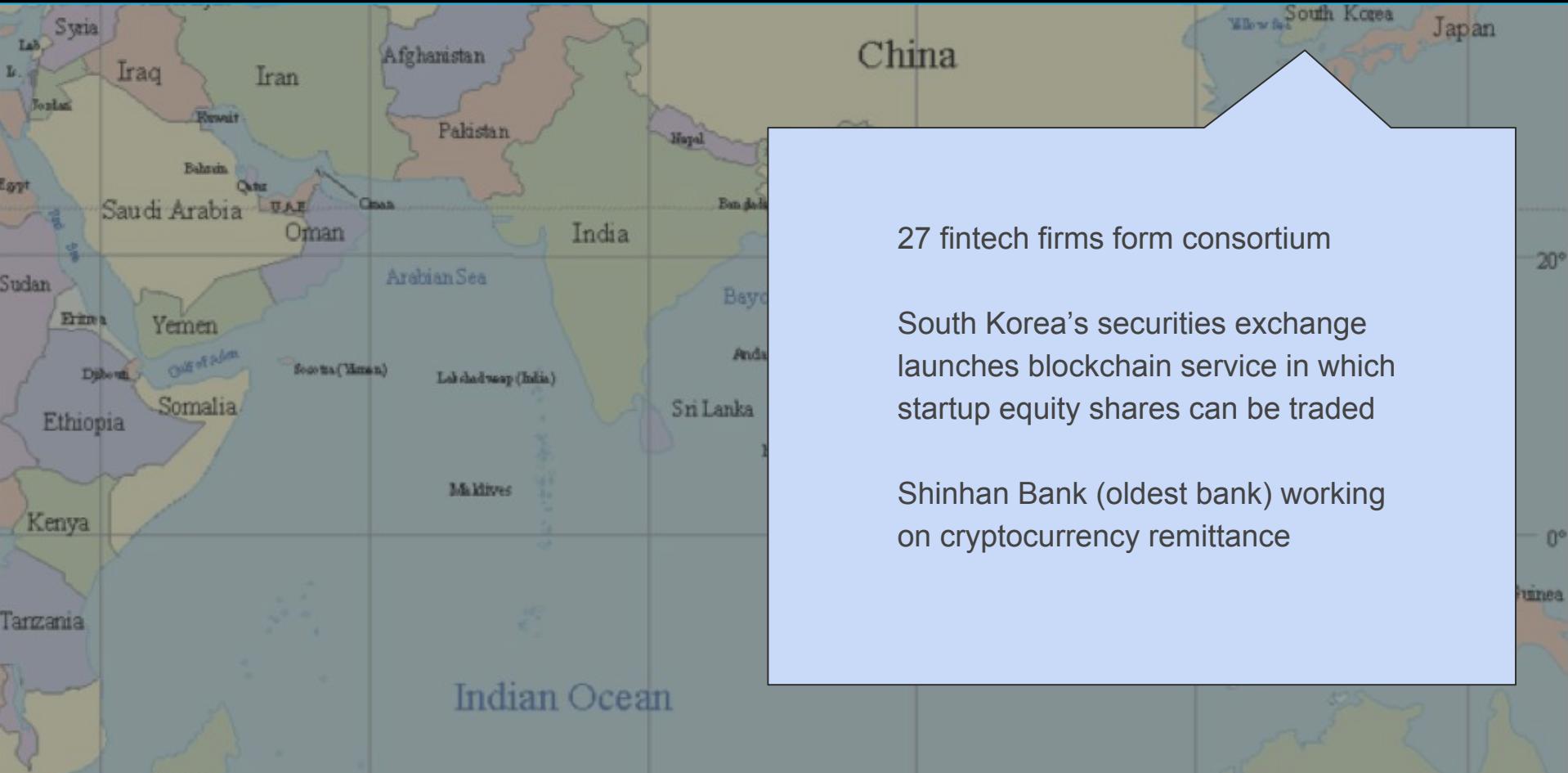
Over 60% of Bitcoins mined in China

10 banks hiring 30 blockchain
developers at a 50% salary premium

Postal Savings Bank of China sent
100 asset TXs on its own Blockchain

US\$1.44 billion fund for blockchains

KOREA - SLOW TO START BUT QUICK TO ACTION

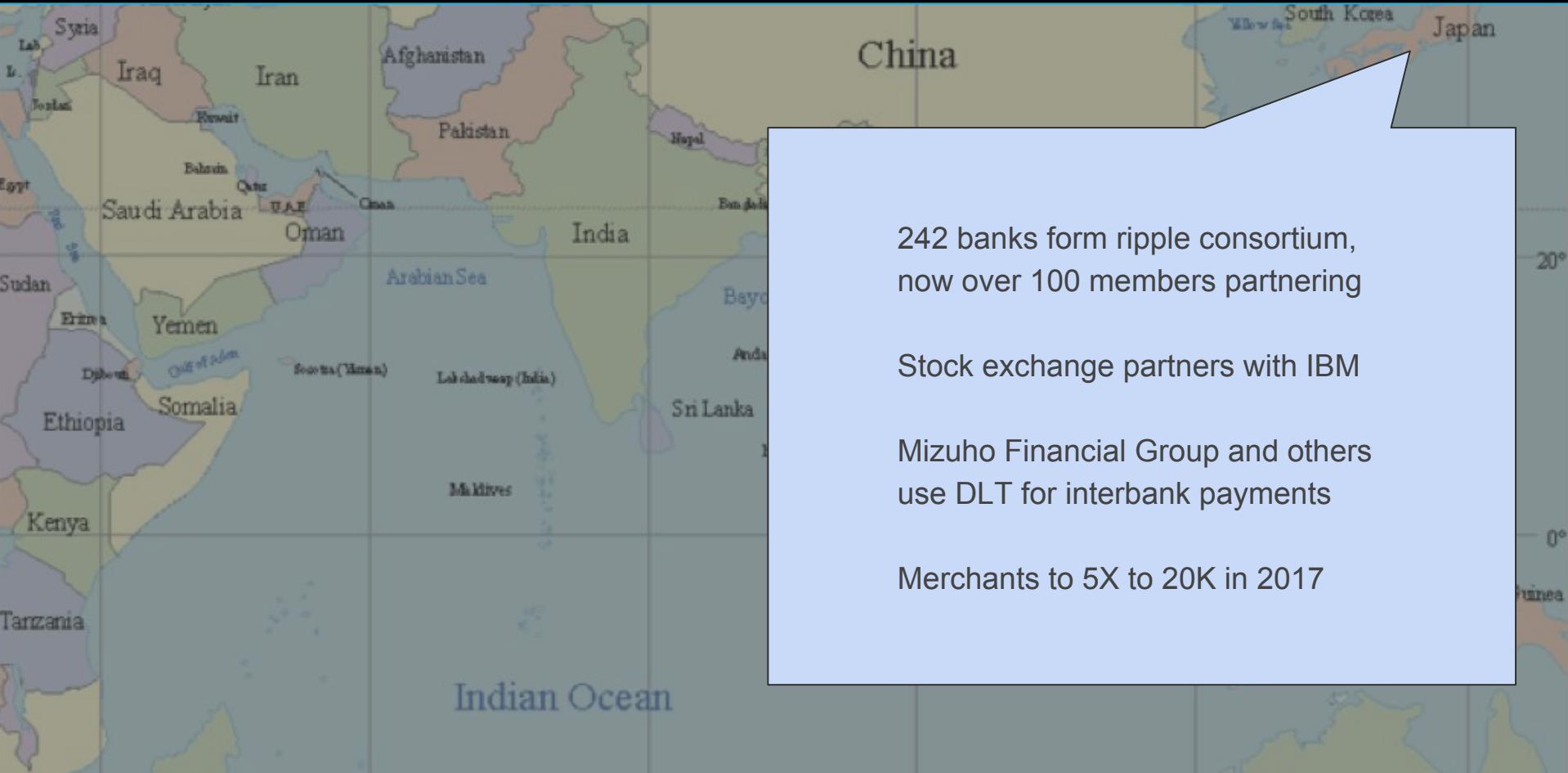


27 fintech firms form consortium

South Korea's securities exchange launches blockchain service in which startup equity shares can be traded

Shinhan Bank (oldest bank) working on cryptocurrency remittance

JAPAN - FIRST TO LEGALIZE THINGS



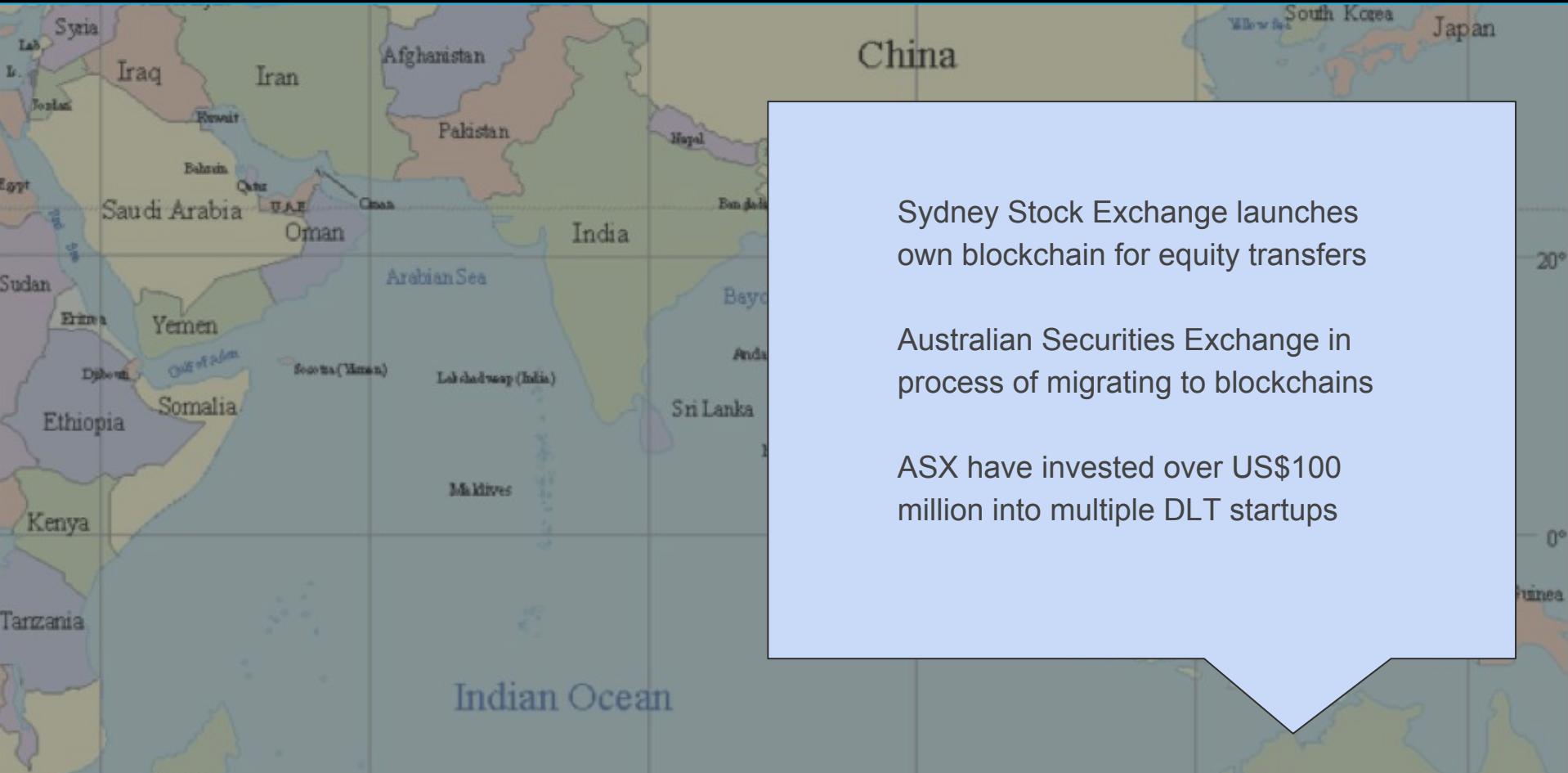
242 banks form ripple consortium,
now over 100 members partnering

Stock exchange partners with IBM

Mizuho Financial Group and others
use DLT for interbank payments

Merchants to 5X to 20K in 2017

AUSTRALIA - FIRST TO ACT - LAST TO ACTION



Sydney Stock Exchange launches own blockchain for equity transfers

Australian Securities Exchange in process of migrating to blockchains

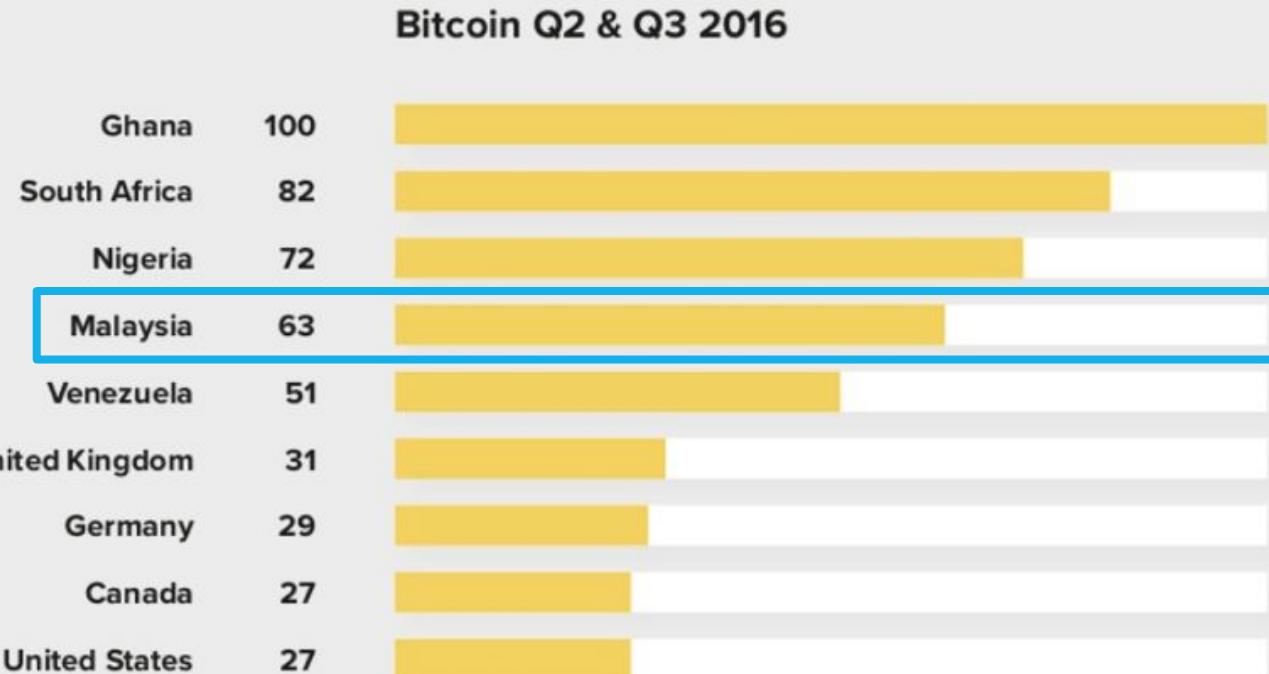
ASX have invested over US\$100 million into multiple DLT startups

BLOCKCHAINS
IN MALAYSIA

BLOCKCHAINS BOLEH - INTERESTING FACTS

- In 2012 - Malaysia was LEADING the Bitcoin mining race in Asia
- Malaysia is the LEADING manufacturer of ASIIC (used by miners)
- First petrol station in Asia accepting Bitcoin was in Malaysia
- First co-working space in Asia accepting Bitcoin was in Malaysia
- First global VPN service accepting Bitcoin was also in Malaysia
- Chief Minister of Sarawak supported blockchains at IDECS 2017

WHERE DO WE (MALAYSIA) STAND ...?



THE BLOCKCHAIN EMBASSY OF ASIA - MADE IN MALAYSIA



BlockChain Embassy Asia

AMBASSADORS

USE CASES

CONTACT EMBASSY

TOOLBOX

NEWS

our mission is to educate organizations throughout asia in both
the legal and technical implications of distributed ledgers

We are a non-profit digitally distributed organization that is using and promoting blockchain governance as a method for
collaboration between various business entities and existing community efforts across Asia

REQUEST MEMBERSHIP

9 FOUNDING MEMBERS FORM THE STEERING COMMITTEE



banking ambassador

LIM JOYAN & CO.
ADVOCATES | SOLICITORS

legal ambassador



banking ambassador



iTrainAsia™

education ambassador

REDmoney

media ambassador



IoT ambassador



fintech ambassador

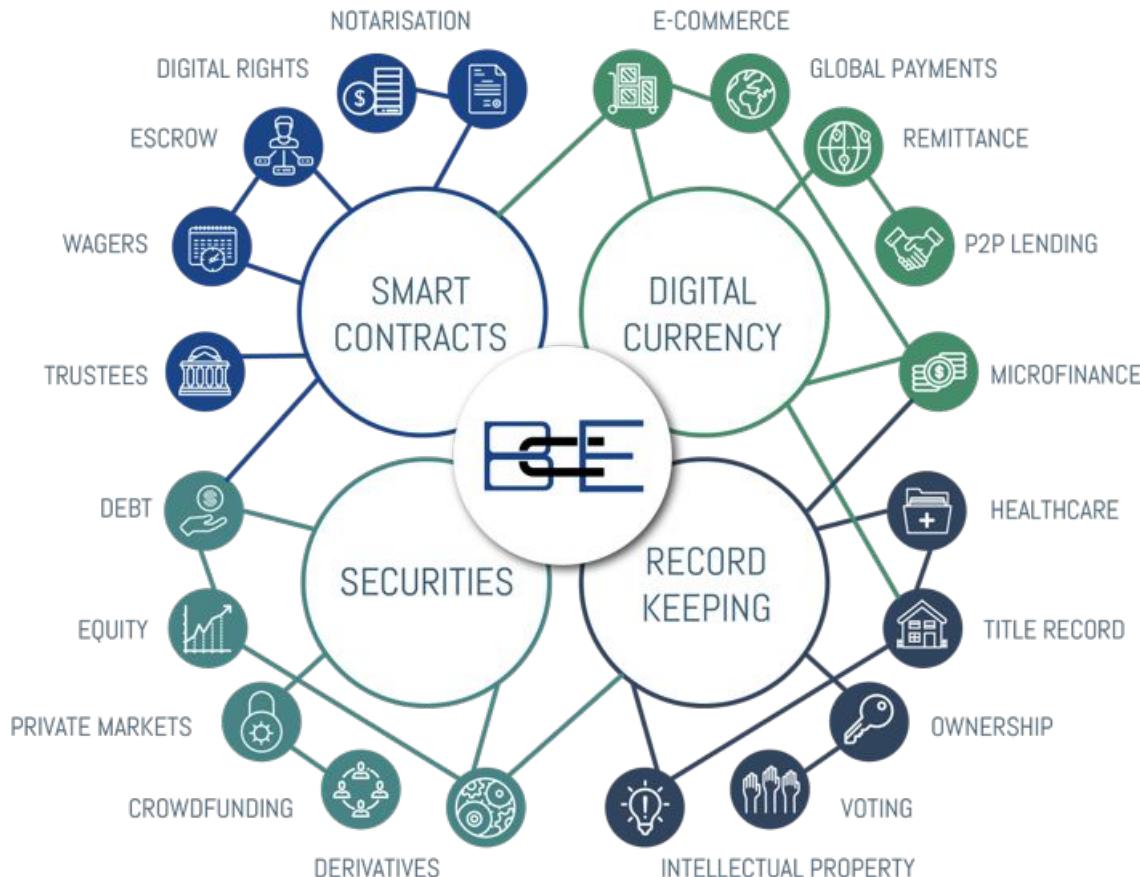
CapitalBay

invoice ambassador



tech ambassador

BIG PROBLEMS INVOLVE MULTIPLE PARTNERS & MOVING PARTS



TRAINING & WORKSHOPS WITH THE EMBASSY TOOLBOX

build and send blockchain transactions from your browser

Build your own transactions using the form below:

Input Control

Input Type	Private Keys
-------------------	--------------

Private Key 1	Private key to use?
----------------------	---------------------

[ANOTHER KEY](#)

Transaction Variables

Blockchain	Dogecoin
-------------------	----------

Fee	Leave blank for default
------------	-------------------------

Optional Data	Data added to chain
----------------------	---------------------

Output Control

Return Change	Auto Send
----------------------	-----------

Address 1	Send to this address
------------------	----------------------

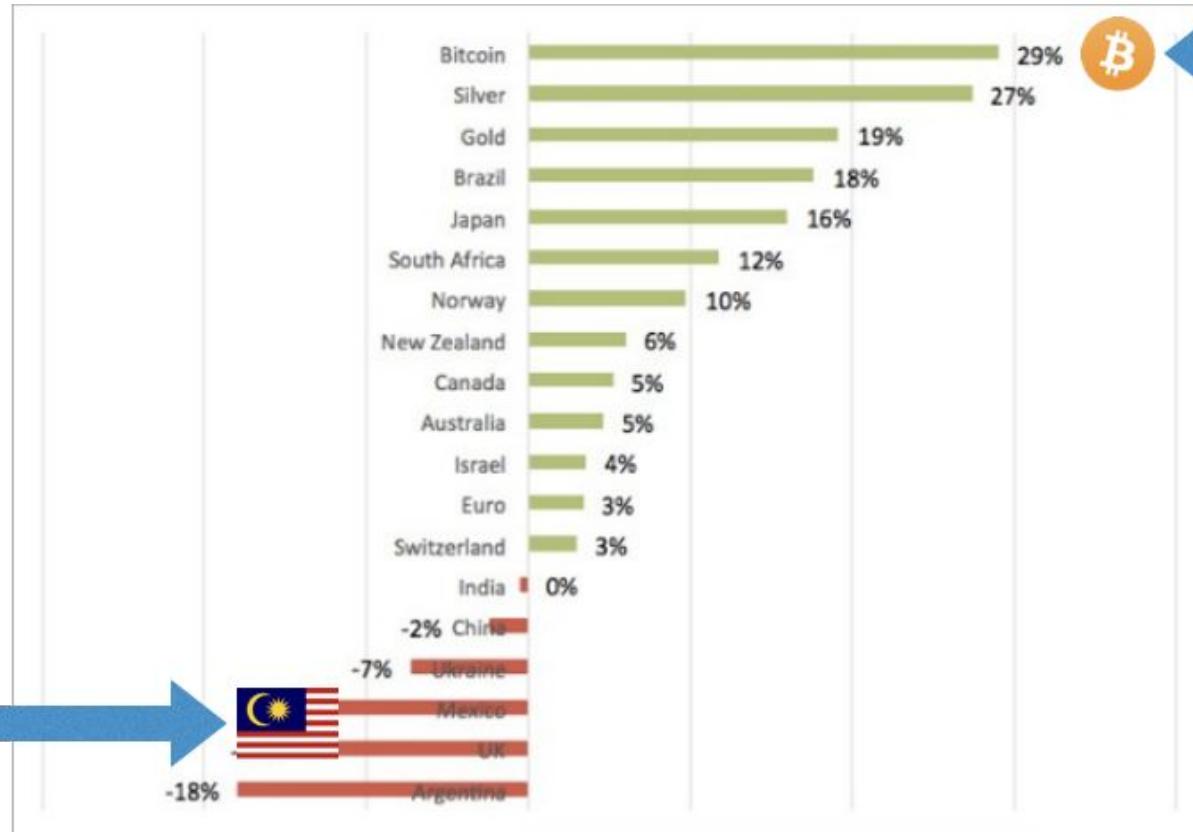
Amount 1	How much to send?
-----------------	-------------------

[ANOTHER ADDRESS](#)

[RESET](#)

[BUILD](#)

WHERE DO WE (MALAYSIA) STAND ...?



OUR FIRST CLIENT IS ONE OF SIX LICENSED ECF OPERATORS

The screenshot shows the ataplus platform interface. On the left, a sidebar menu includes 'COMMITS', 'DATASTORES' (with sub-options: ISSUERS, COMPANIES, INVESTORS, INVESTMENTS, SECTORS), and 'ADD NEW'. Below that are 'SCHEMA' and 'DOCUMENTATION'. The main area features a bar chart titled '6 Months Sitewide Total Investments' comparing January and March. A large black speech bubble contains the quote: "For ECF to flourish, there must be a deep depository of trust and transparency that is frictionless & inclusive. Neuroware's tech enables us to provide all that and more!" At the bottom right, a logo for 'ataplus' is displayed next to the text: 'Kyri - Co-Founder & Director of Licensed ECF Platform'.

ataplus

Dogecoin (Testnet) Blockchain / ATA-Plus V0.0.1 / Datastores / Investments

Credits: 254.00000000 FLUSH LOGOUT

COMMITS

DATASTORES

- ISSUERS
- COMPANIES
- INVESTORS
- INVESTMENTS**
- SECTORS
- ADD NEW

SCHEMA

DOCUMENTATION

6 Months Sitewide Total Investments

RM Invested (Millions)

Month	Investment (Millions)
January	0.40
March	0.35

sort by Most Recent search investments

f2583c4bbbc1d7f70fe776ef8de24e3e9131884de2be5ed3365fe72e53fa2177

EDIT DELETE SCHEMA

Key	Value
Index: Investment ID [auto]	bf28617205e695439c0dd2285a76d7c1

powered by neuroware

ADD NEW RECORD

74c87dfa57a94dc86666209cd87a01b⁵

Date of Investment

“For ECF to flourish, there must be a deep depository of trust and transparency that is frictionless & inclusive. Neuroware’s tech enables us to provide all that and more!”

ataplus

Kyri - Co-Founder & Director of Licensed ECF Platform

OUR OTHER CLIENTS & PARTNERS



BANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIA



Suruhanjaya Sekuriti
Securities Commission
Malaysia



MINISTRY OF FINANCE MALAYSIA

500 startups
coinsilium

FINNOVASIA

TEDx BFM 89.9
The Business Station

Asia 8th Annual Premier Banking Technology Event

BankTechAsia'16
Where banking meets technology...



DBS

axiata

ataplus

Maybank

COINGECKO

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Search Coins

฿ - BTC - All Hashing Algorithms -

Rank	Coin	%	Total		Market Cap		Liquidity		Developer		Community		Public Interest		Last 7 Days	
			฿	฿	฿	฿	%	฿	฿	%	฿	฿	%	฿	฿	%
1	Bitcoin	96 + 0.0	฿16,248,112 + 2.54%	฿116,139.30	98	11974 ↓ 7759 + 1364 + 3072 + 2606	4375 393 2.23 132 313	94	213664 + 501 2.23 169012	f ฿ 28627 ฿ 10539	87	9,386,000 + 1.00000000	10539	Buy	Sell	
2	Ethereum	85 + 0.4	฿4,181,995 + 1.98%	฿7644.15	93	3579 ↓ 751 + 463 + 1954 + 1705	751 85 2.28 29.9	72	32579 + 164 2.28 61075	f ฿ 30038 ฿ 24497	56	392,000 + 0.04631565	24497	Buy	Sell	
3	Litecoin	75 + 2	฿315,383 + 0.80%	฿52212.93	85	1199 ↓ 66 + 269 + 148 + 144	66 27 1.17 24.5 13	62	22437 + 59 1.17 23327	f ฿ 42749 ฿ 409,000	42	174,781 + 0.00625351	174,781	Buy	Sell	
4	Ripple	74 + 3	฿753,065 + 37.271%	฿70260.68	87	1269 ↓ 397 + 251 + 247 + 199	397 251 21 247 36	49	2234 + 20 1.1 23406	f ฿ 4394 ฿ 122,000	54	122,000 + 0.00002014	63256	Buy	Sell	
5	Dash	71 + 0.5	฿473,649 + 9.424%	฿18547.61	82	410 ↓ 228 + 119 + 206 + 159	228 119 39 23	53	4220 + 31 1.1 18935	f ฿ 10764 ฿ 46914	47	255,000 + 0.06579709	46914	Buy	Sell	
6	Monero	70 + 0.2	฿265,592 + 1.465%	฿4601.69	85	514 ↓ 307 + 143 + 558 + 387	307 143 100 260 155	54	9793 + 52 0.9 11648	f ฿ 3022 ฿ 318,000	44	318,000 + 0.01868439	96176	Buy	Sell	

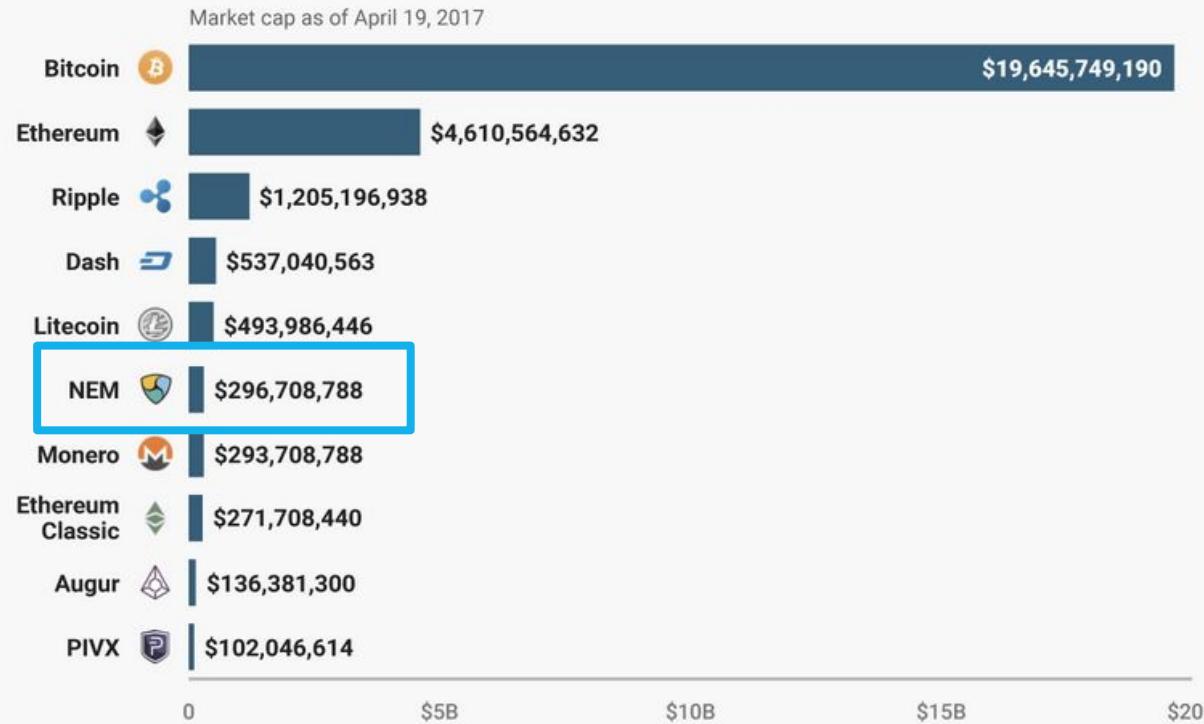
Social Media: f 660, r 13, in 3, tw 1, em 1, crown 1.

NEM - MALAYSIAN BASED BLOCKCHAIN

		Total	MktCap	Liquidity	Developer	Community	Public Interest	Last 7 Days					
Rank	Coin	%	Value	Value	%	★	Value	%	Value	%	Value	Value	
16	LBRY Credits	53 + 0.6	\$1,477 + 3.310%	139.65	77	208 ↑ 30 ↓ 34 ↑ 107 ↓ 5 ↑ 69	252 ↑ 11 ↓ 278	41	1157 ↑ 2 ↓ 0.02 ↑ 0	8842 ↓ 3394	35	↳ 48,800 ↑ 378400 \$0.00003348	
17	Storjcoin X	52 + 0.6	\$7,572 + 1.319%	19.06	81	137 ↑ 54 ↓ 31 ↑ 443 ↓ 421	180 ↑ 25 ↓ 29	41	1200 ↑ 4 ↓ 0.06 ↑ 0.2	2688 ↓ 10386	35	↳ 37,900 ↑ 201256 \$0.00015004	
18	BitShares	52 + 0.8	\$10,626 + 1.088%	65.70	71	133 ↑ 58 ↓ 75 ↑ 199 ↓ 58	186 ↑ 30 ↓ 30 ↑ 16 ↓ 0	41	1133 ↑ 3 ↓ 0.02 ↑ 0	7979 ↓ 5833	36	↳ 75,100 ↑ 529201 \$0.00000412	
19	NEM	52 + 0.3	\$49,606 + 2.678%	115.28	62	40 ↑ 36 ↓ 30 ↑ 316 ↓ 215	82 ↑ 16 ↓ 16 ↑ 0	33	171 ↑ 2 ↓ 0 ↑ 0	2371 ↓ 3083	38	↳ 318,000 ↑ 253353 \$0.00000551	
20	Lumens	51 + 1	\$16,603 + 1.524%	78.61	60	271 ↑ 49 ↓ 64 ↑ 112 ↓ 50	68 ↑ 14 ↓ 14 ↑ 0	40	789 ↑ 3 ↓ 0.06 ↑ 0.2	4970 ↓ 8358	41	↳ 379,000 ↑ 316512 \$0.00000240	
21	Namecoin	51 + 0.8	\$3,526 + 2.630%	29.90	74	132 ↑ 43 ↓ 33 ↑ 31 ↓ 34	133 ↑ 28 ↓ 28 ↑ 0	41	2571 ↑ 2 ↓ 0 ↑ 0	1442 ↓ 3318	42	↳ 106,000 ↑ 1632993 \$0.00023929	
22	Vertcoin	50 + 0.1	\$1,528 + 11.306%	27.91	63	81 ↑ 49 ↓ 31 ↑ 40 ↓ 36	25 ↑ 16 ↓ 16 ↑ 0	46	4070 ↑ 3 ↓ 0.06 ↑ 0.6	2612 ↓ 25801	43	↳ 78,600 ↑ 1269033 \$0.00004637	

DOES MARKET CAP ALSO REPRESENT SECURITY TOO ...?

10 CRYPTOCURRENCIES HAVE A MARKET CAP OVER \$100M



ETHERSCAN FOUNDED BY A MALAYSIAN - FUNDED BY DCG

Etherscan
The Ethereum Block Explorer

LOGIN Search by Address / Txhash / Block / Token GO LANGUAGE

HOME BLOCKCHAIN ACCOUNT TOKEN CHART MISC

TOTAL SUPPLY OF 88,464,230.97 ETHER
\$10.56 @ 0.01085 BTC/ETH

LAST BLOCK
3104622 (14.40s Avg)

Hash Rate
7,786.31 GH/s

TRANSACTIONS
16160931

Network Difficulty
111.68 TH

14 day Ethereum Transaction History

Blocks

View All

Block 3104622
Mined By Ethpool_2
> 15 secs ago
3 txns IN 12 secs
Block Reward 5.00015 Ether

Block 3104621
Mined By Ethermine
> 27 secs ago
5 txns IN 13 secs
Block Reward 5.00409 Ether

Block 3104620
Mined By 0x96338149e9f6c26...
> 40 secs ago
4 txns IN 4 secs
Block Reward 5.000187 Ether

Block 3104619
Mined By DwarfPool
> 44 secs ago
0 txns IN 20 secs
Block Reward 5 Ether

Transactions

View All

TX# 0X8C82912A90EB24422A0DD89...
> 15 secs ago
From 0xea874fdde714fd9... To 0xdc17d353b01285...
Amount 1.0045803417014828 Ether

TX# 0X30803DA432AD0EC50B674EB...
> 15 secs ago
From 0xf34a762291e2578... To 0x6fc82a5fe25a5cd...
Amount 0.09972424738776952 Ether

TX# 0X9F3AEC03CD8978780C11C59...
> 15 secs ago
From 0x2e67179261a34b... To 0x44e9bfd5eb0651...
Amount 1.506161 Ether

TX# 0X69429B51113744361D7EF7D...
> 27 secs ago
From 0xea874fdde714fd9... To 0xb2db64a2574811...
Amount 1.0055965023717969 Ether

MONEY MATCH FIRST IN MALAYSIA TO USE RIPPLE

Malaysia: MoneyMatch raises \$150k seed from Australia's Kosciuszko for forex platform



Enter Your Email

Subscribe to our newsletter



(L-R) Naysan Munusamy, Damien Santer and Fazil Fuad

USE CASES WE HAVE BEEN EXPLORING IN MALAYSIA

BANKING

From AML & KYC cost reductions to reward schemes & reaching the unbanked or general key-signing

HEALTHCARE

Complete and immutable family histories of every related diagnosis and condition available from 1 key

ACCOUNTING

Creation of programmable processes & automated auditing trails increase transparency & efficiency

LEGAL

Cryptographically secure document notarization, copyright protection, and dispute settlement

GOVERNANCE

Increase the accountability of public officials and offer total transparency in voting & elections

LOGISTICS

Tracking of shipping cycles and provenance systems that autonomously verify actions

GAMING

Share digital assets between an entire network of games, or use the blockchains to create immutable persistent open-worlds

ASSETS

Track possession of your property in the digital economy by creating, managing, storing, or sharing multiple asset classes

INSURANCE

Integrated insurance and medical services can be intelligently designed to quickly and contractually settle claims with cryptographically

SECTION SUMMARY

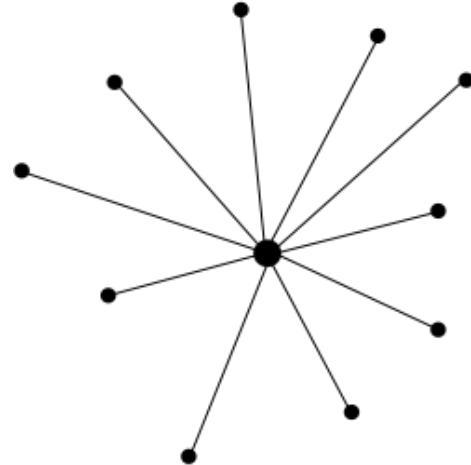
WHAT IS HAPPENING REGIONALLY?

- Malaysia was at one time leading the way in Asia
- Singapore & China are now leading their own ways
- Malaysia has LOTS of blockchain knowledge & talent
- FinTech is no longer the only active use-case

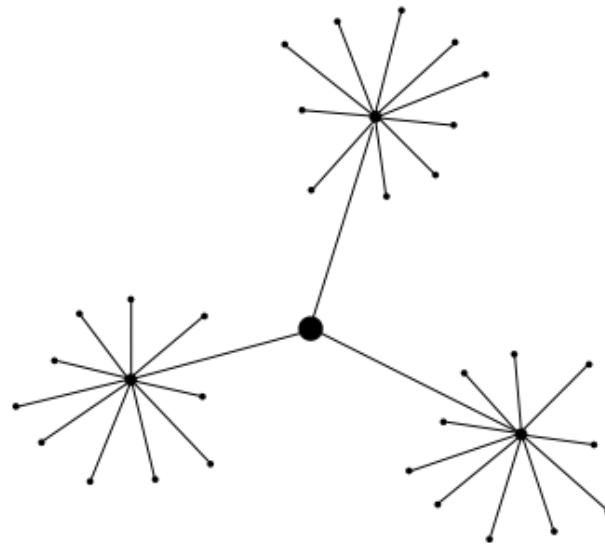
USE CASE 01

DATA STORAGE

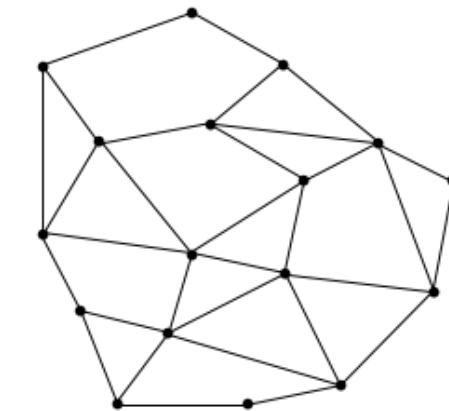
THREE PLACES TO STORE DATA - SOMETIMES ALL ARE REQUIRED



CENTRALIZATION
DATABASE



DECENTRALIZATION
THE CLOUD



DISTRIBUTION
BLOCKCHAINS

DIFFERENT WAYS DATA CAN BE STORED ON BLOCKCHAINS

- Blockchains can provide a tamper proof audit trail for structured data
 - Useful for public data (births, deaths, marriages and education)
 - Ideal for sharing data (identity, loyalty, supply chains and healthcare)
- Alternatively, blockchains can also be used to timestamp data hashes
 - Useful for large data sets (such as data lake authenticity checks)
 - Ideal for compliance (independently verify data timelines)
- Simple applications that require limited data can run autonomously without the need to pay for and (or) service ongoing hosting or server requirements
 - Useful for operating censor resistant applications

WHAT IS A DATA LAKE...?

- An intelligent repository for storing large quantities and varieties of data
- With a constant stream of data being fed to it from different sources
 - There is an expectation to preserve the original data
 - As well as the precise lineage of data transformation
- Requires unstructured data & structured data with embedded schema
- Leads to a stockpile of archived anonymous yet actionable events
- **However**, the more routes that lead to and from this lake of data, the more susceptible it becomes to presenting misleading information...

THE PROBLEMS FACED BY DATA LAKES

- **How can we trust the data coming into the lake?**

- Is it going to the right place & is it coming from who it says it is?
- If the application is independent - how to change schemas?

- **Can we trust the data does not get altered once in the lake?**

- Risks associated with centralized truth for distributed workloads

- **How can we trust the data coming out of the lake?**

- Do the right team members have the data specific privileges?

HOW OUR DISTRIBUTED PROTOCOLS CAN HELP



Our DNKey protocol could be used to manage hierarchical public key abstraction so that external input routes could be controlled remotely

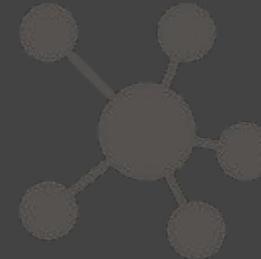


Our BlockAuth protocol could be used to manage network-wide, inter-internal hierarchical authentication and administrative privileges



Our Everstore protocol could be used to track and publicize data archives with hashed payloads and other important meta information

HOW IT ALL FITS TOGETHER



COLLECT DATA

Collect RAW schema-less data
using MongoDB - can use GridFS
for file storage

Document-Driven Design

This allows you to store and
query anything

ARCHIVE DATA

Hash batches of data prior to
archiving and publicize the meta
data to the blockchains

Relational and Replicated

Mixing some of the oldest
technologies with the latest

ANALYZE DATA

Use APIs to get data from the
archives and prove its validity by
checking the blockchains

Polyglot Persistance Prevails

Use the right database for the right
job at the right time!

EVERSTORE - THE FIRST BLOCKCHAIN POWERED DATABASE

- Everstore is the first protocol capable of storing large amounts of structured data directly on a blockchain - bypassing singular transaction limitations
- Replicates full CRUD-like functionality with schemas, indexes & relationships
- Data encoded via an Everstore instance is available for the life of the ledger



CURRENT BLOCKCHAIN DATA STORAGE ATTEMPTS

- Most well known in the ecosystem are Factom.org and Tierion.com
- Both store checksums or ‘receipts’ on a blockchain in an OP_RETURN
- Records notarized on the blockchain must fit within Bitcoin’s 38 byte limit
- References then link to the actual data which is stored somewhere off-chain
- Other solutions such as StoreJ and Filecoin are attempting to build dedicated blockchains from the ground up specifically for just storing data and files
- The concern from the technical community is that without an underlying token of value or properly incentivized network security will suffer

WHY EVERSTORE IS SO SPECIAL

- Using a ‘master key’ Everstore can map transaction-outputs intelligently
- This allows Everstore to bypass the 38 byte limit with structured linking
- Data can be directly encoded on a blockchain - making it the database itself
- Each Everstore instance can hold up to 999,999,999 tables each with up-to 999,999,999 fields, with unlimited records, indexes and relationships
- Already supports over 20 field types from simple strings and numbers to more complex arrays and objects such as dates and geo-coordinates
- Private keys allow updates whilst public keys provide read-only access

USE CASE 02

IDENTITY

THE BLOCKCHAIN EMBASSY'S CHANCERY PROJECT



INCLUDES A DIGITAL BLOCKCHAIN-BASED PASSPORT



- Allows users to create and host their identity on the blockchains
- Uses endorsements and referrals to validate certain events occurred
- Allows users to login and sign-up for partnering services with 1 click

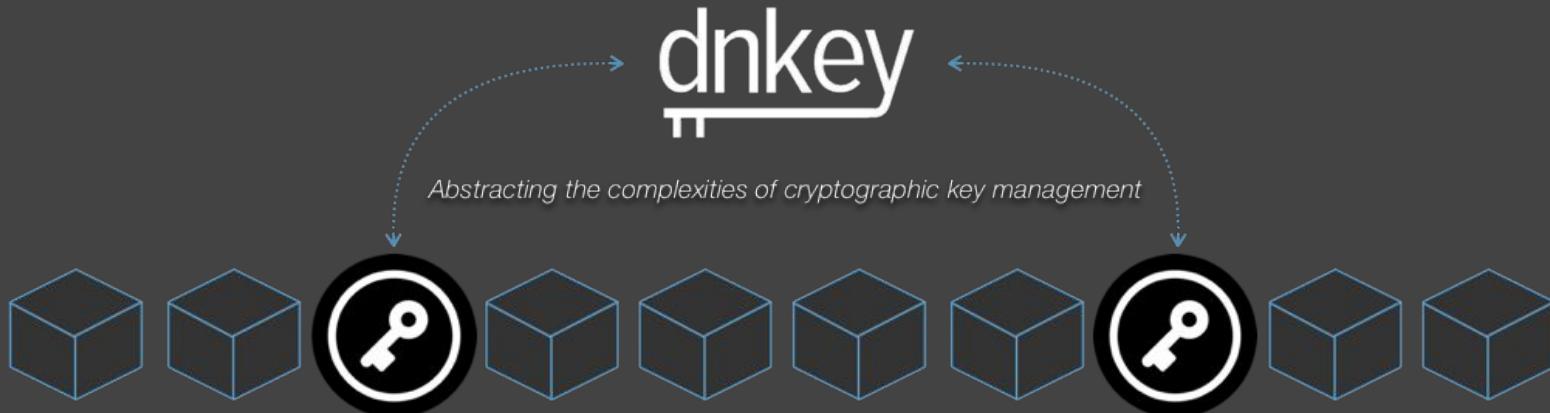
BLOCKAUTH - IDENTITY MANAGEMENT & AUTHENTICATION

- Enables intelligent account authentication via cryptographic keys
- Private keys replace passwords whilst the public keys becomes an identity
- Applications and organizations can independently authenticate credentials



SIMPLIFIED CRYPTOGRAPHIC IDENTITIES WITH DNKEY

- Scalable key logistics across multiple platforms, applications, and processes
- Enables DNS style abstraction for key retirement, replacement, and rotation
- Decodes memorable, trustworthy domain names to public cryptographic keys



HOW WE ABSTRACT THE COMPLEXITIES OF KEY MANAGEMENT

- Transform wallet addresses from complicated public keys such as:
`13aaehx6p4QrTHMvQUZy3dTEevXr4Wrap` into something much more
memorable and manageable - such as mark.neuroware.io
- Services configured to read DNKeys (rather than direct public keys)
can programmatically control keys remotely
- Ensures organizations have total control over key management and
are not locked-in to any one vendor or blockchain
- High-level domains can be used as a way to control your distributed
on-chain presence across multiple applications

USE CASE 03

TRUST

IN BANKS WE TRUST

- Banks traditionally play three fundamental roles:
 - **STORE DEPOSITS** (can now be done with any e-Wallet)
 - **MAKE PAYMENTS** (can now be done with crypto-currency)
 - **PROVIDE CREDIT** (can now be done by P2P operators)

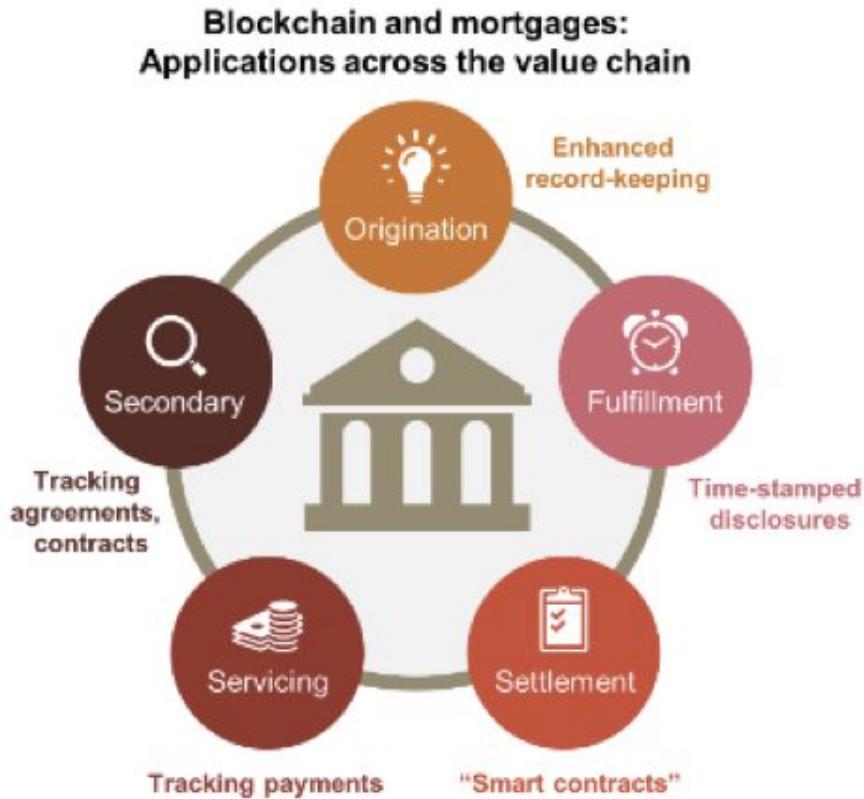
- Perhaps more importantly, banks are also the custodians of trust:
 - **TRUSTEE SERVICES** (trust can now be provided by blockchains)
 - **ESCROW PAYMENTS** (can now be programmed with multi-sig addresses)
 - **LETTERS OF GUARANTEE** (can now be issued with smart contracts)

BANKING ON THE FUTURE OF BLOCKCHAINS

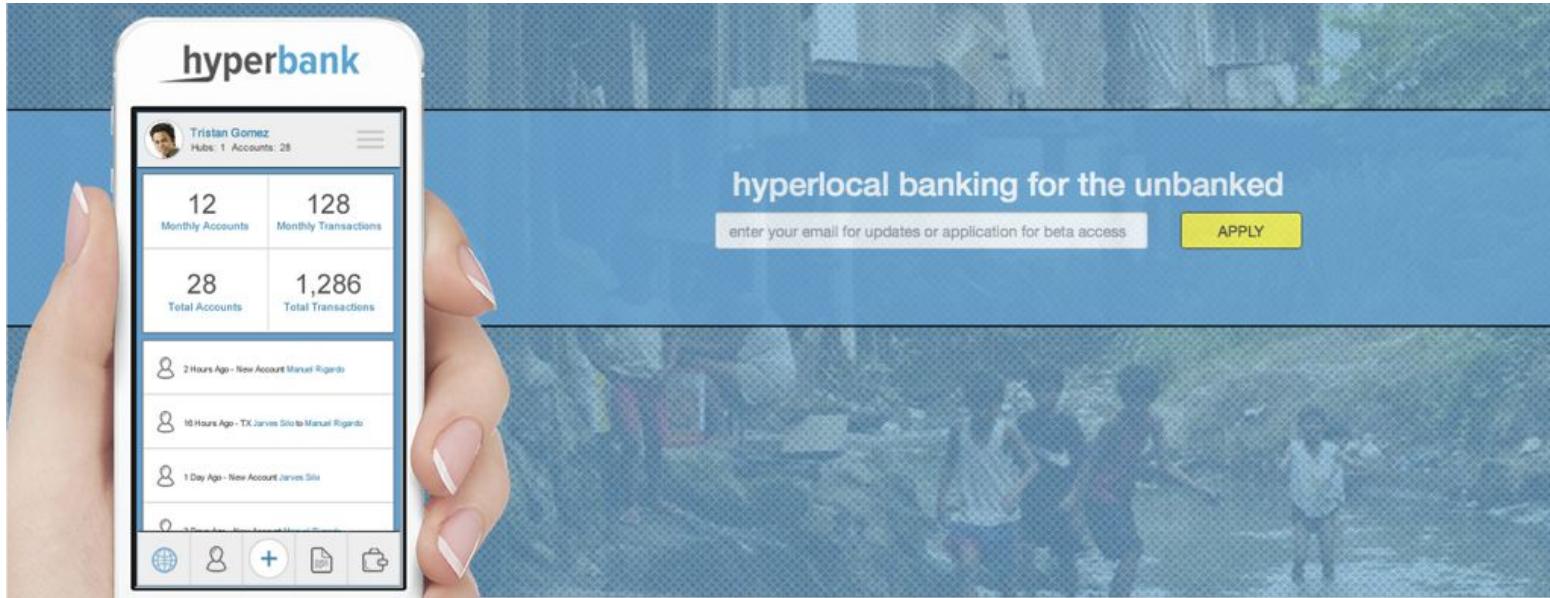
- With banks already KYC and AML compliant, there are no entities more suited to be offering digital currency brokerage and key management
- With the advent of smart-contracts, banking becomes a sequence of code
- Regulation and compliance would be designed as part of the protocol
- If retail and commercial banking processes were 100% based upon blockchains, staffing requirements could be reduced by at least 90%
- Existing internal infrastructure can be replaced by distributed protocols

PWC AND MORTGAGES - AUTOMATING TRUST

- At origination, blockchain could help establish more accurate record keeping
- At fulfillment, it could provide immutable proof that loan estimates were sent and received on time
- Smart contracts would speed up settlement flows throughout
- In the servicing process, blockchain could track the movement of payments
- And in the secondary markets, it might also provide transparency about the ownership of underlying assets



2ND PLACE WINNER OF THE DBS BLOCKCHAIN HACKATHON



The application that was previously known as NuBank won 2nd place at the recent [DBS Hackathon](#) in Singapore and is now HyperBank.

We utilize the blockchains in order to provide a secure and fully auditable digital trail of transactions but avoid volatility by keeping transfers at fixed local currencies with multi-signature signing from top-tier institutional financial partners.

Consumers communicate using standard SMS functionality directly with their village elders who then use their smartphones to record and relay transactions to the blockchain - providing fully distributed M-Pesa functionality.

PROVIDING HYPERLOCAL BANKING TO THE UNBANKED

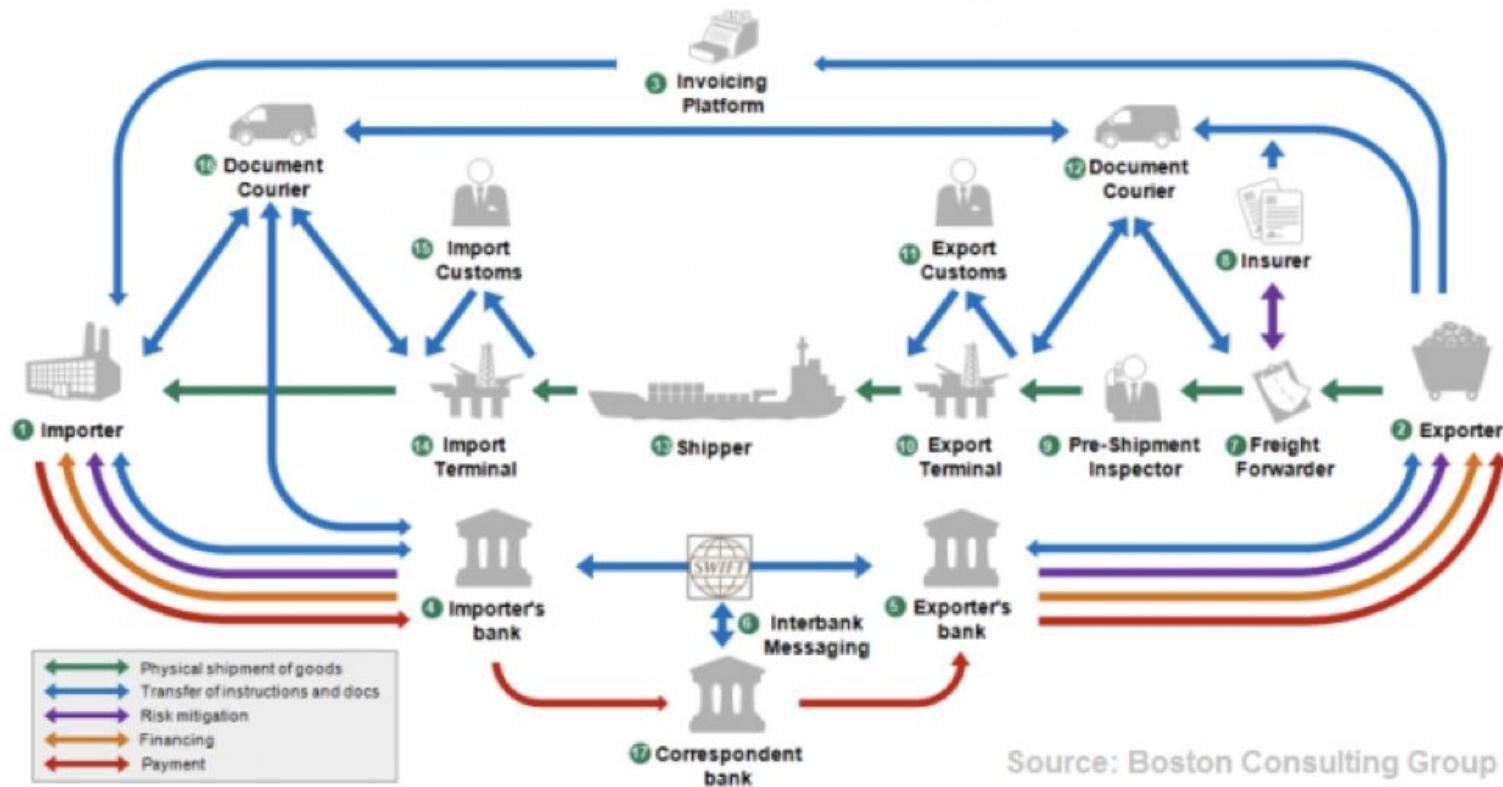
- One village elder with smart-phone creates and verifies accounts locally
- Multi-signature keys provided to elder, account owner and regional hub
- Regional hubs could be traditional banks - acting as arbitrators for disputes
- Deposits can be made in any currency accepted both locally or regionally
- Local users transfer directly via local hubs or internationally via regional hub
- Standard SMS can be used to transfer funds and make direct payments
- Web-based technology can be utilized by other inter-network participants

SUPPLY CHAINS ARE NOT JUST ABOUT TRADE FINANCE

- Lending, letters of credit, factoring, export credit and insurance have created new trade finance products earning banks US\$50+ Billion a year
 - These bank-backed products are used by 80 to 90% of all global trade
 - Every US\$1 Million in goods has a trade-financing cost of US\$50,000
-
- **Beyond the financials there is also the product delivery experience**
 - The history and authenticity of each and every ingredient or raw material
 - The verified processes involved in creating and transporting products

TRADITIONAL SUPPLY CHAINS ARE COMPLICATED

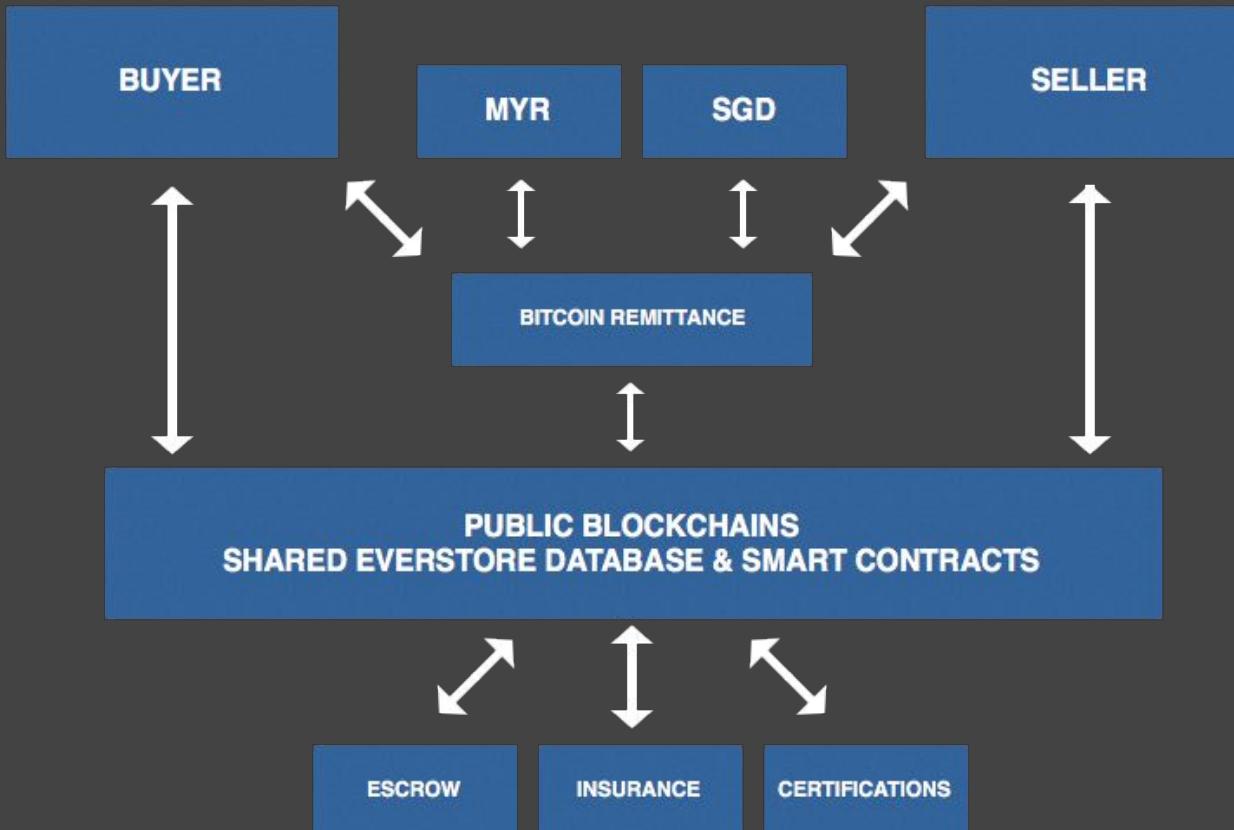
The international trade “ecosystem”



COMMON PROBLEMS WITH THE MAJORITY OF SUPPLY CHAINS

- Multiple entities maintaining multiple copies of the truth within easily compromised closed silos requiring painfully slow & expensive reconciliation
 - Time consuming requirements for setting-up third-party financial trustees and physical escrow accounting processes between each transaction
 - Lack of automation between checkpoints, processes and sensory inputs
 - Excessive use and reliance upon physical paper-trails and certification
-
- **ALL OF THESE PROBLEMS EXIST DUE TO A LACK OF TRUST**
(if only there was a way they could all use the same source of truth)

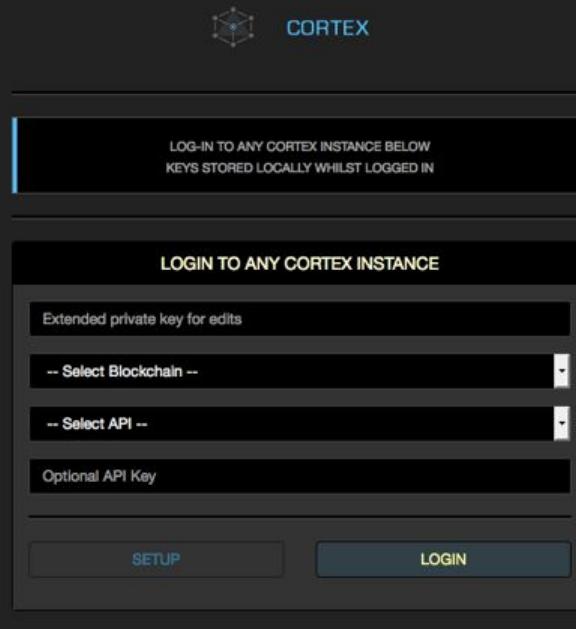
SIMPLIFYING SUPPLY CHAINS WITH BLOCKCHAINS



CORTEX

GUIDED TOUR

CORTEX IS OUR BLOCKCHAIN-BASED OPERATING SYSTEM



WORKS WITH ANY BLOCKCHAIN - SUPPORTS 10 OUT OF THE BOX

 CORTEX

[dashboard](#) add domain add user add database add api key help

credits : 11.00000000 flush logout

You are currently logged-in with your private key!
Please remember to logout when you are done editing in order to remove the private key from localStorage.

YOUR PROFILE [EDIT](#)

	Name	Mark Smalley
	Title	Co-Founder & CEO
	Company	Neuroware

RECENT ACTIVITY [MORE](#)

-  Updated DNKey on mark.neuroware.io
12 seconds ago by Mark Smalley
-  Added new user johnny.neuroware.io
1 minute ago by Mark Smalley
-  New Everstore db at team.neuroware.io
3 minutes ago by Mark Smalley
-  New wallet for mark.neuroware.io
1 hour ago by Mark Smalley
-  Added new user johnny.neuroware.io
2 days ago by Mark Smalley
-  New Everstore db at team.neuroware.io
3 weeks ago by Mark Smalley
-  New DNKey on keys.neuroware.io
3 month ago by Mark Smalley

CURRENT USAGE [REPORTS](#)

Domains	3 / 10
Sub-Domains	64 / 100
User Accounts	5 / 10
Databases	72 / 100
Active Modules	2 / 7
Active Protocols	3 / 8

DOMAINS

USERS

DATABASES

API

EXPLORER

WALLET

SETTINGS

MANAGE DOMAIN NAMES FOR KEY ABSTRACTION SERVICES

The screenshot shows the CORTEX web application interface. On the left is a vertical sidebar with icons and labels: DASHBOARD, DOMAINS (selected), USERS, DATABASES, API, EXPLORER, WALLET, and SETTINGS. The main area has a header with tabs: domains (selected), new domain, help, and buttons for credits (0.0000000), flush, and logout.

A central message box states: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage."

The main content area displays a table for a specific domain entry:

2354d0cd9a746db9e9ebd4c00b5f3bb3504c9c516474bc2eec091b55d8c5adb1		EDIT	DELETE	SCHEMA
Key	Value			
Index: Domain ID [md5]	e12e805608c5b56a2072e238e8b7523			
Domain [string]	neuroware.io			
2 of 2 : 2354d0cd9a746db9e9ebd4c00b5f3bb3504c9c516474bc2eec091b55d8c5adb1 (encoded 10 months ago)				
Path	Value			
[323335346, 430636439, 613734366, 462396539, 656264346, 330306235, 663362623, 335303463, 396335313, 634373462, 633265656, 330393162, 353564386, 335616462, 31, 2, 1]	MD5/e12e805608c5b56a2072e238e8b7523			
1 of 2 : bce354fb09a475c535938cb270739e30de30b68c9341d4b9990e903c6936c8 (encoded 10 months ago)				
Path	Value			
[323335346, 430636439, 613734366, 462396539, 656264346, 330306235, 663362623, 335303463, 396335313, 634373462, 633265656, 330393162, 353564386, 335616462, 31, 2, 2]	neuroware.io			

To the right, a modal window titled "EDIT RECORD" shows the current values for the domain and its MD5 hash, with a "COMMIT CHANGE" button at the bottom.

CREATE, AUDIT AND MANAGE DISTRIBUTED USERS

The screenshot displays the CORTEX web application interface for managing users. The left sidebar contains navigation links: DASHBOARD, DOMAINS, USERS (selected), DATABASES, API, EXPLORER, WALLET, and SETTINGS. The main header includes links for users, new user, import user, help, credits (0.0000000), flush, and logout.

A central message box states: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage."

The main content area shows a user profile for the ID 245a9ed7c9ed5f239b03df4a39a4a459bbe6c7d02f87b7b8e5b4c6c0b03d8426. The profile details are:

Key	Value
Index: User ID [md5]	e8612b6ec287b942b9421a464c13ac95
Email Address [email]	mark@smalley.my
Name [string]	Mark Smalley
Title [string]	Co-Founder & CEO
Company [string]	Neuroware
Company URL [url]	http://neuroware.io

An "EDIT" button is available for modifying the profile.

Below the profile, an "EDIT RECORD" section is shown with a "COMMIT CHANGE" button.

The bottom section displays audit logs for the user profile:

Path	Value
[323435613, 965643763, 396564358, 632333962, 303364663, 461333961, 346134353, 962626536, 633764303, 266383762, 376238653, 562346336, 633062303, 364383432, 36, 3, 1]	MD5/e8612b6ec287b942b9421a464c13ac95

Log entries are numbered 6 of 6, with a timestamp indicating they were encoded 10 months ago.

CREATE AND MANAGE DISTRIBUTED BLOCKCHAIN DATABASES

The screenshot displays the CORTEX blockchain database management interface. On the left is a sidebar with navigation links: DASHBOARD, DOMAINS, USERS, DATABASES (selected), API, EXPLORER, WALLET, and SETTINGS. The main header includes links for databases, new database, import database, public data directory, help, credits (11.0000000), flush, and logout.

The central area shows two database entries:

- af1850ac00bc1c42ef6bddc9c2fd...6097**
Key Value
Index: ID [ad5] 80c374f4d331e84b9618b8b68c4750ec
Name [string] Cortex v0.0.1
URL [url] http://localhost/neuroware/everstore/
- 2f9805d2f32853b9e47785225261d37f074d666fcc0f0c94c54cb9995fa4161f**
Key Value
Index: ID [ad5] abd05c4ec8b1854d52292cffcde34e75
Name [string] ATA-Plus v0.0.1
URL [url] http://localhost/neuroware/everstore/?skin=ata&logout=true

A red box highlights a message: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage."

To the right, there is an "ADD NEW RECORD" form with fields for ID, Name, and URL, and a COMMIT button.

CORTEX ALSO INCLUDES ITS OWN API AND DOCUMENTATION

The screenshot shows the Cortex web application interface. On the left is a vertical sidebar with icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET, and SETTINGS. The API section is currently selected. The main content area has a header with 'api docs' and 'console' tabs, 'credits : 11.00000000', a 'flush' button, and a 'logout' button. A message at the top says 'You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage.' Below this are tabs for 'CortexJS', 'Raw API Requests', 'Everstore API', and 'BlockAuth API'. There is a search bar with a 'SEARCH' button. Two API examples are shown:

api.blocks.latest(<chain>, <count>, <callback>)

This function calls upon `spinal.neuroware.io/<chain>/blocks/latest/<count>`

The `count` variable defines how many of the latest blocks to return.

The `callback` function is called upon completing the AJAX request.

```
api.blocks.latest('btc', 5, function(blocks)
{
  console.log(blocks);
});
```

api.blocks.get(<chain>, <ids>, <callback>)

This function calls upon `spinal.neuroware.io/<chain>/block/id/<ids>`

The `ids` variable defines which blocks to return and can be a string or an array.

The `callback` function is called upon completing the AJAX request.

```
var block_ids = ['block_heights', 'and_block_hashes'];
api.blocks.get('btc', block_ids, function(blocks)
{
  console.log(blocks);
});
```

AS WELL AS A IT'S OWN BUILT-IN BLOCK-EXPLORER

COREX

explorer help

credits : 11.00000000 flush logout

DASHBOARD DOMAINS USERS DATABASES API EXPLORER WALLET SETTINGS

You are currently logged-in with your private key!
Please remember to logout when you are done editing in order to remove the private key from localStorage.

blocks transactions addresses markets graphs Search SEARCH

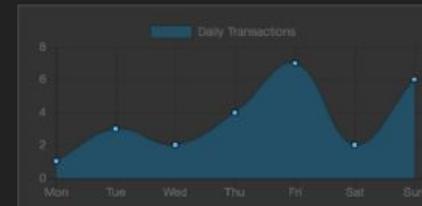
latest blocks SEE ALL BLOCKS Daily Transactions Last 7 Days

Height	Age	Transactions	Size (KB)
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714

latest transactions SEE ALL TRANSACTIONS currency calculator US Dollar

Hash	Inputs	Outputs	BTC Value
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518

BTC = US\$ JSON FEED market conditions



WITH GRAPH QUERIES FOR ADVANCED ANALYTICS AND TRACING

CORTEX

explorer help credits : 11.00000000 flush logout

DASHBOARD DOMAINS USERS DATABASES API EXPLORER WALLET SETTINGS

You are currently logged-in with your private key!
Please remember to logout when you are done editing in order to remove the private key from localStorage.

blocks transactions addresses markets graphs Search SEARCH

Daily Transactions Last 7 Days



Daily Transactions

Day	Daily Transactions
Mon	1
Tue	3
Wed	2
Thu	4
Fri	6
Sat	1
Sun	5

currency calculator US Dollar

BTC = US\$

market conditions JSON FEED

Statistic	Value

NOT TO MENTION INTEGRATED MULTI-CURRENCY WALLETS

The screenshot shows the CORTEX web application interface. On the left is a vertical sidebar with icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET (highlighted in teal), and SETTINGS. The main content area has a header with 'dashboard' and other navigation links like add domain, add user, add database, add api key, and help. It also shows 'credits : 10.00000000' and buttons for 'flush' and 'logout'. A message at the top says 'You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage.' Below this is a navigation bar with tabs for DASHBOARD, ACCOUNTS, CONTACTS, SEND, and HELP, along with a search bar. The central part of the interface is divided into two main sections: 'Recent Transactions' on the left and 'BTC > USD - Market Conditions' on the right. The 'Recent Transactions' section lists several entries:

Transaction Details	Date
1.066 Bitcoin (Testnet) to My First Wallet	21 DAYS AGO
0.01066 Bitcoin (Testnet) from My First Wallet	22 DAYS AGO
0.001 Bitcoin from My First Wallet	22 DAYS AGO
0.1066 Bitcoin (Testnet) to My First Wallet	22 DAYS AGO
0.01 Bitcoin to My First Wallet	22 DAYS AGO
14 Dogecoin to My First Wallet	22 DAYS AGO
2 Dogecoin from My First Wallet	22 DAYS AGO

The 'BTC > USD - Market Conditions' section displays the following data:

Condition	Value	Details
US\$ 677.06	218,458	BTC to USD Daily TXs
1.4 Billion	2,056,343.22	Daily US\$ Sent Daily BTC Sent
15.7 Million	10.7 Billion	BTC Discovered Market Cap US\$

ALSO ABLE TO CREATE AND MANAGE CUSTOM TOKENS

The screenshot displays the CORTEX wallet interface, specifically the 'TOKENS' section. On the left is a vertical sidebar with icons and labels: DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET (highlighted in blue), and SETTINGS.

The main header includes 'wallet', 'new wallet', 'import wallet', 'help', 'credits : 11.00000000', 'flush', and 'logout'.

The 'TOKENS' tab is selected in the top navigation bar, which also includes 'DASHBOARD', 'ACCOUNTS', 'CONTACTS', 'SEND', 'HELP', and 'TOKENS'.

A search bar at the top right contains the placeholder 'Search your wallet'.

The central area is titled 'Your Tokens & Contracts'. It displays a message: 'These are your Ethereum based token contracts and public account credentials.' Below this are buttons for 'CREATE TOKENS', 'WATCH TOKENS', and 'CREATE ACCOUNT'.

A sub-section below the message says: 'Track existing custom tokens, create and manage token accounts - and even generate new custom token eco-systems from scratch.'

A table lists tokens:

Token Name	Contract Address	Decimals	Symbol	Total Supply	Actions
Neuroware Sdn Bhd	0x4AE75feE889d57d3229817565032bf428CB9b673	2	%	100.00 %	

Below the table are pagination controls: '10 records per page', 'Showing 1 to 1 of 1 entries', 'Previous', '1', and 'Next'.

At the bottom of the screen, another table shows wallet details:

Account Name	Address	Tokens	TXs	Balances	Actions
My First Wallet	7c7eb521767083e5f73059fdbd06e77b87318bec	Ethereum Neuroware Sdn Bhd	1 0	1.066 ETH 0.01 %	

Below this table are similar pagination controls: '10 records per page', 'Showing 1 to 1 of 1 entries', 'Previous', '1', and 'Next'.

WITH OPTIONAL MULTI-SIGNATURE ESCROW CONTRACTS



CORTEX

wallet new wallet import wallet help credits : 11.0000000 flush logout

DASHBOARD DOMAINS USERS DATABASES API EXPLORER WALLET SETTINGS

You are currently logged-in with your private key!
Please remember to logout when you are done editing in order to remove the private key from localStorage.

DASHBOARD ACCOUNTS CONTACTS SEND HELP TOKENS Search your wallet

Your Accounts

These are all the different accounts you have in different blockchains. More advanced filtering coming soon!

You are currently communicating with the blockchains via BlockCypher and have 1 account and 1 contact stored on this device

EXCHANGE COINS ADD NEW ACCOUNT

Account	Blockchains	Current Addresses	Balances	Actions
My First Wallet	+ ADD CHAIN		Total: US\$ 5.16	  REMOVE ALL
+ ADD CONTRACT	Bitcoin (Testnet)	n2C6A7MCduFwK6GsSHfS74Yf5dOvu78YI	0.00000000	    
+ ADD CONTRACT	Bitcoin	1JCGyGLHsRrNy6lUMTx9NLMNhVc9jD5xv	0.00890000	    
+ ADD CONTRACT	Dogecoin	DDkUM427ZNPXsKkSG3pw1HDk32bybXshJT	9.98785433	    
	Dogecoin (2 of 3)	A3VIEyhRcXdPJRkp1BAR2d4pLRdaLJG3Ma	5.00000000	

10 records per page Showing 1 to 1 of 1 entries Previous 1 Next

CAN BE EASILY EXTENDED WITH THEMES AND PLUGINS

The screenshot displays the Cortex web application interface, which is highly extensible and customizable. The left sidebar features a dark theme with various icons and labels:

- COREX** (top item)
- DASHBOARD
- DOMAINS
- USERS
- DATABASES
- API
- EXPLORER
- WALLET
- SETTINGS** (highlighted)

Below the sidebar, the main content area includes a header with navigation links: **settings**, export, import, reset, help, credits (0.0000000), flush, and logout.

The central part of the interface shows a message: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage." Below this, the breadcrumb navigation shows: Dogecoin (Testnet) Blockchain / Cortex V0.0.1 / Schema / Explore.

The main content area contains several sections:

- sort by**: Order dropdown and search schema input.
- Datastore: Databases [data]**: A table listing fields:

Field: ID (datastore index)	EDIT	DELETE
Key	ID	
Type	md5	
Properties	public	
- Datastore: Name [data]**: A table listing fields:

Field: Name	EDIT	DELETE
Key	Name	
Type	string	
Properties	public	
- ADD NEW DATASTORE**: Form fields:
 - name of datastore
 - select naming type
 - DEFINE DATASTORE INDEX
 - Index Label
 - select index type
 - select index properties
 - OPTIONAL DATASTORE FIELDS
 - Label for Field 2
 - select field type
 - select field properties

MASTERCLASS Q2 SUMMARY

FROM PAST TO PRESENT

- Bitcoin provides the most secure data storage
- Bitcoin has outperformed every global currency
- Over US\$1.5 billion a day in crypto-transactions
- GNOSIS ICO raised US\$12.5M in 10 minutes
- **Blockchain agnosticism is critical**



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THANK YOU FOR YOUR TIME

please email us for more information - founders@neuroware.io