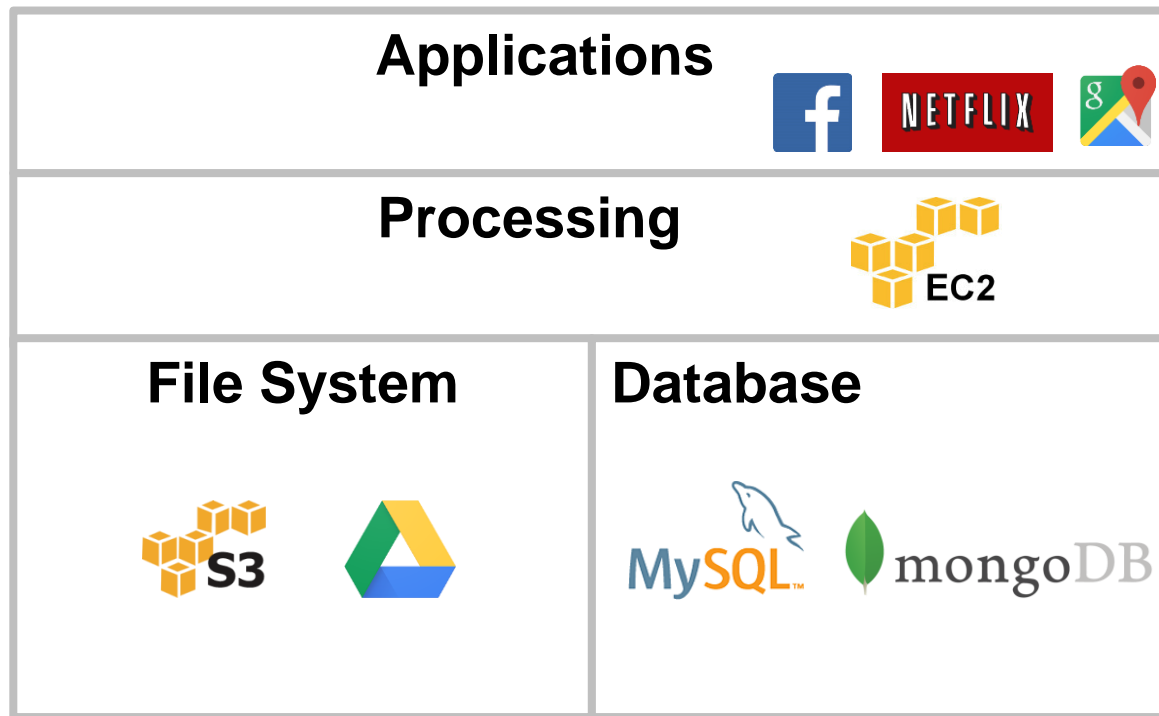


# BigchainDB: A Scalable Blockchain Database

Trent McConaghy

**BIGCHAIN<sup>DB</sup>**

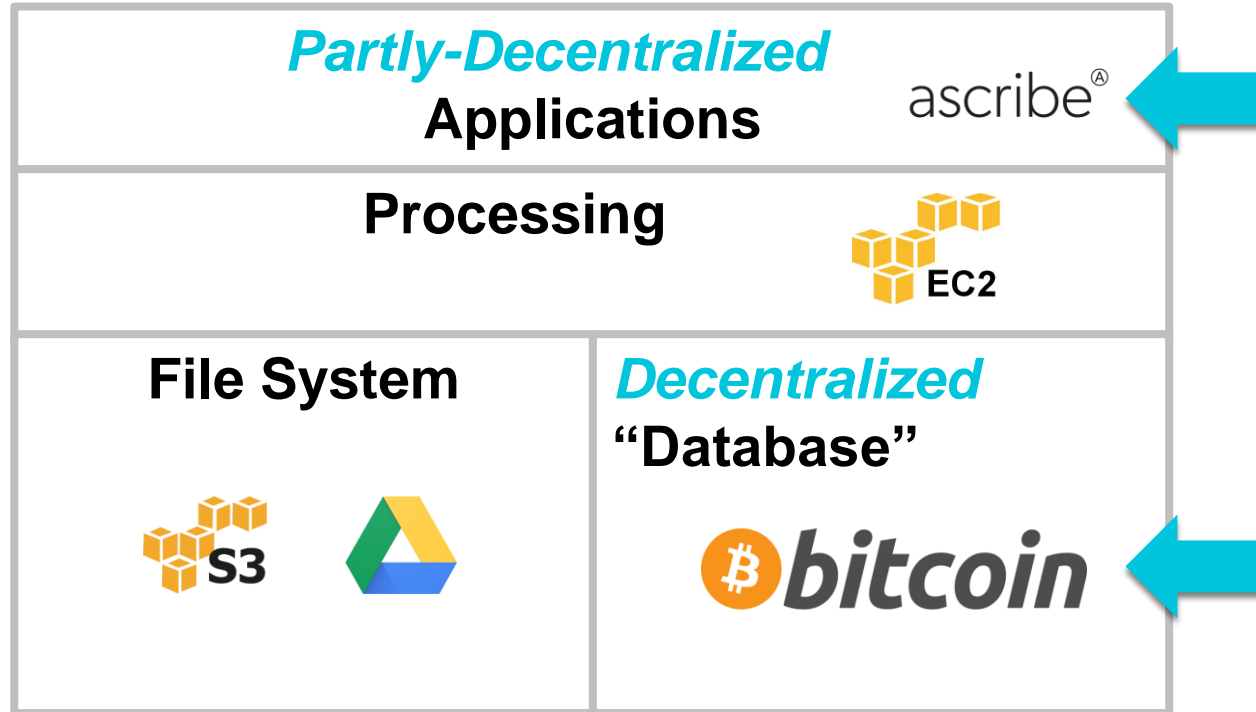
# The modern cloud application stack



# Along came Bitcoin...



# The modern cloud application stack – with Bitcoin



# Blockchain: A Special “Spreadsheet in the Sky”

What's special:

- no one owns it
  - anyone can add to it
  - no one can delete from it
- 
- Writing to a blockchain is like etching in stone.
  - Which allows us to issue assets, and transfer them
  - Which can include art!



1.5 tx/s  
50GB

What about **planetary** scale?

Netflix uses 37% of Internet bandwidth

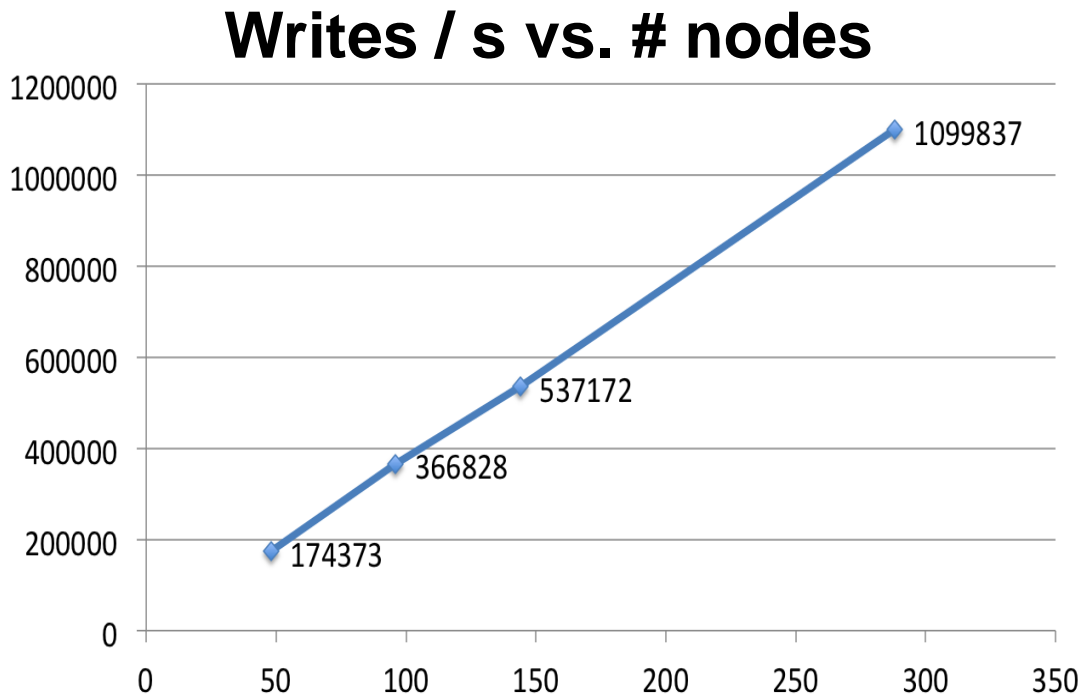
Netflix uses 37% of Internet bandwidth

Using a modern distributed “big data” database



# Netflix uses 37% of Internet bandwidth

## Using a modern distributed “big data” database



# Two ways to scale up

## **Big data-fy blockchains**

- 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
- How to blockchain-ify? ...

# “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!)

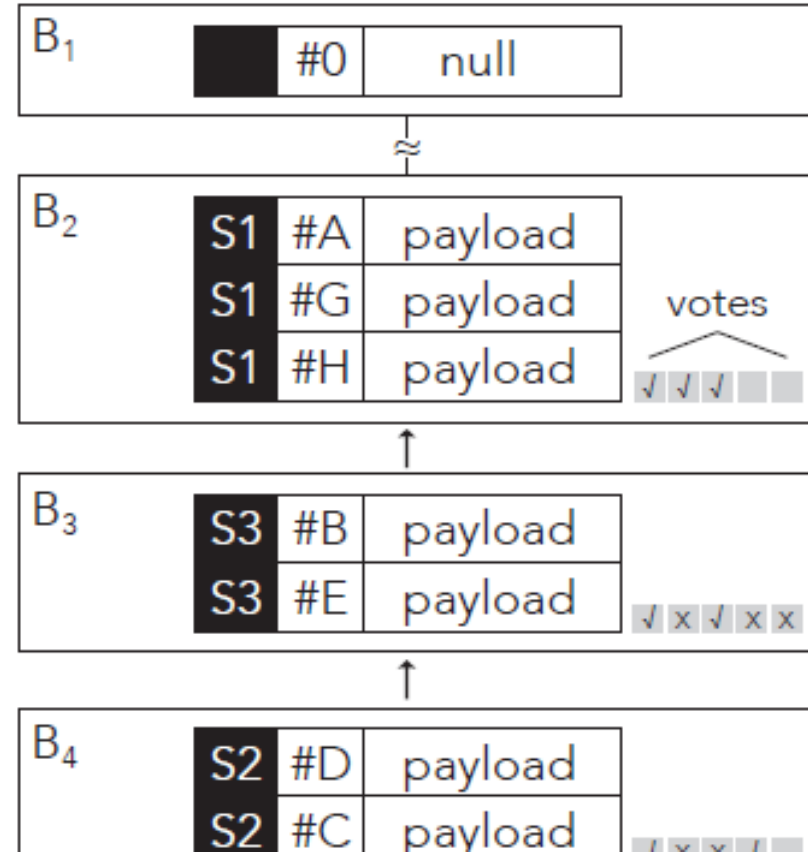
**Blockchain (noun):** storage that is decentralized + immutable + assets

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

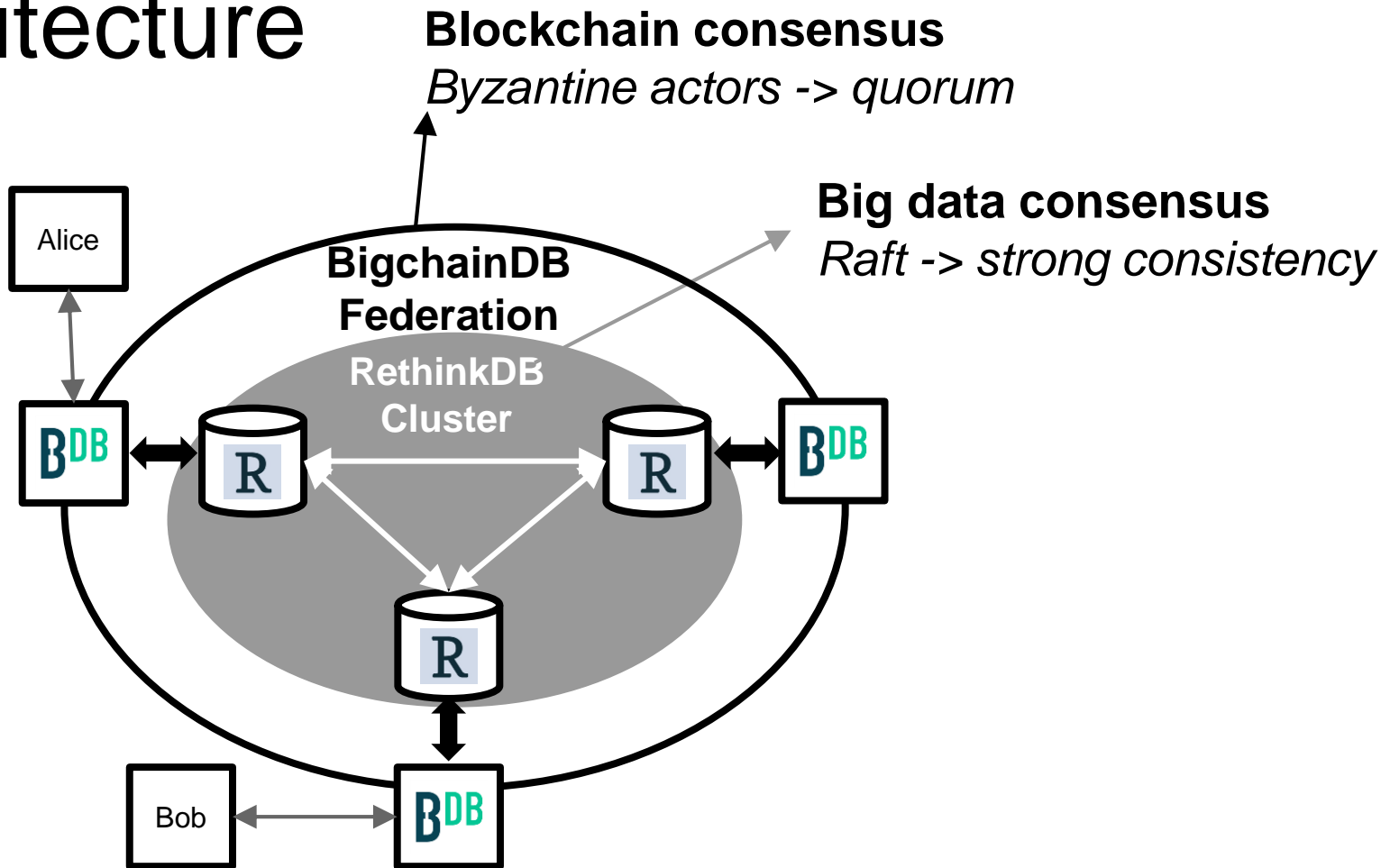
# How to Blockchain-ify Big Data

- **Decentralized:** each DB node is a federation node
- **Immutable:** hash on prev. blocks, append-only
- **Assets:** Interledger protocol

[bigchaindb.com/whitepaper](http://bigchaindb.com/whitepaper)  
[github.com/bigchaindb](https://github.com/bigchaindb) (AGPL)



# Architecture



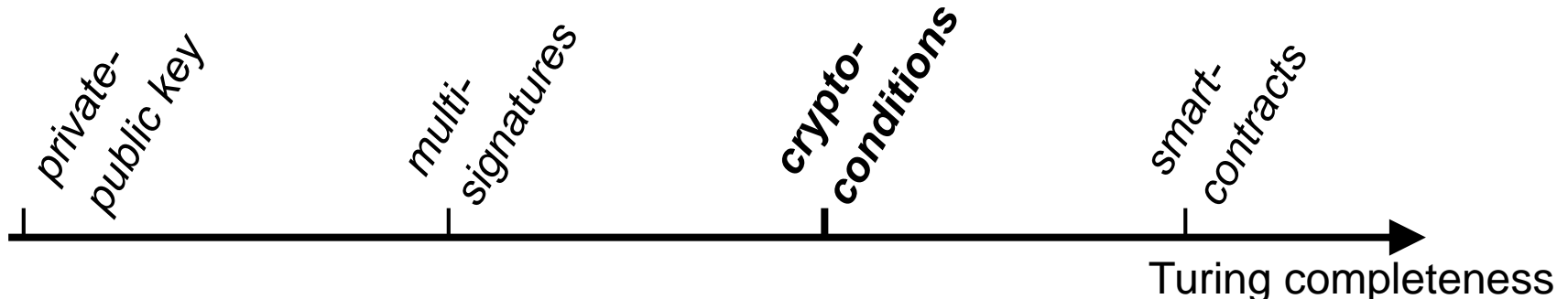
# BigchainDB Interface

**Database part : data**

Via ReQL (JSON meets SQL)

**+ Blockchain part : assets, transaction-style**

Via Interledger Protocol (Crypto-conditions)



# BigchainDB characteristics



## 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



## Decentralization

Federated  
non-anonymous participation

# Public version of BigchainDB



# ipDB

INTERPLANETARY DATABASE



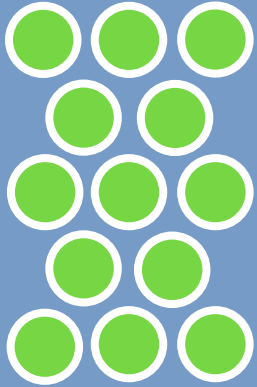
# iPDB

INTERPLANETARY DATABASE



- A shared global database. For everyone, everywhere
- And, a nonprofit foundation, with decentralized governance
- Powered by BigchainDB, to start
- Free except for high-volume users
- Caretakers co-operate network & co-govern foundation

# IPDB Caretakers (so far)



## Not-for-profit

Blockstack  
COALA  
Dyne.org  
Internet  
Archive  
OpenMedia  
UnMonastery

## For-profit

BigchainDB  
Consensys  
Eris Industries  
Protocol Labs (IPFS)  
SmartContract.com  
Synereo  
Tendermint

# Decentralization of the Cloud

Centralized



Partly  
Decentralized



Fully  
Decentralized

Apps



Proc'ing



FS



DB



Partly Dec. Apps

ascribe®

Proc'ing



FS



Dec. DB



Dec. Apps



Dec. Proc'ing



Dec. FS



Dec. DB





User:  everledger

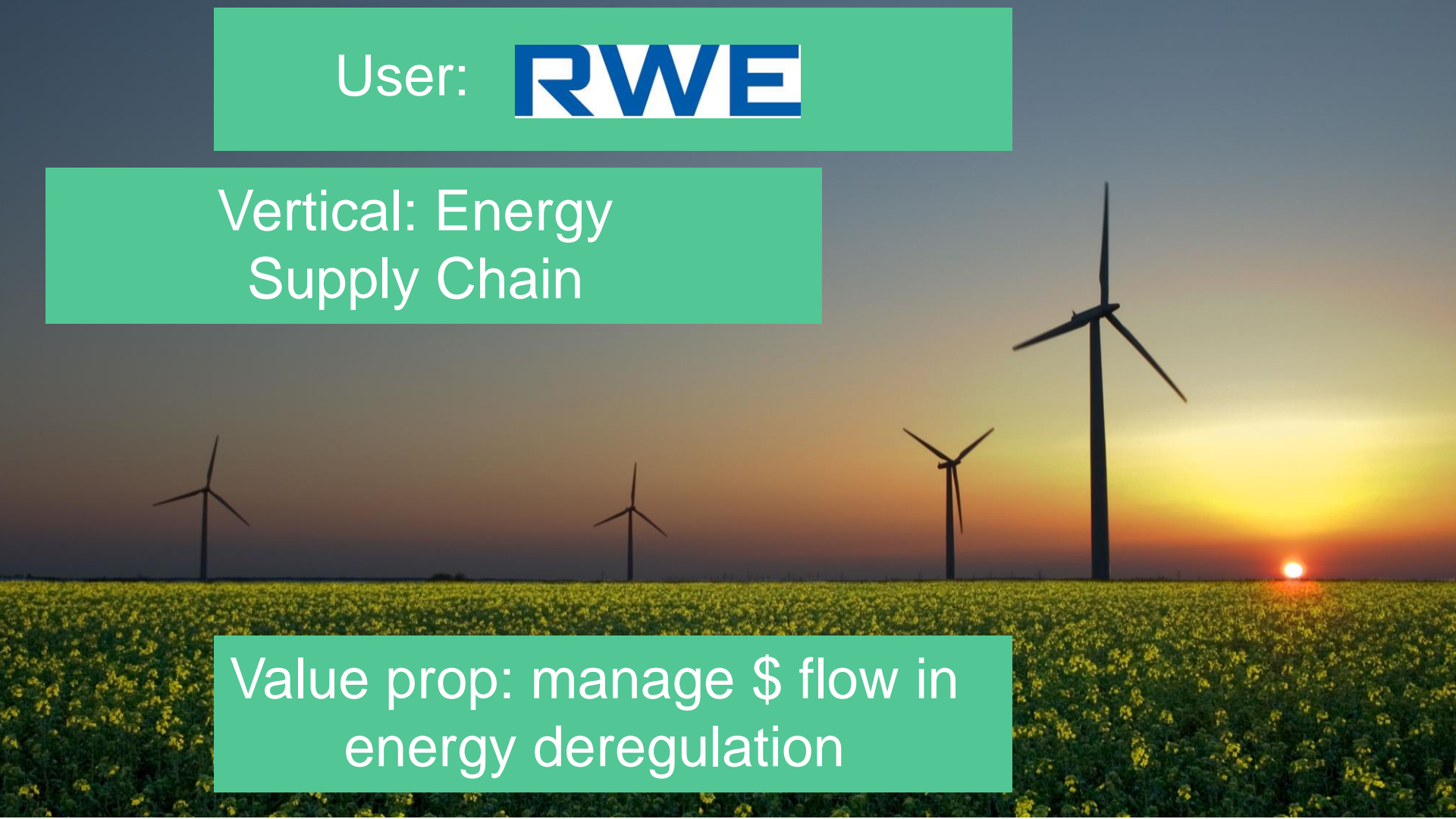
Vertical: Diamond  
Supply Chain

Value prop: identify & prevent  
fraud. 7-40% in \$80B industry

User: **RWE**

Vertical: Energy  
Supply Chain

Value prop: manage \$ flow in  
energy deregulation





User:



Vertical:  
Land registry

Value prop: less-corruptible land titles;  
land ownership as stepping stone



Vertical: Medical Journals /  
Supply Chain

User:

Tangent<sup>90</sup>

Value prop: government-  
mandated transparent \$ flow



User:  RECRUIT

Vertical: Education  
credentials

Value prop: reduce  
fraudulent degrees,  
lower HR friction





User: ascribe.io  
(incl. 5000 artists, 25 orgs)

Verticals: Art Supply Chain,  
Intellectual Property

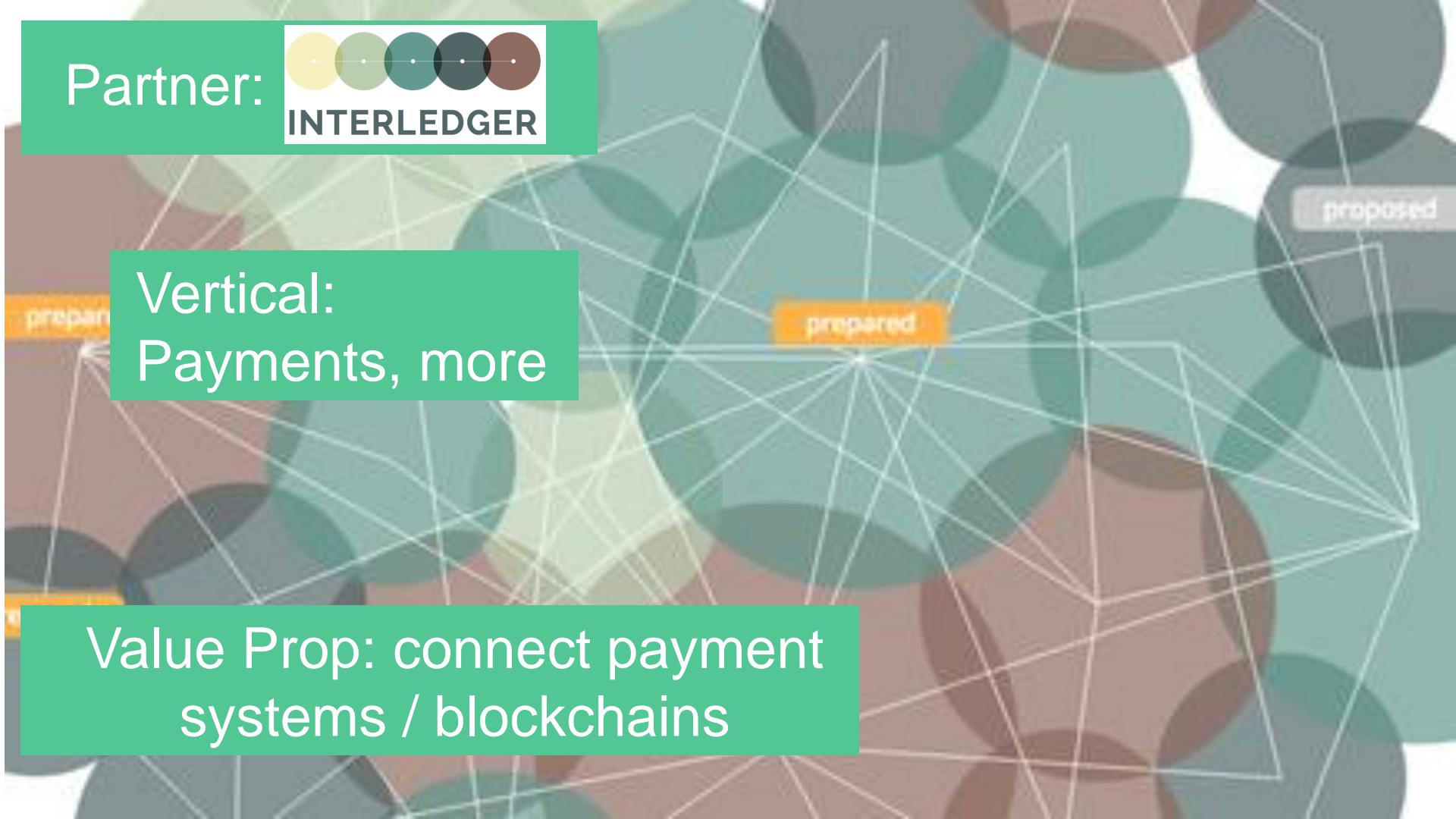
Value Props: secure  
provenance, IP mgmt.

Partner:



Vertical:  
Payments, more

Value Prop: connect payment  
systems / blockchains



More users /  
verticals

Delivery vs  
Payment (many)

Identity

Ticketing

Enterprises & financial institutions  
moving from POCs to scale

# Decentralization of the Cloud

Centralized



Partly  
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Fully  
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Apps



Proc'ing



FS



DB



Partly Dec. Apps

ascribe®

Proc'ing



FS



Dec. DB

BIGCHAIN<sup>DB</sup>

Dec. Apps



Dec. Proc'ing



Dec. FS



Dec. DB

BIGCHAIN<sup>DB</sup>

# Big data, meet blockchain

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@trentmc0

BigchainDB is a blockchain database

- Scale, querying
- Decentralized, immutable, assets

Links:

- [bigchaindb.com](http://bigchaindb.com)
- [github.com/bigchaindb](https://github.com/bigchaindb)

We're hiring!

[github.com/bigchaindb/org/blob/master/engjob.md](https://github.com/bigchaindb/org/blob/master/engjob.md)