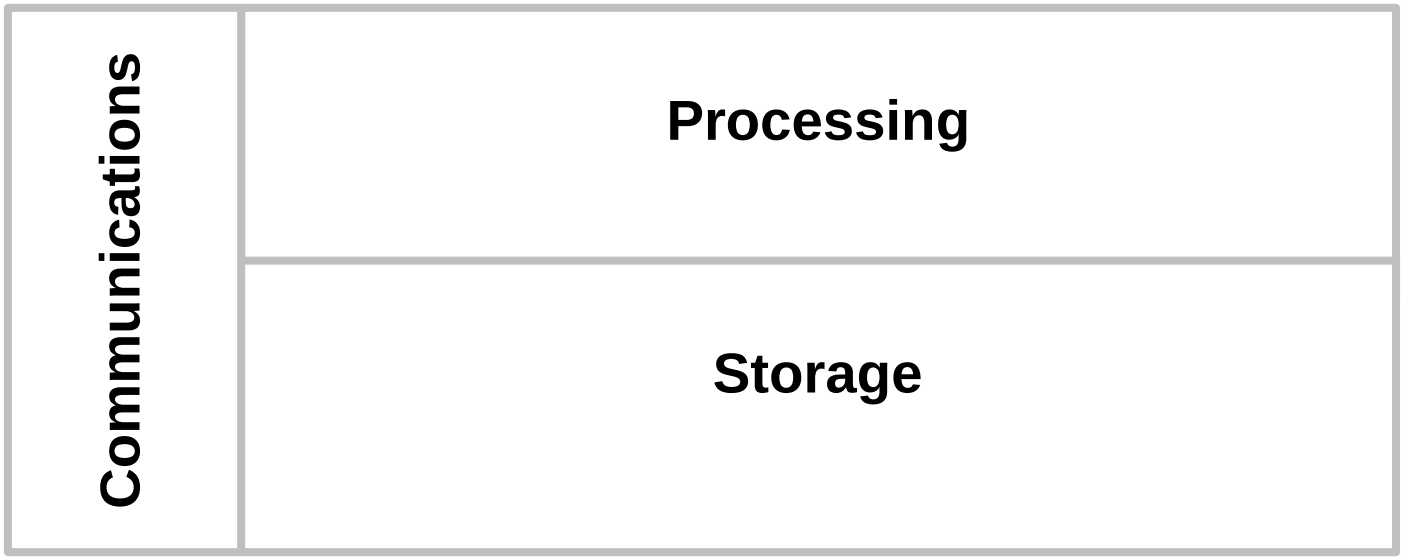
BigchainDB:
A Scalable Blockchain Database

Trent McConaghy

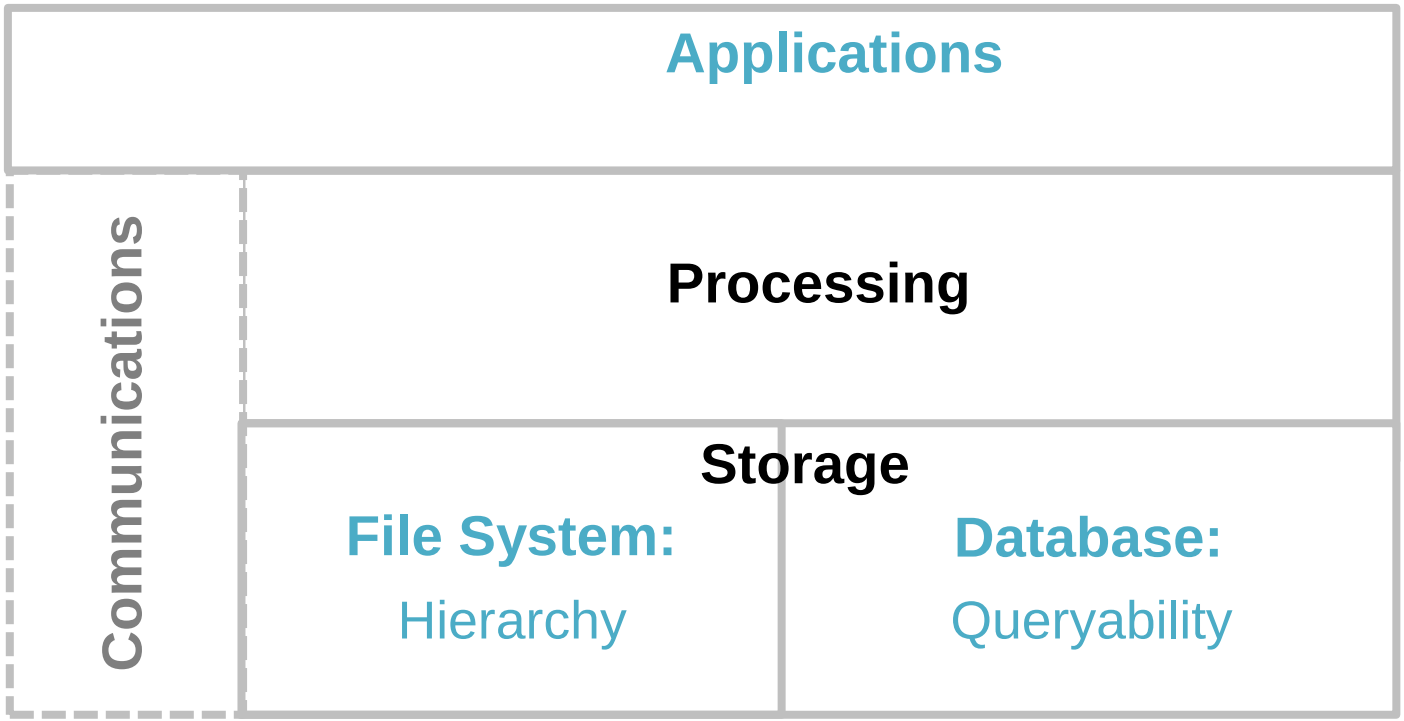
BIGCHAINDB

ascribe®

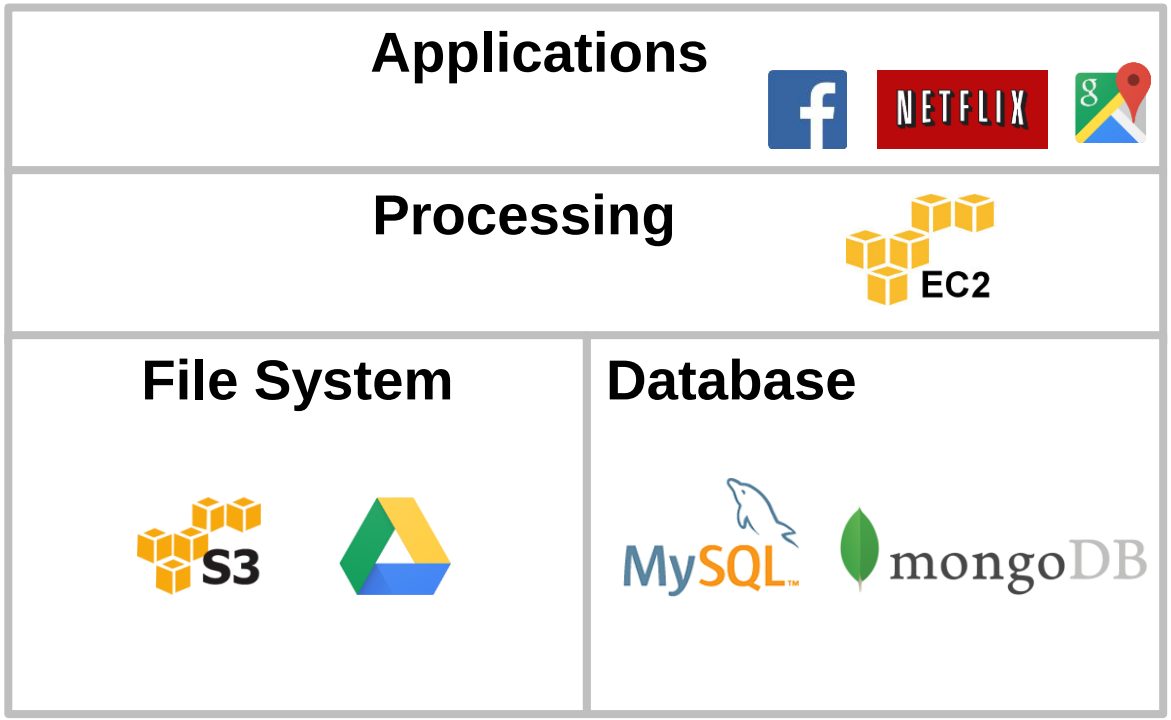
The Elements of Computing



Modern Application Stacks



The modern cloud application stack

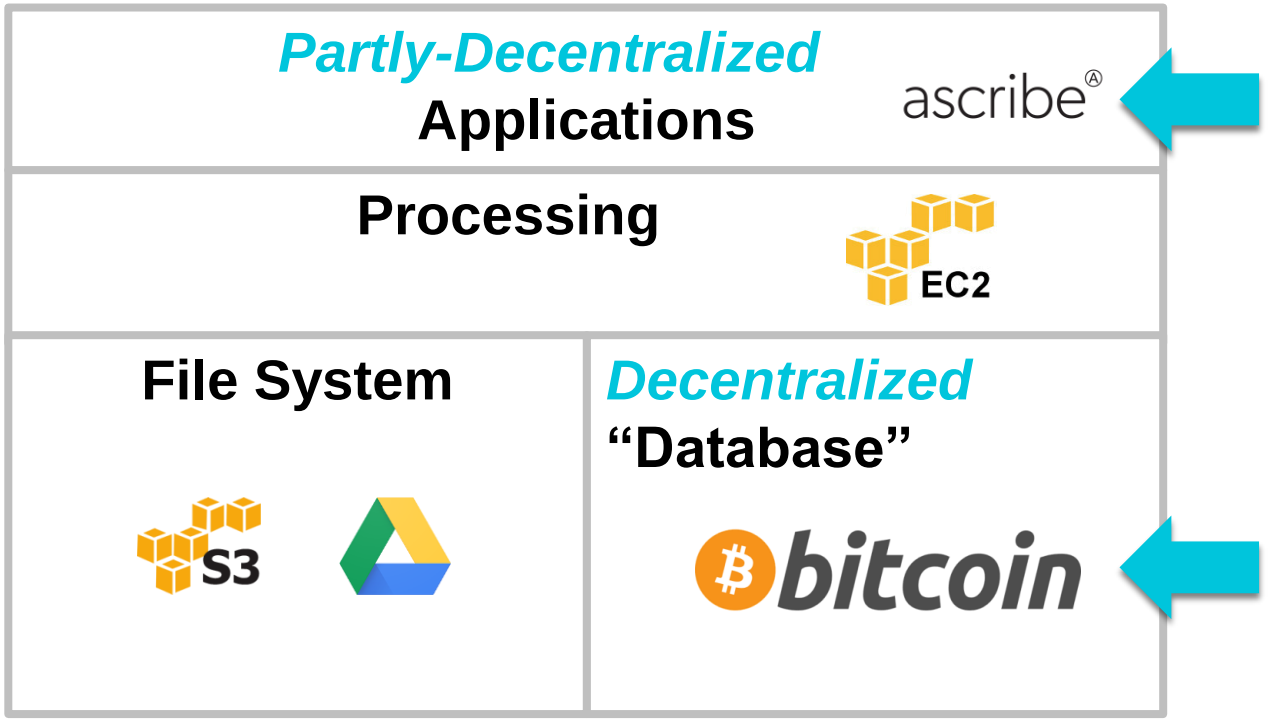


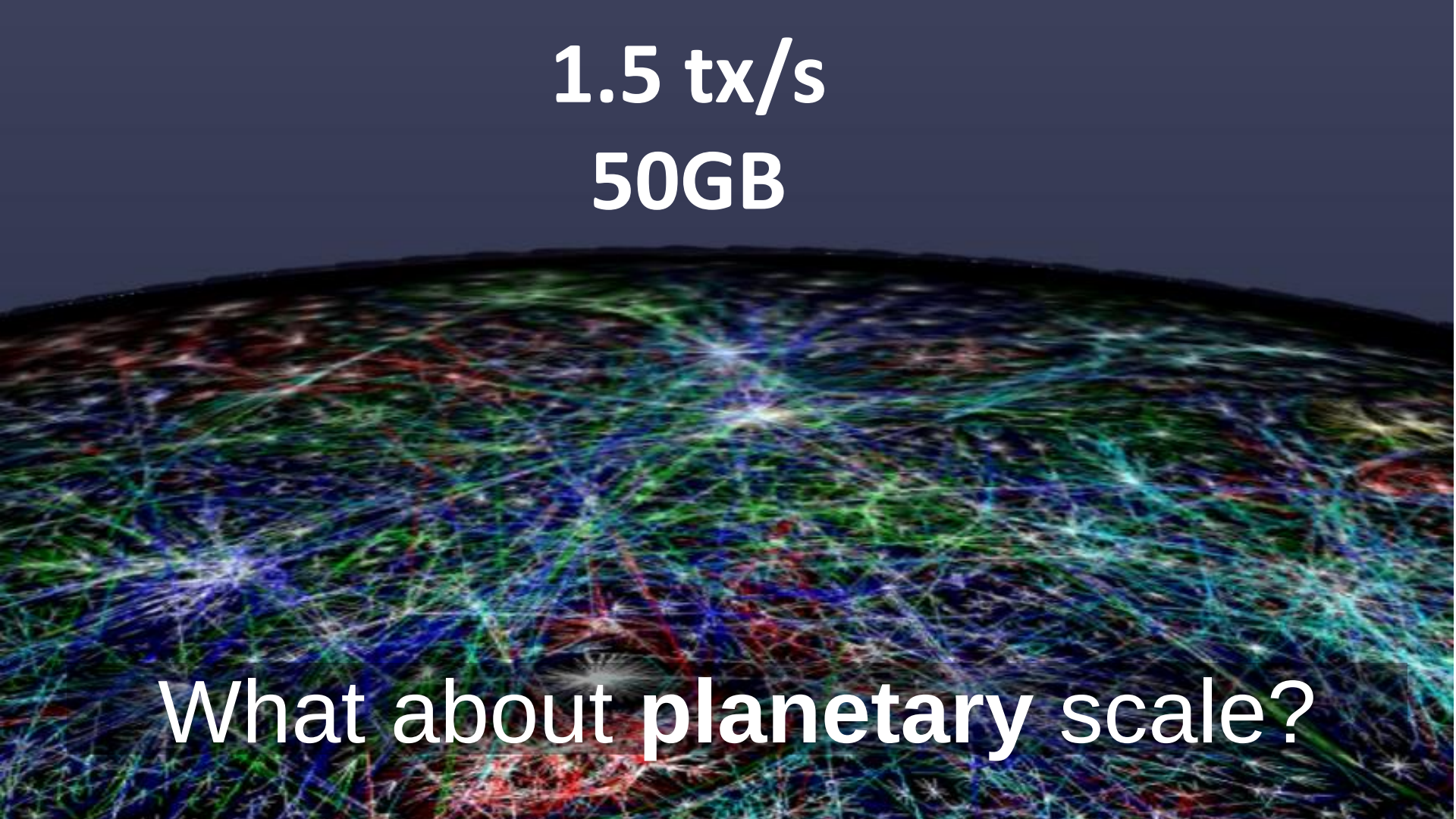
Along came Bitcoin…

“Magic Internet Money”

Bitcoin sparked a revolution

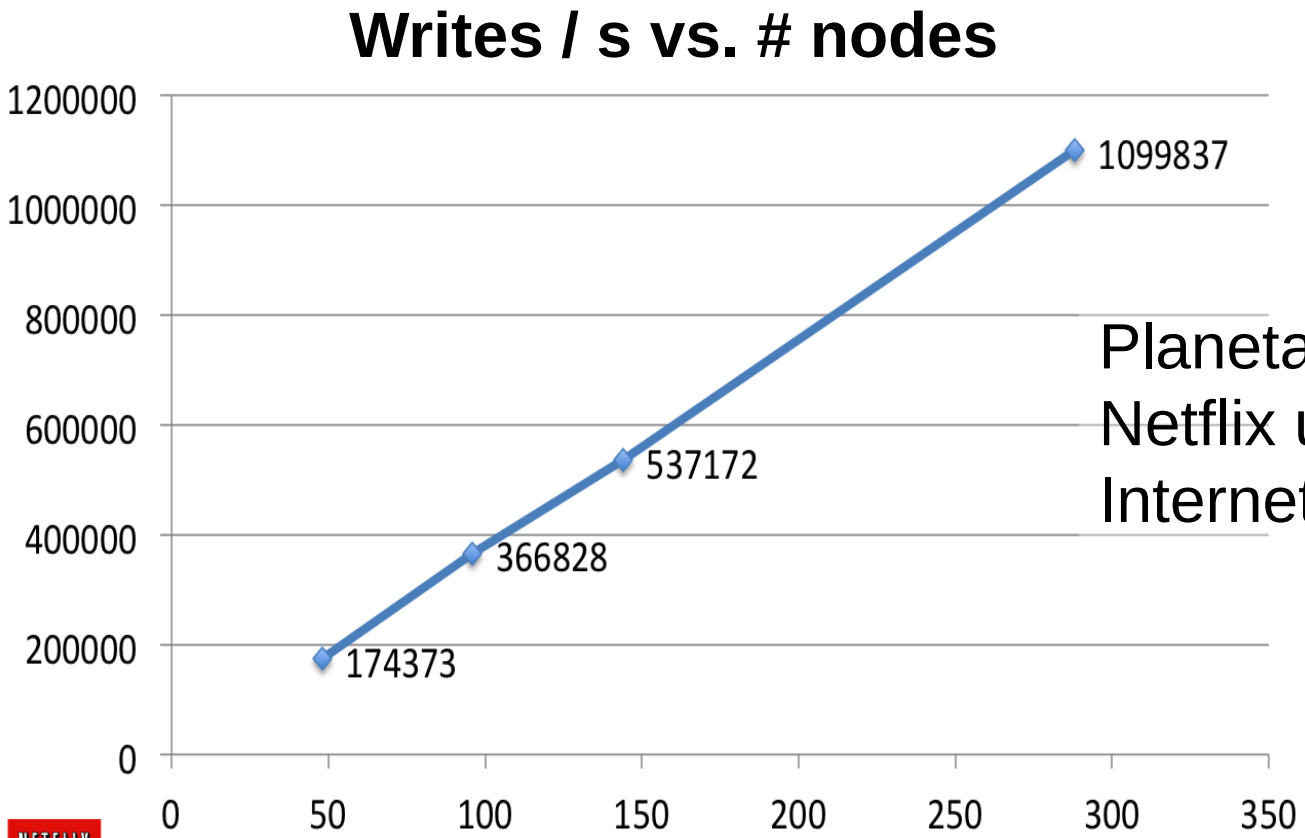
Truly own digital assets, supply chain visibility, ….




1.5 tx/s
50GB
What about **planetary** scale?

Planetary scale:
Netflix uses 37% of
Internet bandwidth

“Big data” Distributed DBs

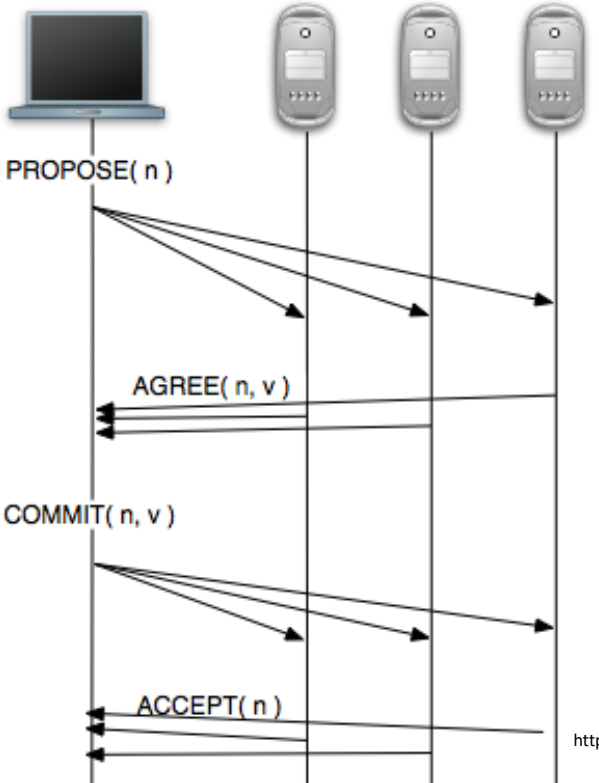


Planetary scale:
Netflix uses 37% of
Internet bandwidth

NETFLIX

http://1.bp.blogspot.com/-ZFtW7MFMqZQ/TrG5ujuDGdI/AAAAAAAAAWw/heceeMD50x4/s1600/scale.png

To be Distributed,
Big Data DBs Must Solve Consensus



Byzantine Consensus (1982)

Paxos (1990/1998)

https://medium.com/the-bigchaindb-blog/the-writings-of-leslie-lamport-abridged-a67df77f464#.1lr34qt6s
http://the-paper-trail.org/blog/consensus-protocols-paxos/

Two ways to scale up

Big data-fy the blockchain

- Builds on man-decades of work
- Big scalability challenges

<or>

Blockchain-ify big data

- Builds on man-centuries (millennia?) of work
- Scalability challenges solved
- But, what does “blockchain-ify” mean?

“Blockchain-ify”

Decentralization: no single entity owns or controls

Immutability: tamper-resistant

Assets: Can issue & transfer assets

Blockchain (noun): hashed-together chain of blocks (1991!)

Blockchain (noun): storage that is decentralized + immutable + assets

Blockchain (*adj):* decentralized + immutable + assets

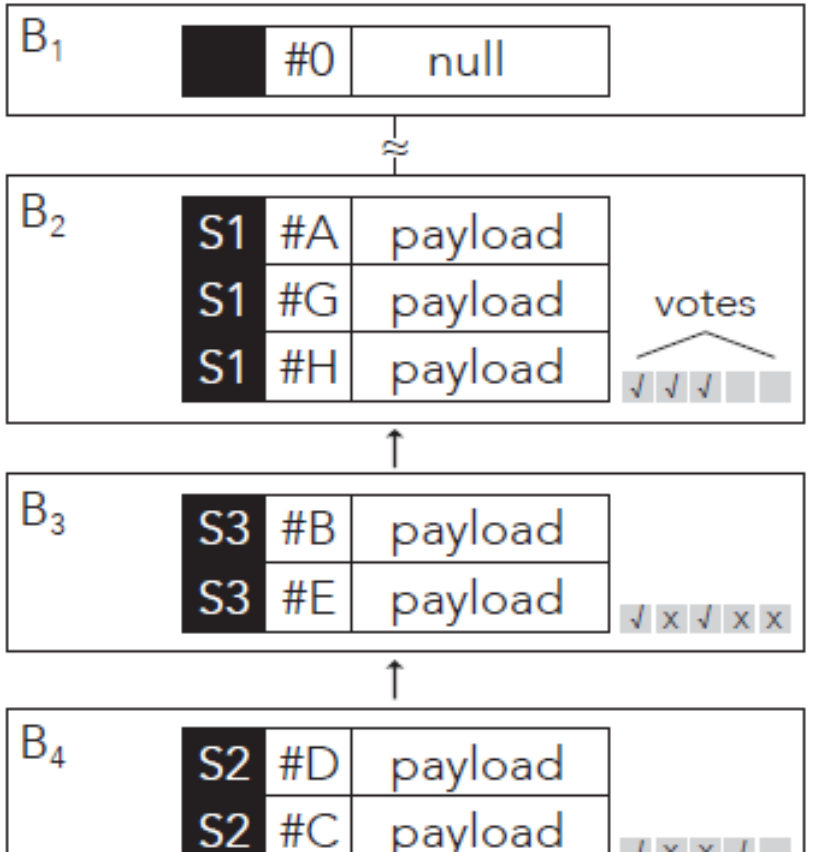
How to Blockchain-ify Big Data

Retain Big Data DB's Performance

- Let the Paxos derivative *solve order*. Get out of its way!
- It naturally builds a log of *all* txs

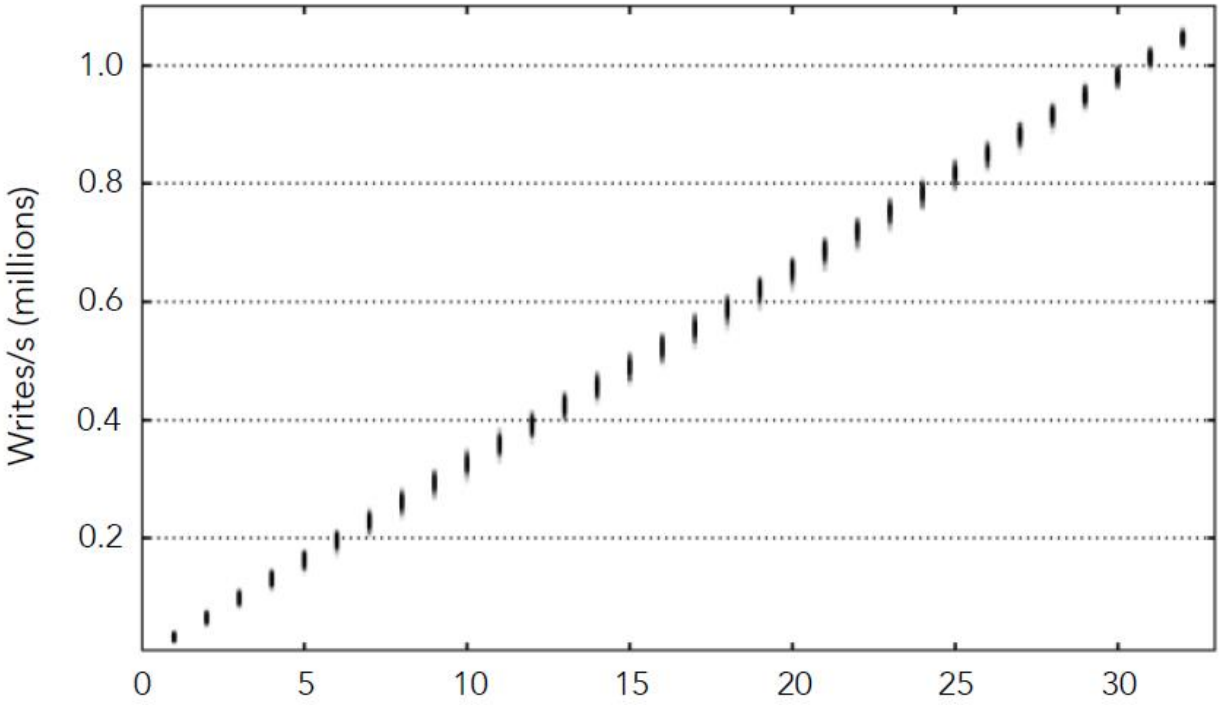
Add in blockchain characteristics

- **Decentralization:** federation voting on txs. Group into blocks for speed.
- **Immutability:** hash on prev. blocks
- **Assets:** Digital signatures etc.



Benchmarks

Writes / s vs. # nodes



www.bigchaindb.com/whitepaper

This is BIGCHAINDB

Throughput
>1,000,000 writes/s

Latency
<100 ms

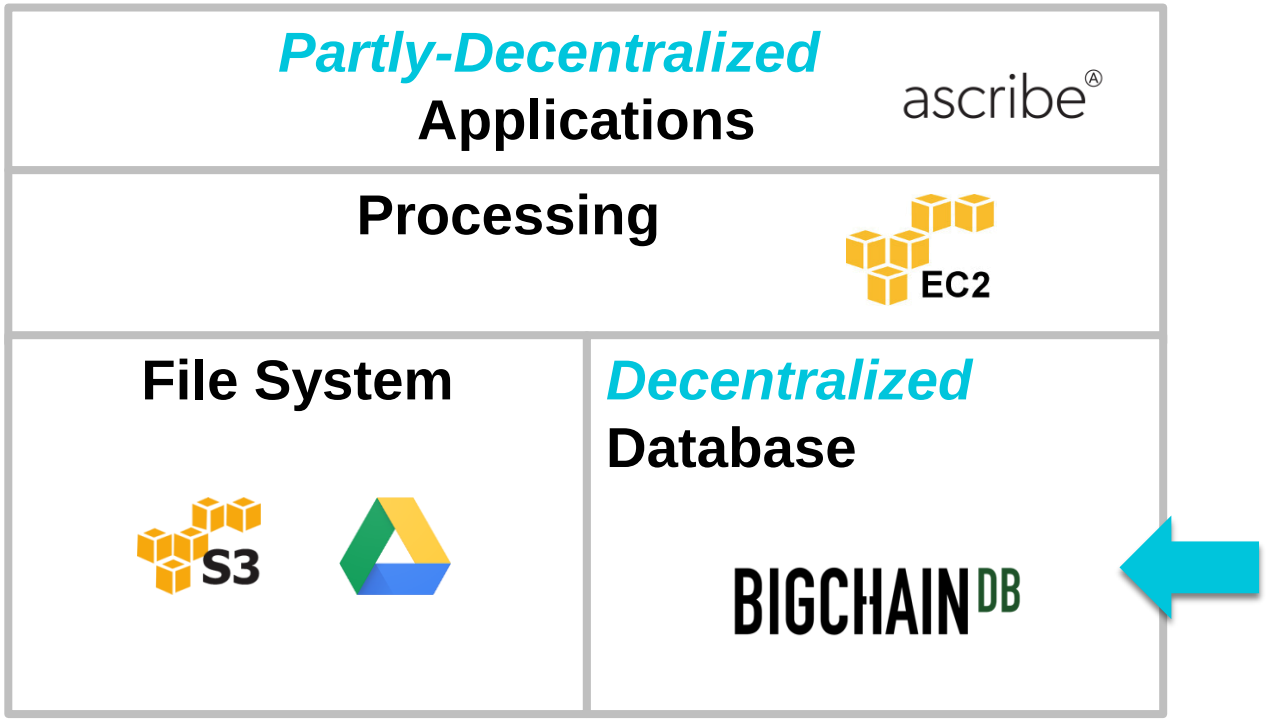
Capacity
Petabytes with each node adding 48TB

Scalability
Performance <u>increases</u> as nodes are added

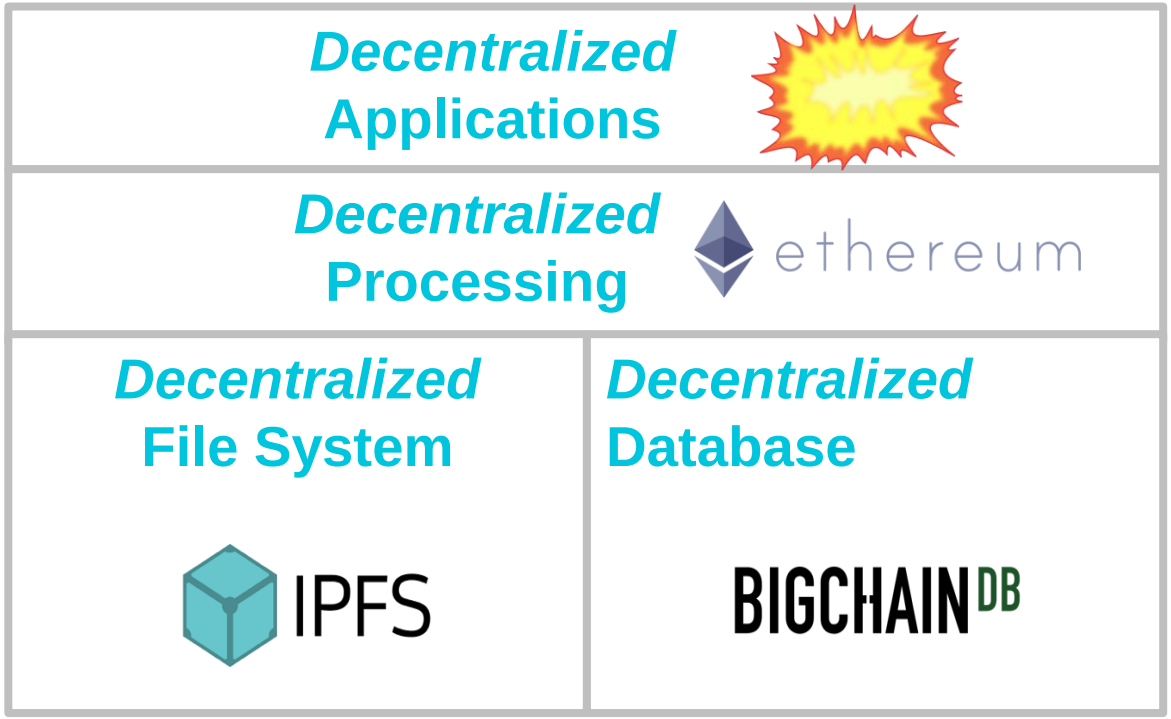
Query
Database is fully queryable

	Traditional blockchains	Big Data	BIGCHAINDB
Immutability	☑		☑
Decentralized control	☑		☑
Assets	☑		☑
High Throughput		☑	☑
Low Latency		☑	☑
High Capacity		☑	☑
Rich Permissioning		☑	☑
Query Capabilities		☑	☑

A Decentralized DB for the Planetary-Scale Cloud



Bonus: A DB for the Emerging Planetary-Scale *Decentralized* Cloud



BigchainDB:
A Scalable Blockchain Database
For the Planet
(& Wrigley)

github.com/bigchaindb
bigchaindb.com/whitepaper

NETWORK ILLUSTRATION
BY OPTE PROJECT