Blockchain

Etage 15, Lindenpartners November 24, 2016

BIGCHAINDB

A scalable blockchain database for people who are changing the world

Agenda



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Digital wants to be an Asset Class

Land Property \$50 Trillion

Intellectual Property \$25 Trillion

assets are All creation is digital now.

The Internet is Like a Bazaar

- Consumers want content but if it's not on iTunes or Amazon, they go to Google
- Search for content
- Find it
- Right click
 - Сору

CC BY-SA 3.0 File:Grand-Bazaar Shop.jpg Uploaded by Dmgultekin Created: 22



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Is Bitcoin Planetary Scale at 2 Transactions per Second?

and the states and the

Netflix Uses 37% Of The Internet Bandwidth

Using a modern distributed "big data" database



Two Ways to Scale Up

Big Data-fy Blockchains

<u>or</u>

- Build on person-decades
 of work
- Significant scalability hurdles

Blockchain-ify Big Data

2

- Build on person-centuries of work
- Scalability challenges already resolved

... but how to blockchainify?

What is a Blockchain?

blockchain

block·chain·\'bläk-chān\

Noun

```
 (1991) hashed-chain of blocks
 (2008) storage that is decentralized, immutable and holds digital assets
```

Adjective

1.

(2015) a system with the characteristics of decentralized control, immutable and holds digital / digitized assets

How to Blockchainify Big Data

Decentralized	No single entity in controlEach DB node is a federation node	
Immutable	Strong tamper-resistanceHash on previous blocksAppend only	
Asset Autonomy	Asset issuance by trusted partiesControl via private/public keys	



Federated Consensus Architecture



BigchainDB Data Sheet

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Throughput

>1,000,000 writes/s

~100,000 transactions/s

Latency <100 ms



Capacity Petabytes with each node adding 48TB

Scalability Performance increases as nodes are added Query Database is fully queryable $\langle \cdot \rangle$

Decentralization Federated non-anonymous participation

Best of Two Worlds

	Bitcoin	Big Data Databases	BigchainDB
Data Immutability	ø		0
Decentralized Control	ø		0
Asset Autonomy	ø		0
High Throughput		0	0
Low Latency		0	0
High Capacity		0	0
Access Permissioning		0	0
Query & Search		0	0

Features

Data Immutability

Suppression of internode communication and DB admin activities guarantees that data can't be modified

BigchainDB



Pipelining of events into a backlog table allows block creation every second with transaction validation in parallel. Throughput of 100k+ transactions per seconds

Business Logic Automation

Circuit inspired crypto-conditions allow business logic automation and escrow. If/Then simple contracts can be triggered with multisig, time and hash locks

Security & Privacy

Key distribution infrastructure allows network participants to identify new members and members to have full control to selectively grant data access

Robust Architecture

Inherits the performance and scalability of the underlying database substrate. Customers can choose their preferred database substrate to minimize integration and interoperability barriers

Engagements









Capital Markets	Supply Chain	Payments	Energy
Determine exposure and positions	Prevent fraud	Reduce risk and cost of escrow	Enable P2P energy trading
Streamline back office processes	Detect leakage	Reduce time to transmit funds	Power IoT and M2M
Faster post trade settlement	See bottlenecks and delays	Provide audit trail and receipts	Balance energy grids
Ś	🗘 everledger	Literhedger	

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Modern Cloud Stack



Modern Cloud Stack – with Bitcoin



Decentralized Cloud Stack



A Decentralized Stack is the Future



Do you need Smart Contracts?













Planetary Scale



Planetary Scale

Server-based Decentralized No one entity controls. Anyone can write. Anyone can read. Anyone voted in by federation can be validator Centralized Single entity controls

Fully Decentralized No one entity controls. Anyone can write. Anyone can read. Anyone* can be validator. (*need CPU power)

Consistent

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Blockchain technology is a general purpose technology



Electricity is an example of a general purpose technology, like the steam engine before it. General purpose technologies drive most economic growth, because they unleash cascades of complementary innovations, like lightbulbs and, yes, factory redesign.

— Erik Brynjolfsson —

AZQUOTES

Blockchain technology allows the digitization of Value

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BLOCKCHAIN

Next wave of digitization

Weave into the fabric of our society

Larger than the internet

The Internet Drove the Digitization of Information

- Knowledge freely shareable for the world
- Spawned billion dollar companies
 - Amazon
 - Google
 - Facebook
- Gave voice to the powerless
- Connected the powerful

The Internet of Everything needs a Ledger of Everything. The blockchain is a truly open, distributed, global platform that fundamentally changes what we can do online, how we do it, and who can participate. Call it the world wide ledger.

- Don & Alex Tapscott

Blockchain Technology will Impact <u>\$100 Trillion</u> in Value

Blockchain allows the digitization of Value

3 (5) 3)

- Rights, licenses, securities, tokens, energy, information assets

Property rights break the chains of poverty

"A property right initiates the rule of law ... makes people interested in the rule of law. The first thing that they understand ... is that everybody on this earth lives on a plot of land."

- Hernando De Soto

and http://slideplayer.com/slide/585994

The Beatles music collection is worth \$2 Billion

f attribution for digital works can be persistent across the world, creators an get compensated and buyers can have clear and transparent channels to buy usage rights – a Google for intellectual property.

Image Credits: Getty Images/Central Press

nternet of Things Needs Decentralized Scale and Security

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Blockchain technology is being deployed at 4x pace of the Internet

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Let's run a workshop or training session for you!



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Resources Website Whitepaper Documentation World Economic Forum

Emerging Decentralized Stack



Blockchain Assumptions Debunked

	Assumption	But You Really Need
Business Logic	Smart Contracts	Simple Contracts
Decentralization	Peer-to-Peer Open Network	Server-Based
Security	Byzantine Fault Tolerance	Fault Tolerance ++
Throughput (Transactions per Second)	1,000	100,000+
Operations	None	Backups, Monitoring Tools
Identity	Public	Private





- Open Source Release Q1/17
- Active community building and collaboration with system integrators, cloud, platforms and blockchain startups
- Release Interplanetary Database, an open platform to let developers build blockchain apps in 5 minutes
- Enterprise Release Q3/17 built on a MongoDB substrate to leverage backups, monitoring and scaling
- Custom integration & POCs
- Support tiers
- Training & consulting

- Hardening of the system
- Full suite of drivers, APIs and webhooks
- Hosted services

