

# **Blockchain Beyond Cryptocurrency**

**Or Is Private Chain a Hoax**

**Or How I Lose Money in Bitcoin but still Decide to Get in  
the Research**

Hong Wan

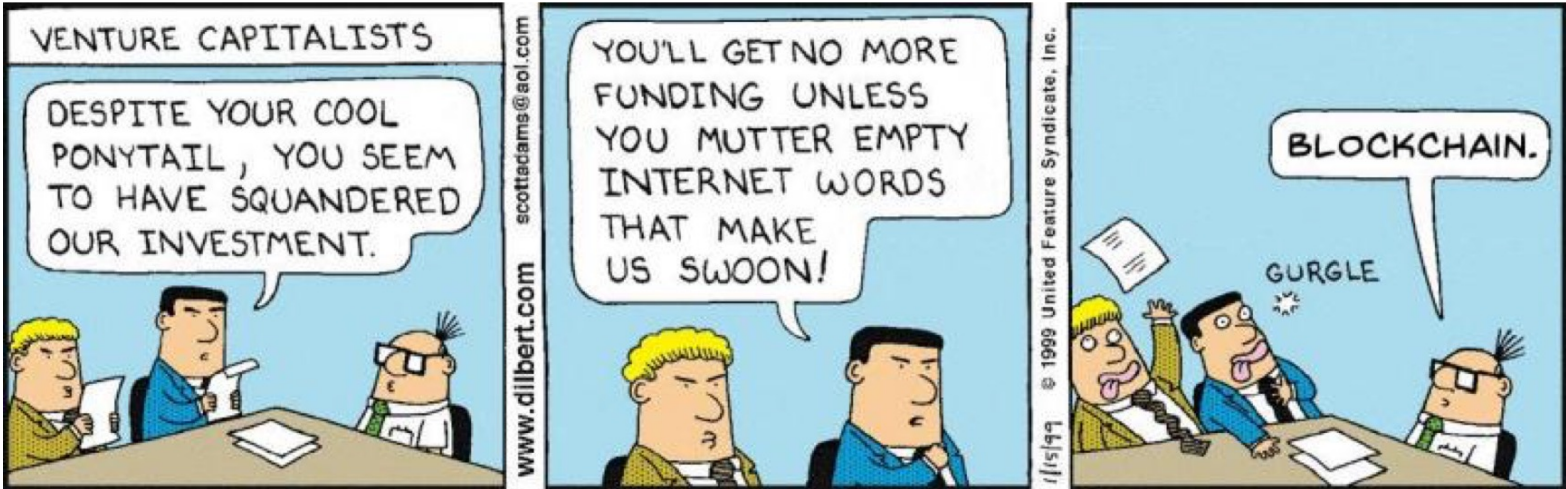
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Systems Engineering

Sept 2019

# In this talk:

- Blockchain and trust
- Different kinds of blockchain
- Cases and Examples
- Discussions

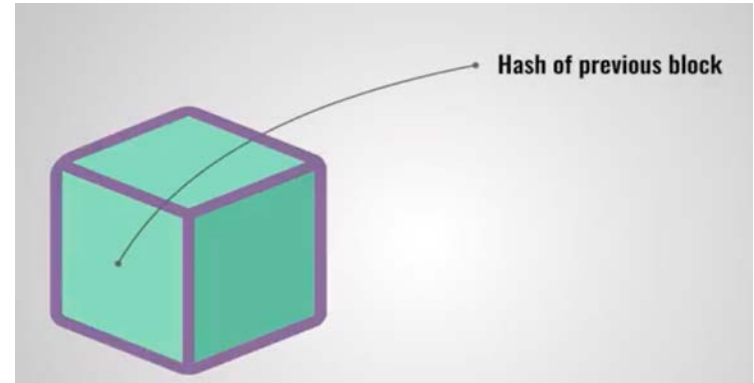
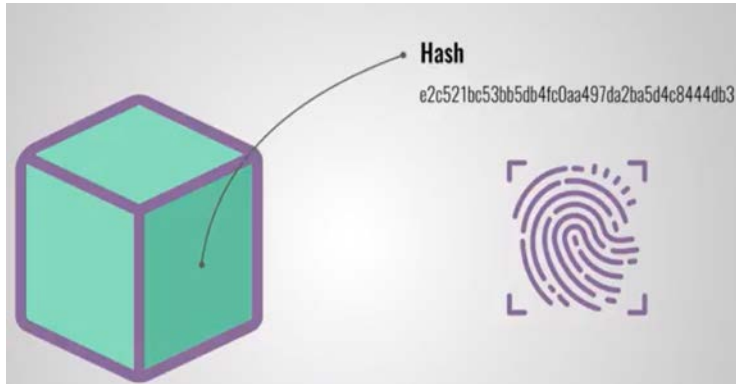
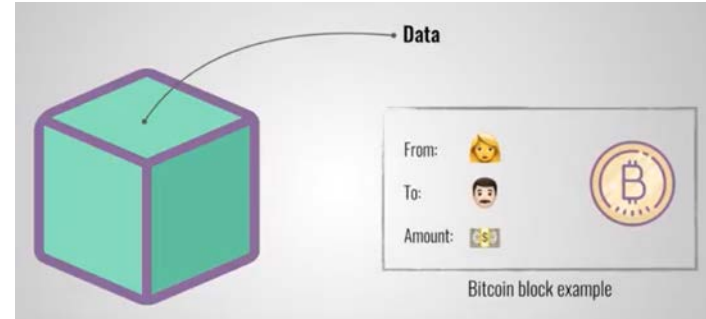
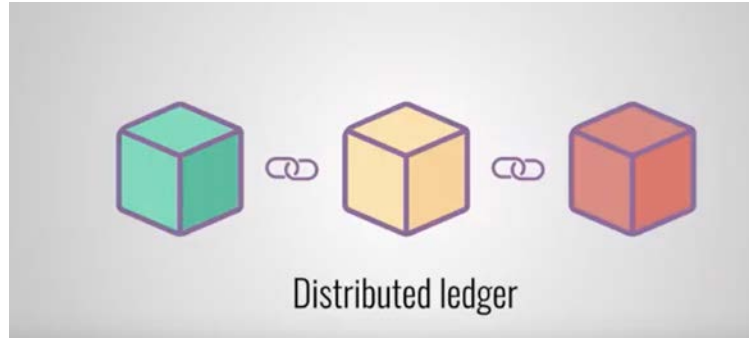
# First Things First



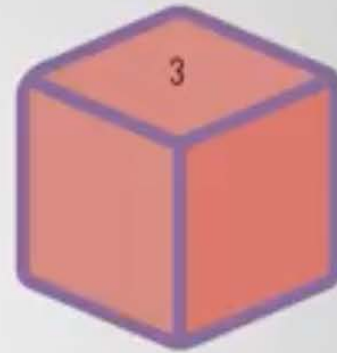
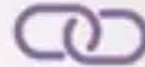
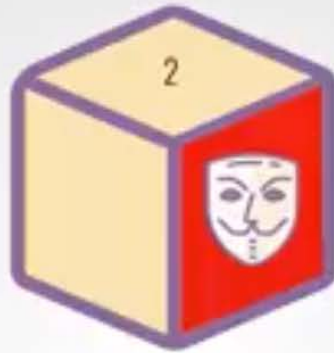
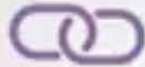
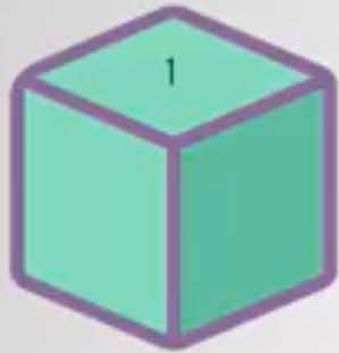
# Disclaimer



# Block and Chain



[https://youtu.be/SSo\\_ElwHSd4](https://youtu.be/SSo_ElwHSd4)



Hash: 1Z8F

Previous hash: 0000

Hash: ~~6BQ1~~ H62Y

Previous hash: 1Z8F

Hash: 3H4Q

Previous hash: 6BQ1

Uh thats  
not right??

# Blockchain Design Questions

- **Who can access data:** *Private vs. Public*
- **Who can validate data/add block:** *Permissioned vs Permissionless*
- **Consensus to be used:** *Trade-off among security and efficiency.*



[https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&ved=2ahUKEwinjN2s7\\_DkAhXlmeAKHXxhAIUQjRx6BAGBEAQ&url=https%3A%2F%2F101blockchains.com%2Fconsensus-algorithms-blockchain%2F&psig=AOvVaw23pKh4qS8W\\_xgyajJ3aFI9&ust=1569669093339830](https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&ved=2ahUKEwinjN2s7_DkAhXlmeAKHXxhAIUQjRx6BAGBEAQ&url=https%3A%2F%2F101blockchains.com%2Fconsensus-algorithms-blockchain%2F&psig=AOvVaw23pKh4qS8W_xgyajJ3aFI9&ust=1569669093339830)

# Bad News First

- “Private blockchains are completely uninteresting... -- the only reason to operate one is to ride on the blockchain hype...” Bruce Schneier



Tonight we will talk about cryptocurrencies... everything you don't understand money combined by everything you don't understand about computers....

Cryptocurrencies: Last Week Tonight with John Oliver (HBO)

[https://www.schneier.com/blog/archives/2019/02/blockchain\\_and\\_.html](https://www.schneier.com/blog/archives/2019/02/blockchain_and_.html)

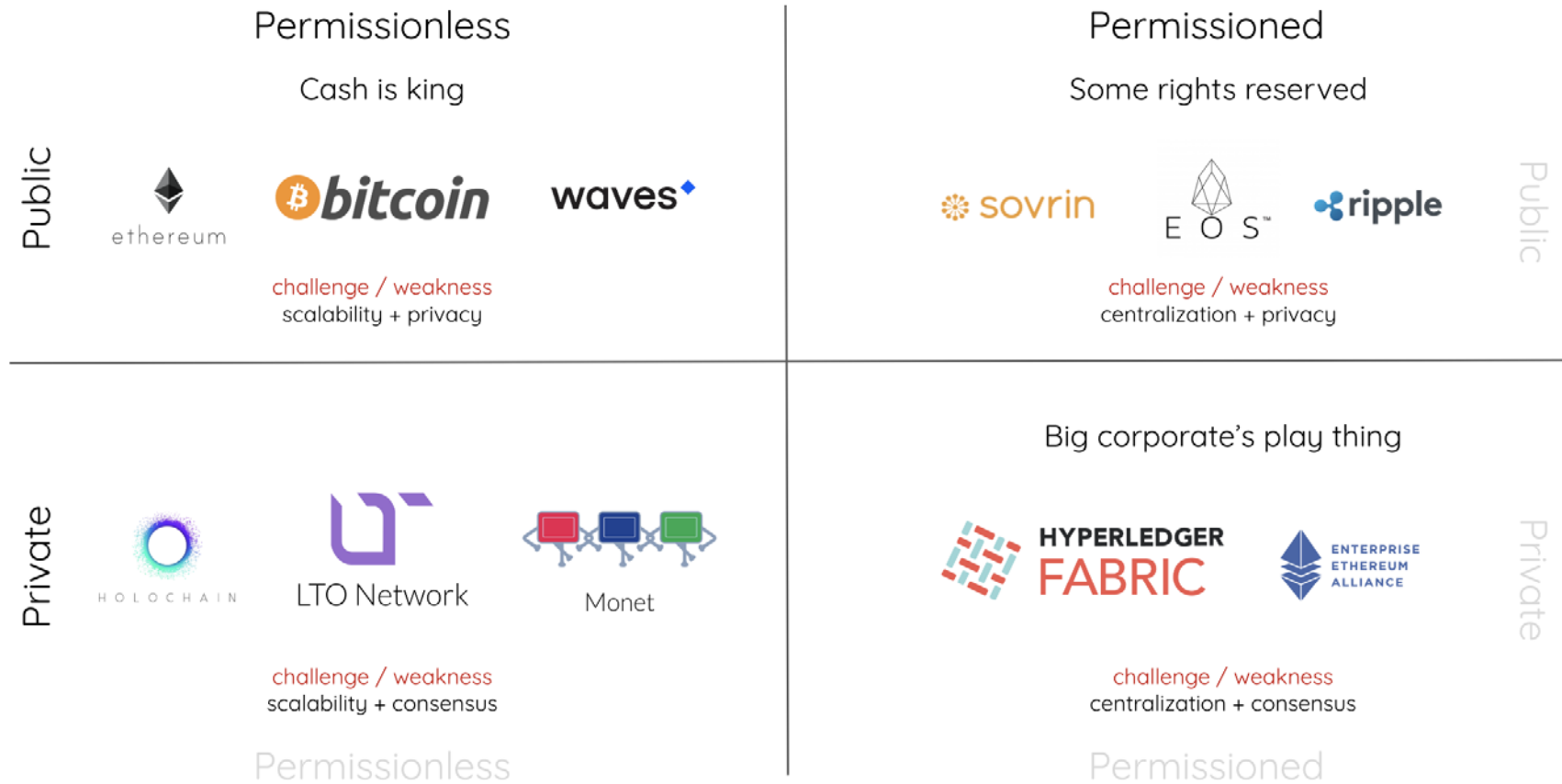
<http://shorturl.at/ahsRU>, [shorturl.at/gETV2](http://shorturl.at/gETV2)

WHO  
CAN YOU  
TRUST?

# Blockchain for Bitcoin and Business

- Assets and records vs. Coins
- Identity vs anonymity: different trust level
- Data privacy vs open ledger
- Efficiency vs security

<https://ibm.co/2xYSoGy>



# Challenges for Each Type

- Permissionless-public chain: **scalability and privacy**
- Permissioned-public chain: **centralization and privacy**
- Permissionless-private chain: **scalability and consensus**
- Permissioned-private chain: **centralization and consensus**

<https://medium.com/ltonetwork/the-rise-of-private-permissionless-blockchains-part-1-4c39bea2e2be>

# Blockchain As a System of Record

- Digital identity: all four kinds.
- Tokenization: private or public, permissioned
- Inter-organizational data management: permissioned, private
- Usage: government, financial institutes, auditing...



[https://i.ytimg.com/vi/1bVczDqh7\\_A/maxresdefault.jpg](https://i.ytimg.com/vi/1bVczDqh7_A/maxresdefault.jpg)

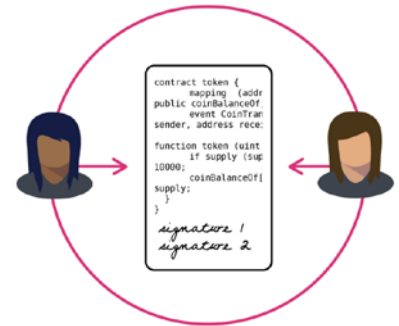
<https://www.coindesk.com/information/applications-use-cases-blockchains>

# Blockchain as A Platform

- Smart contracting
- automated governance
- Market without middleman
- automating regulatory compliance



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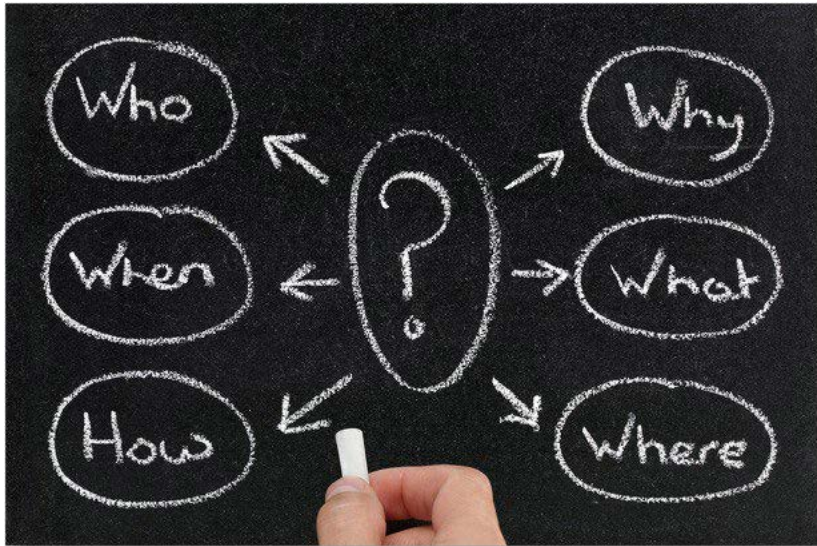


# Fish, Fish, Fish



[https://youtu.be/8nrVlICgiYM?list=PL0MZ85B\\_96CFx2pOvnrGHtF7TXrrSyWNe](https://youtu.be/8nrVlICgiYM?list=PL0MZ85B_96CFx2pOvnrGHtF7TXrrSyWNe)

# Where am I standing?



Game theory  
Machine learning  
And of course,  
Simulation

<https://premium.wpmudev.org/blog/wp-content/uploads/2011/12/5ws-big.jpg>

# Discussions



# Blockchain vs Shared Database

- Private chain is a shared database with one or multiple parties with administrative power.
- Private chain still make use of cryptography and data structures (like [Merkle trees](#)) to ensure non-valid transactions aren't added to the blockchain and data are immutable
- Higher levels of error checking and transaction validity than regular shared databases.

# Ripple Coin



# Hybrid Chain

- Connecting multiple blockchains.
- Data fusion
- Multi-level network: Centralization in some levels and decentralized in other levels.