



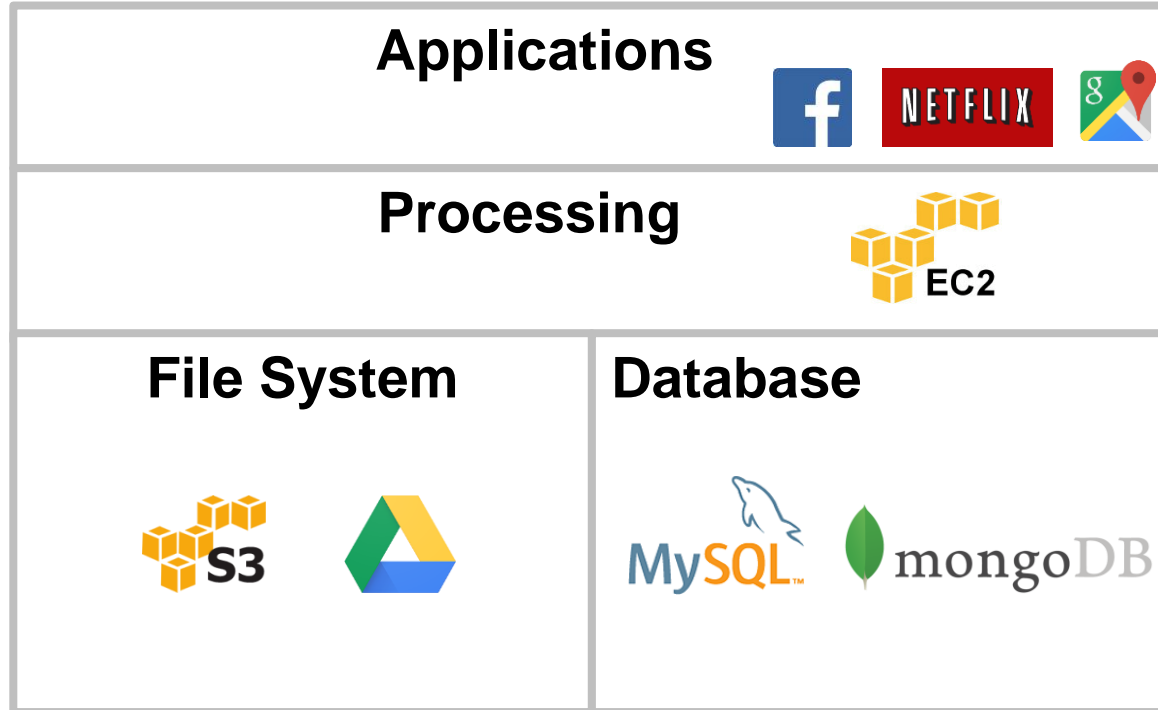
BigchainDB: A Scalable Blockchain Database

Trent McConaghy

BIGCHAIN^{DB}

ascribe[®]

This is how the cloud has been



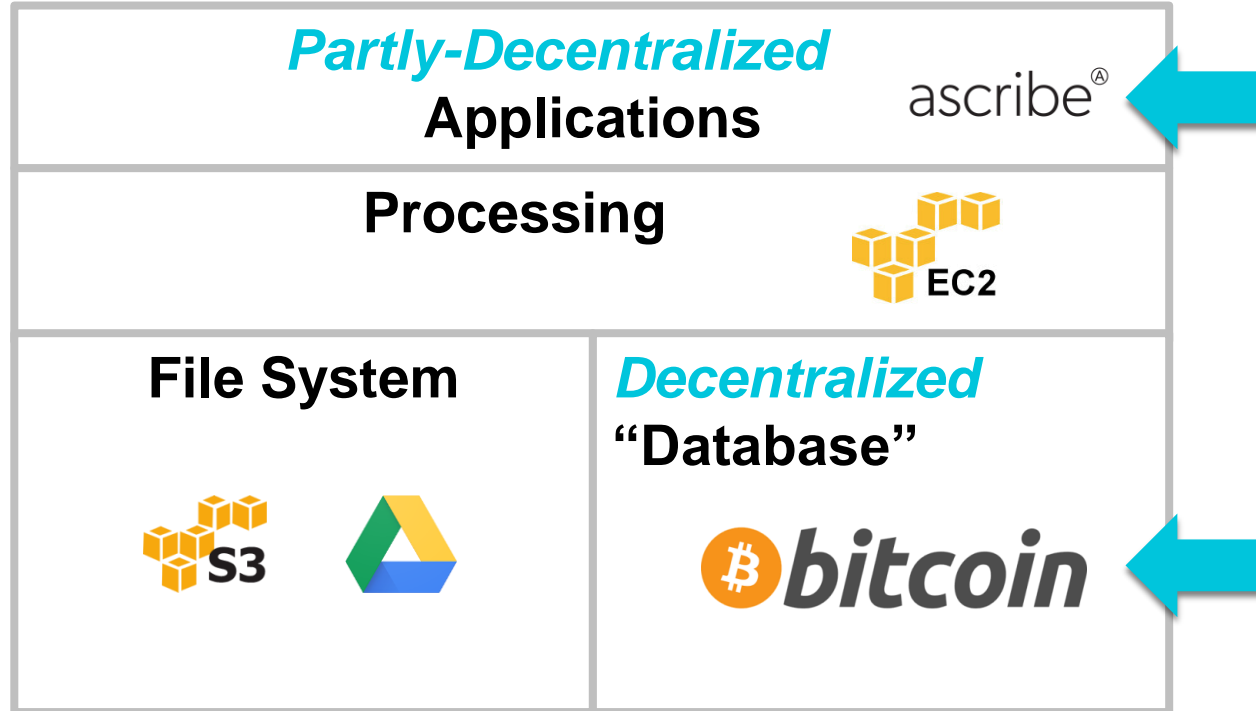
Along came Bitcoin...

“Magic Internet Money”



Bitcoin sparked a revolution

Truly own digital assets, supply chain visibility,



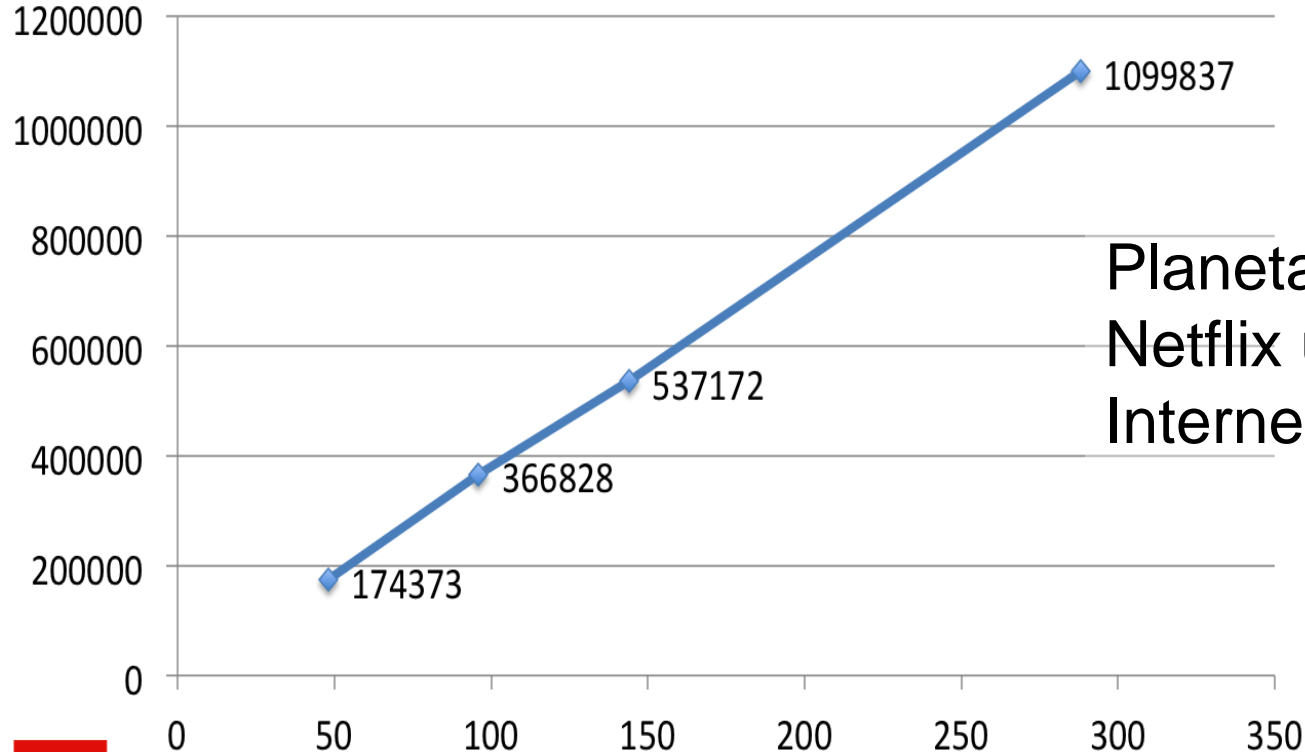
But.. we've mostly seen sandboxes.
What about **planetary** scale?



Planetary scale:
Netflix uses 37% of
Internet bandwidth

“Big data” Distributed DBs

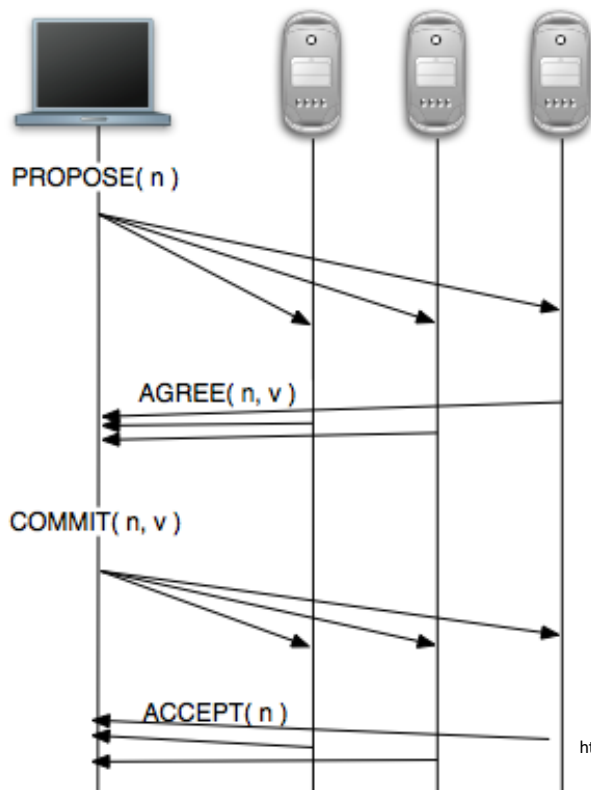
Writes / s vs. # nodes



Planetary scale:
Netflix uses 37% of
Internet bandwidth



To be Distributed, Big Data DBs Must Solve Consensus



Byzantine Consensus
(1982)

Paxos (1990/1998)

Two ways to scale up

Big data-fy the blockchain

- Builds on man-decades of work
- Significant scalability hurdles?

<or>

Blockchain-ify big data

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

“Blockchain-ify”

Decentralization: no single entity owns or controls

Immutability: tamper-proof, “write forever”

Assets: Can issue & transfer assets

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

Blockchain (noun) – a storage mechanism with special benefits of decentralization, immutability, assets

Blockchain (adj) - *a set of properties that may be assigned to a general or specific storage mechanism (e.g. database), where the properties are: decentralized, immutable, assets*

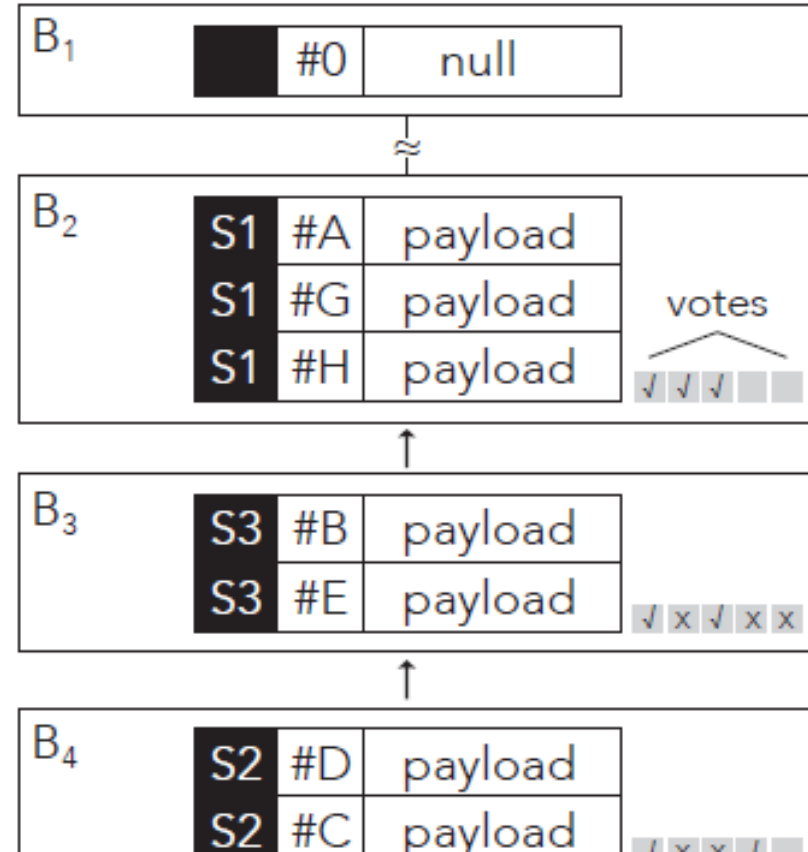
How to Blockchain-ify Big Data

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*

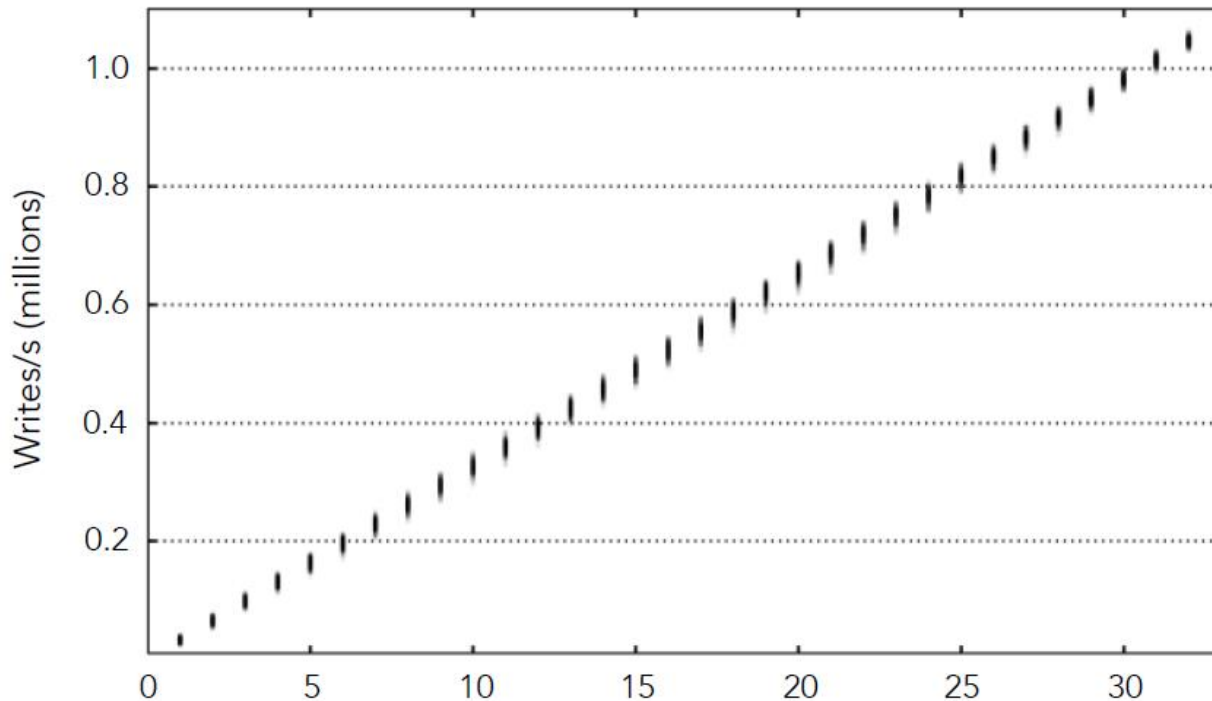
Add in blockchain characteristics

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



Benchmarks

Writes / s vs. # nodes



This is BIGCHAIN^{DB}



Throughput
>1,000,000
writes/s



Latency
<100 ms



Capacity
Petabytes with
each node adding
48TB



Scalability
Performance
increases as nodes
are added



Query
Database is fully
queryable

Traditional
blockchains



Big Data

BIGCHAINDB

Immutability



Decentralized control



Assets



High Throughput



Low Latency



High Capacity



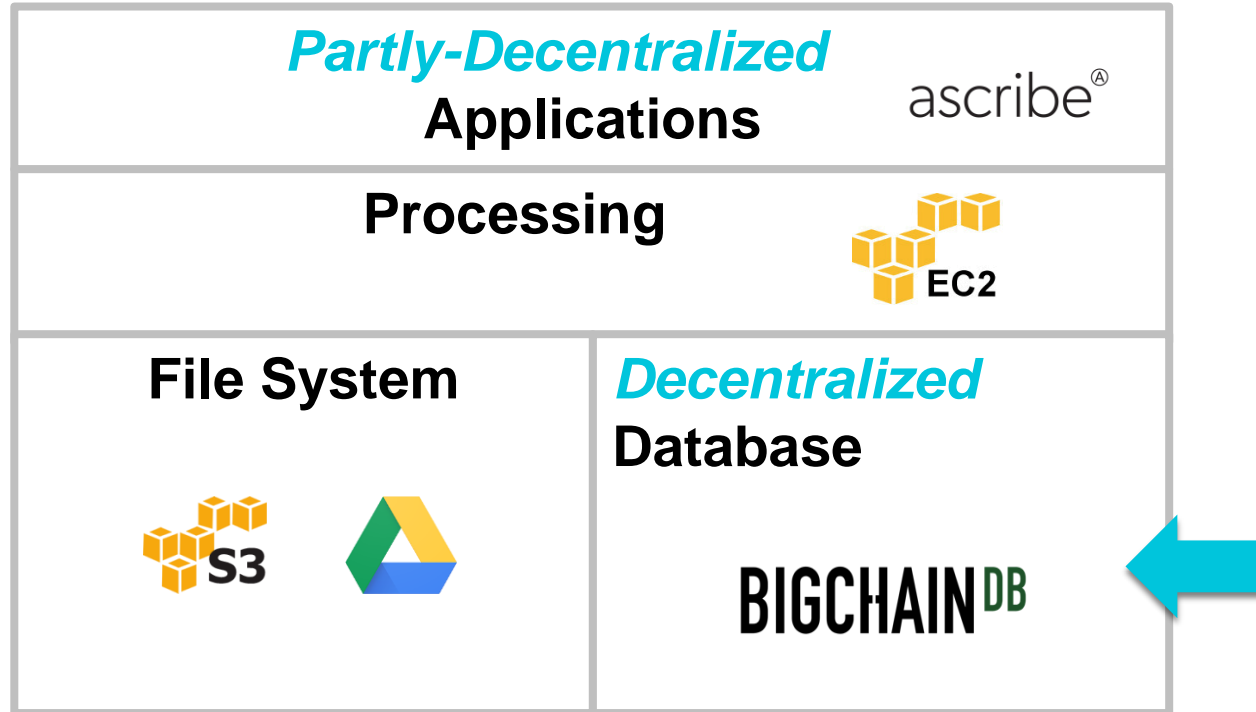
Rich Permissioning



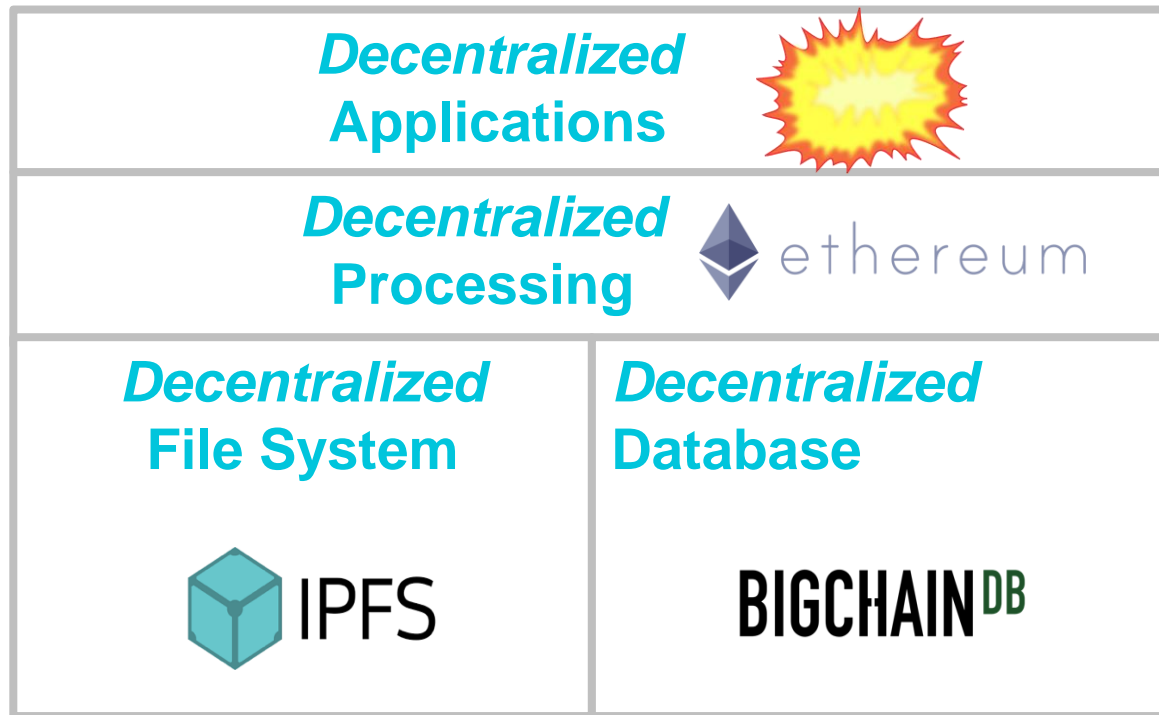
Query Capabilities



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 & The Enterprise.
(& Wrigley)



github.com/bigchaindb
bigchaindb.com/whitepaper