Making Bitcoin Exchanges Transparent

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und Kommunikationsnetze
Computer Engineering and Networks Laboratory

Introduction

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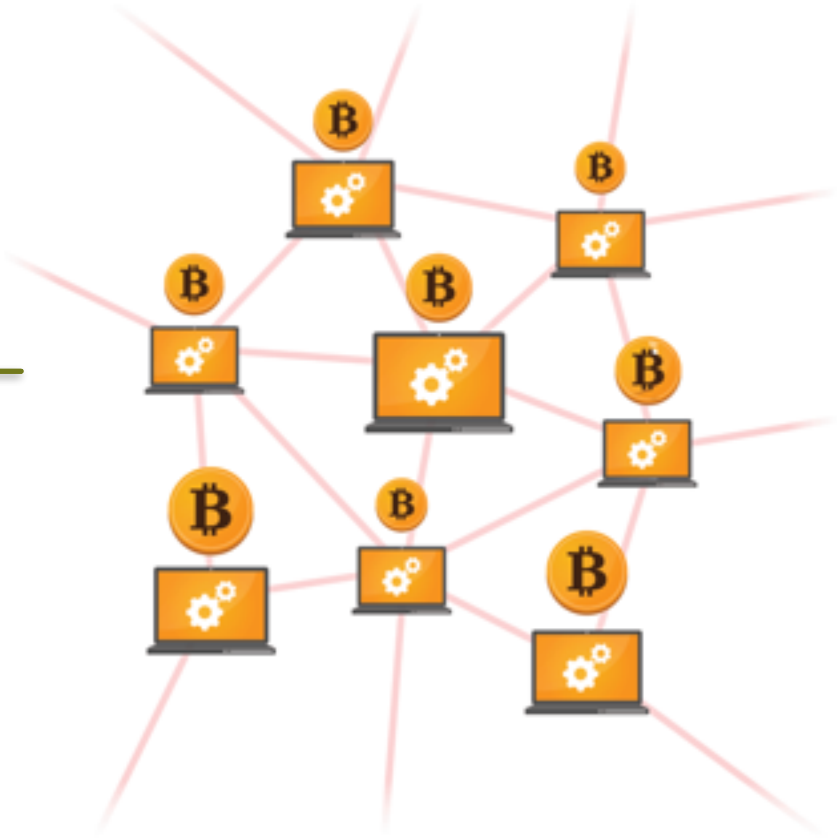

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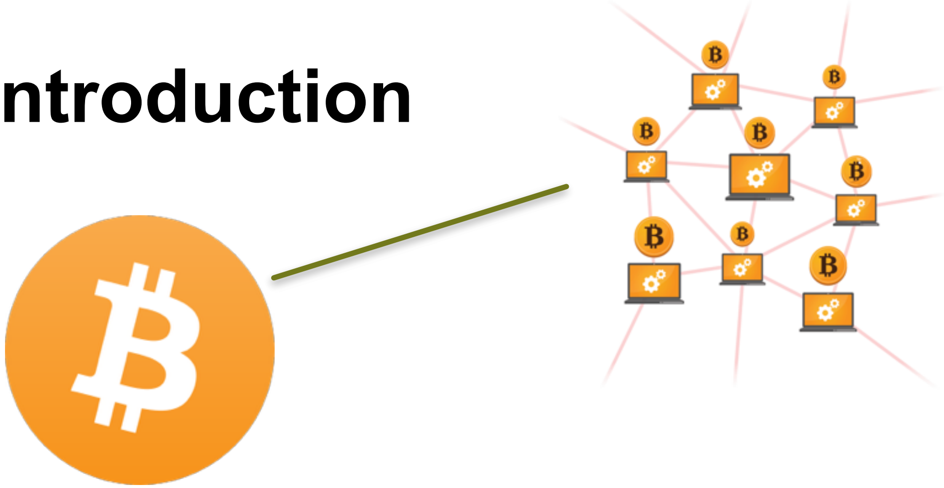
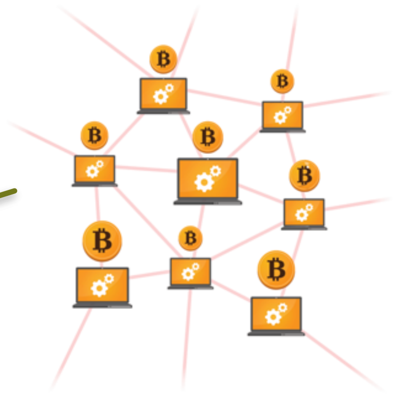


Peer to Peer

Introduction



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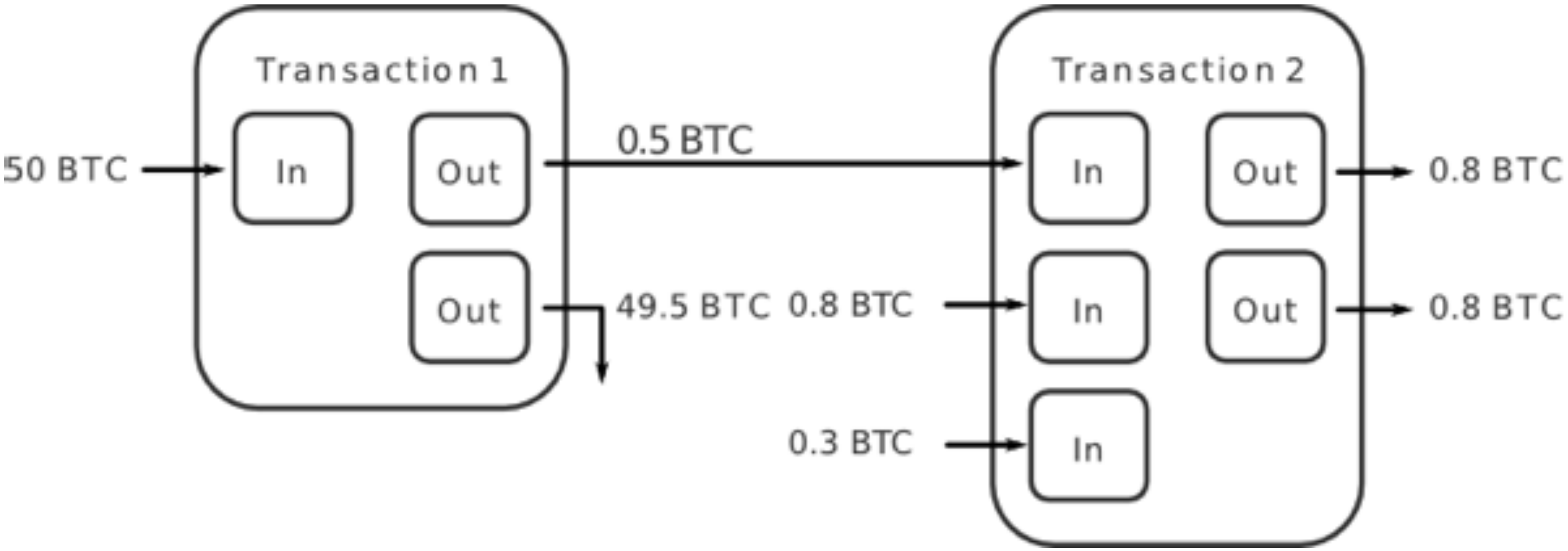

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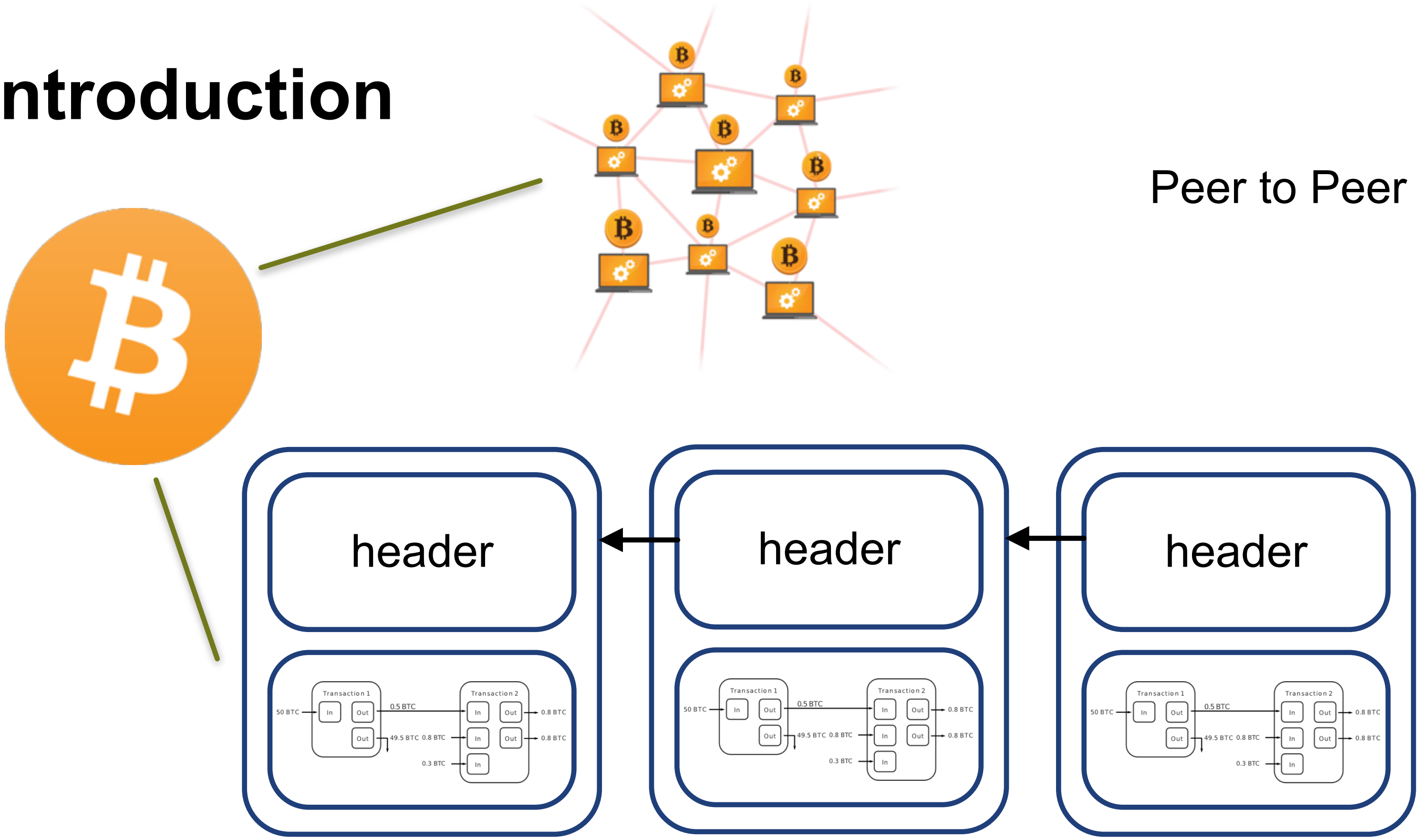

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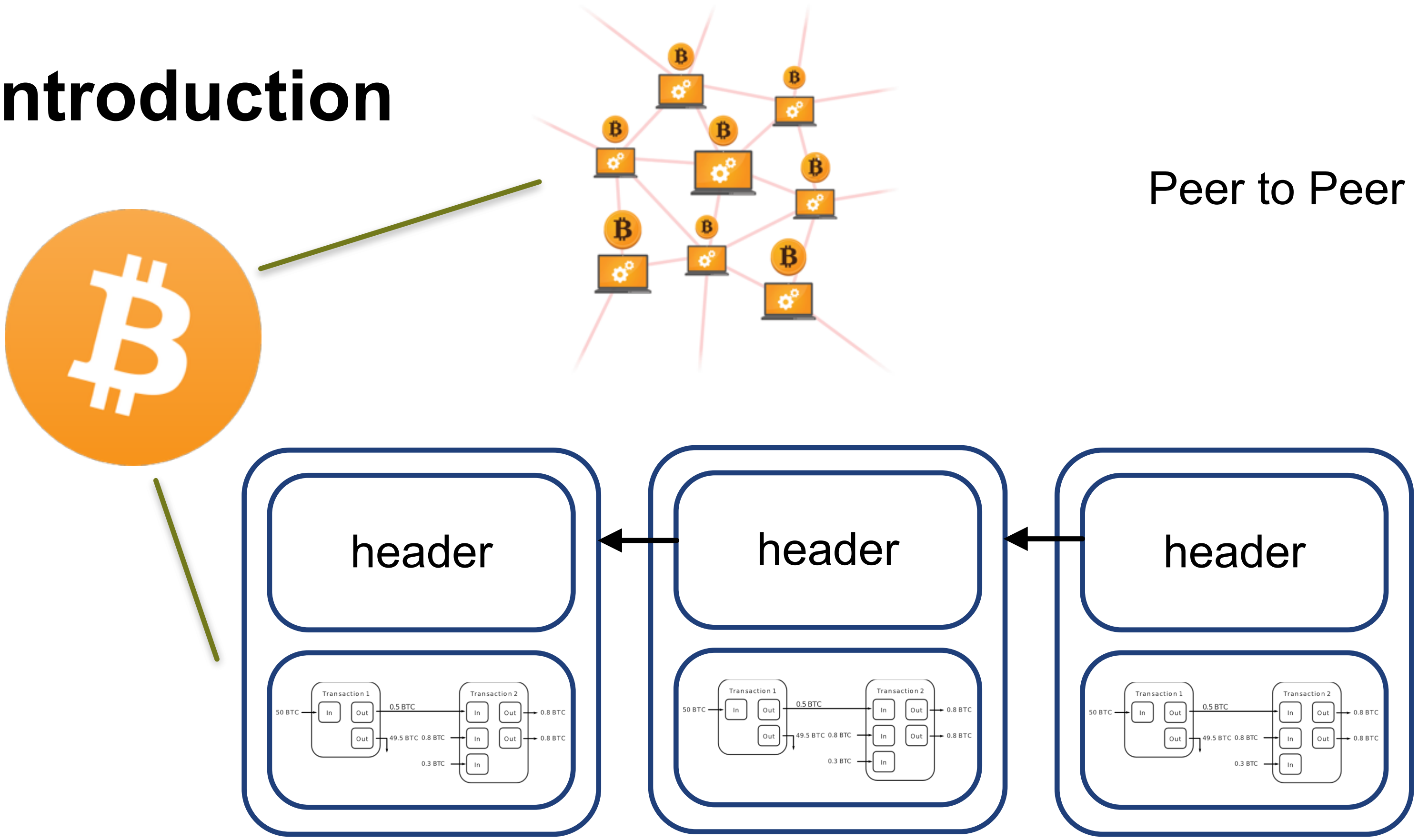

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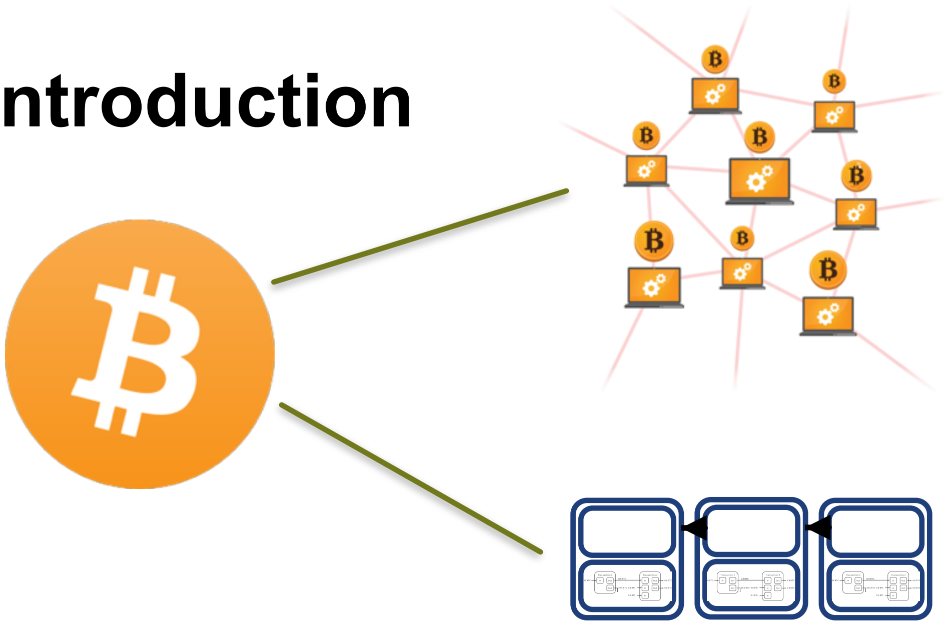
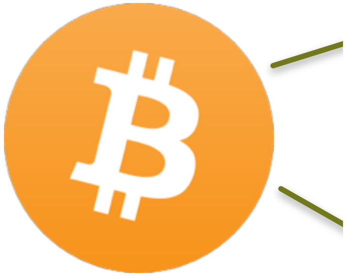
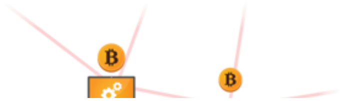


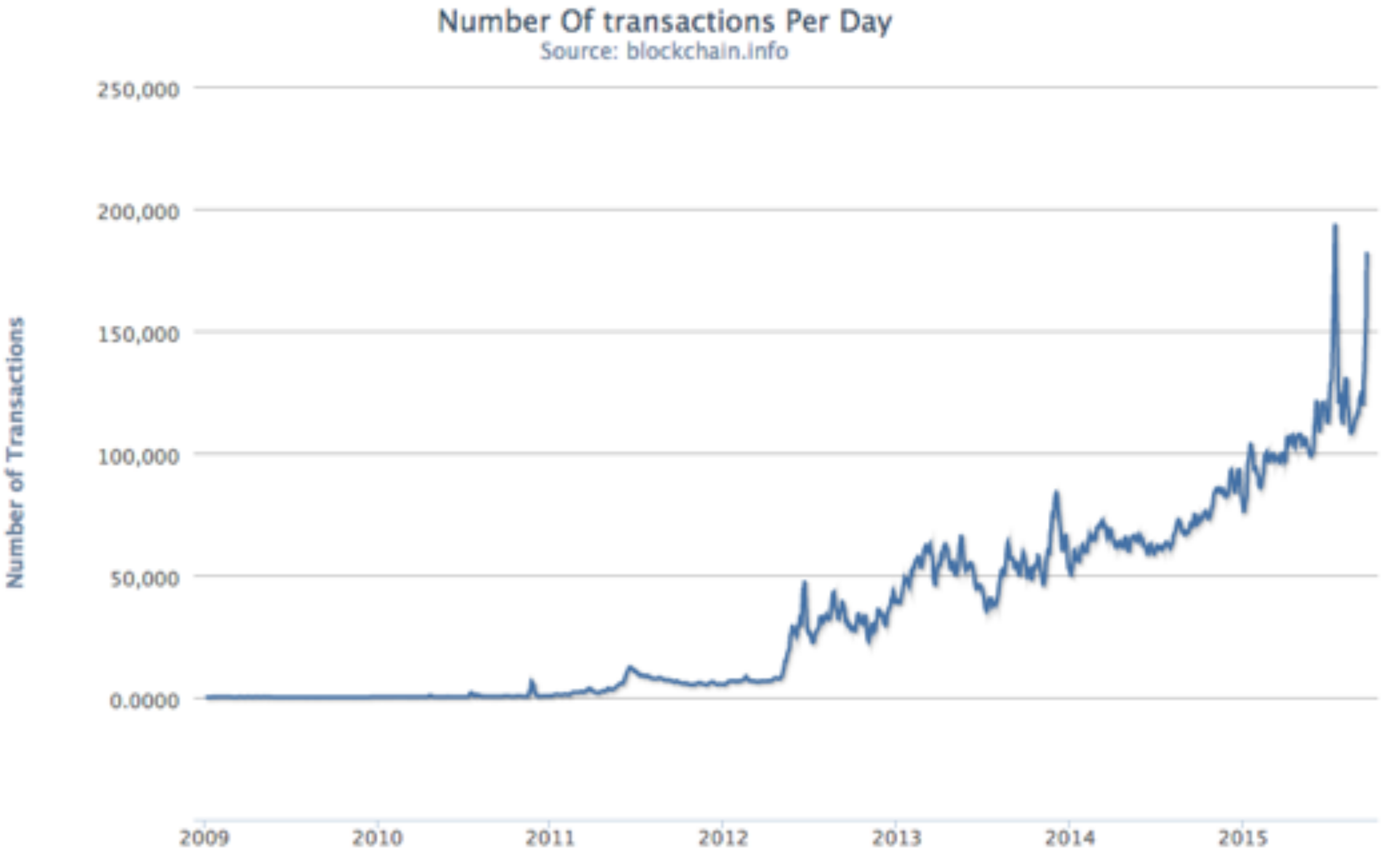
Peer to Peer

Transaction History

Introductio







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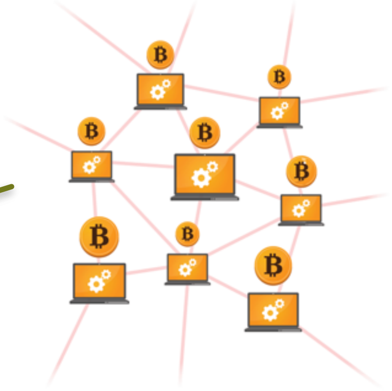

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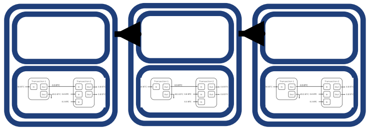
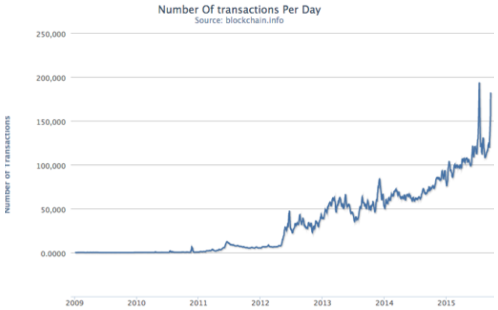


Transaction History



Number Of transactions Per Day

Source: blockchain.info

Growth

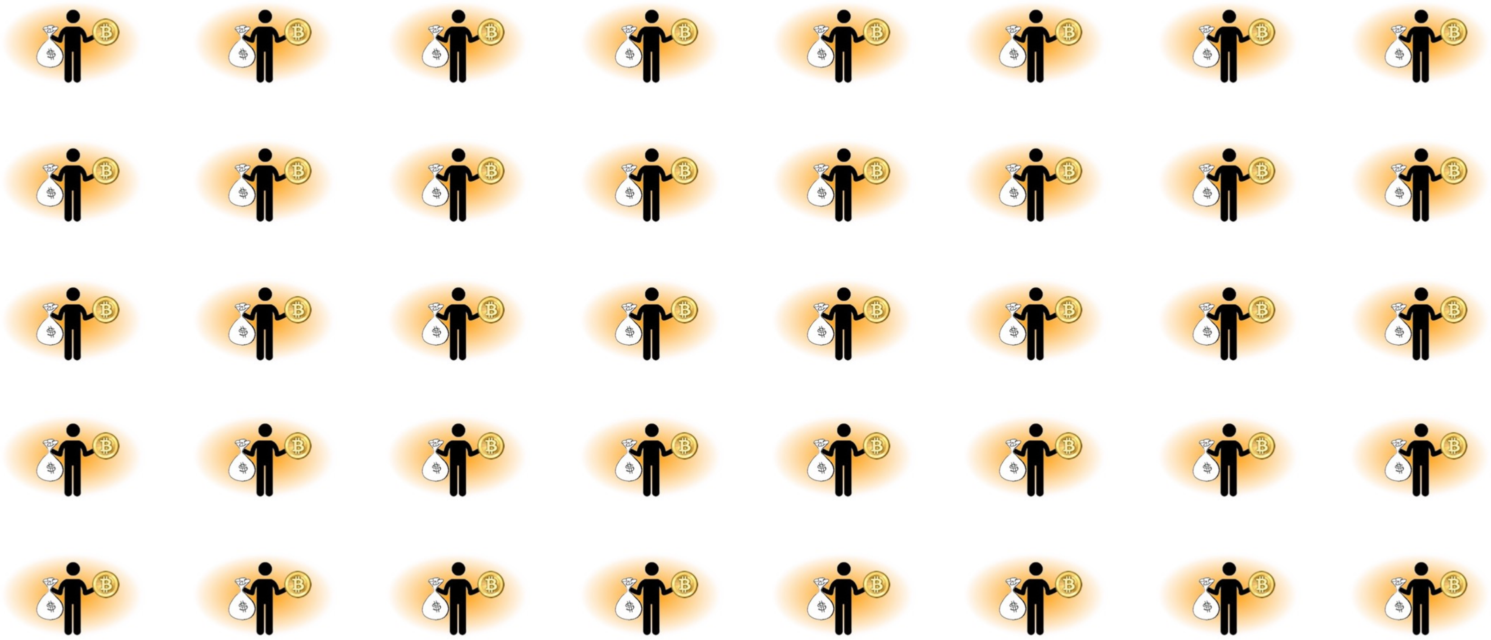
Bitcoin Exchanges

Buyers

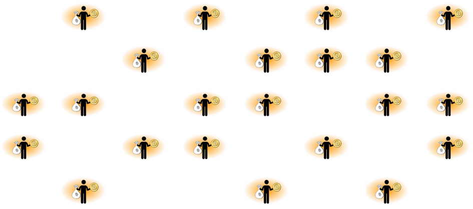
Exchange

Sellers

Trust in Bitcoin Exchanges



Trust in Bitcoin Exchanges



18 of 40 exchanges folded

Trust in Bitcoin Exchanges

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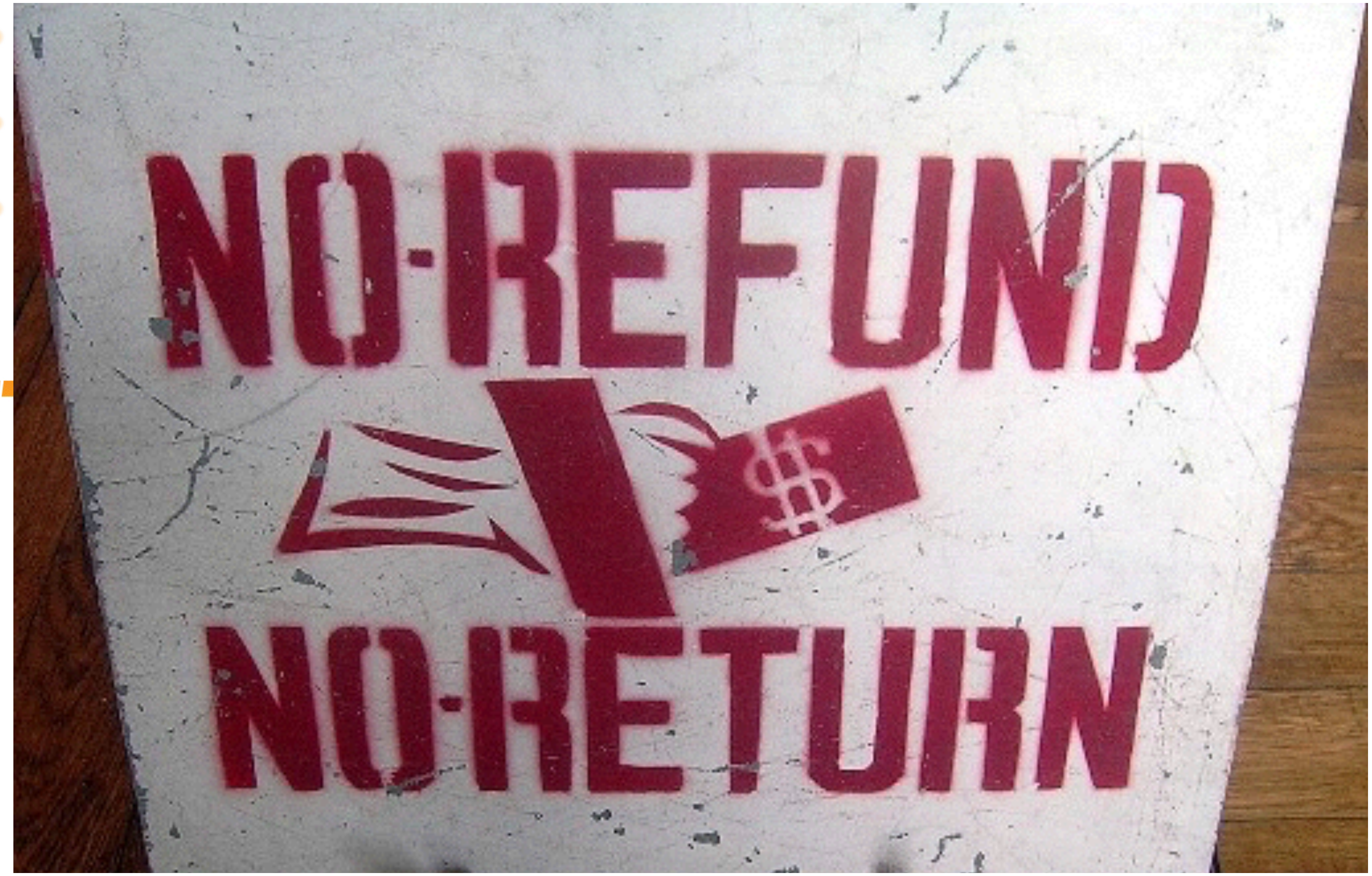

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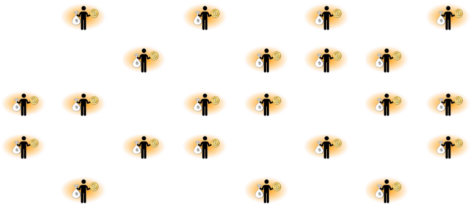
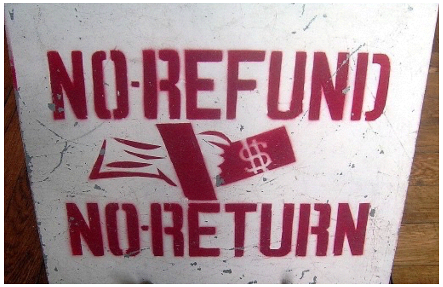


18 of 40 exchanges folded

MT.GOX

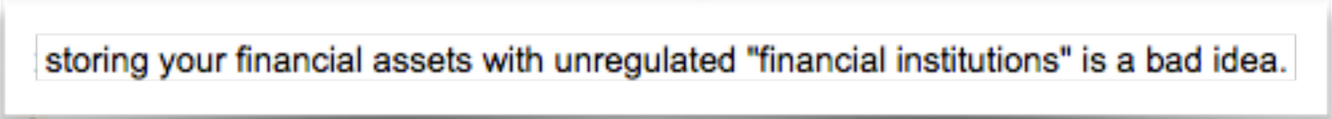
650k bitcoins lost/stolen



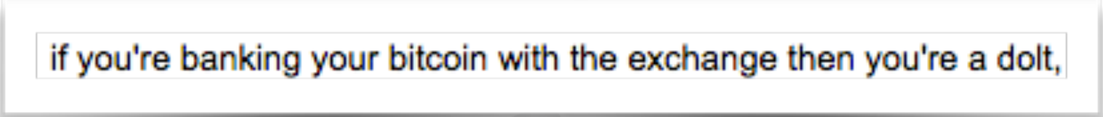
No higher power

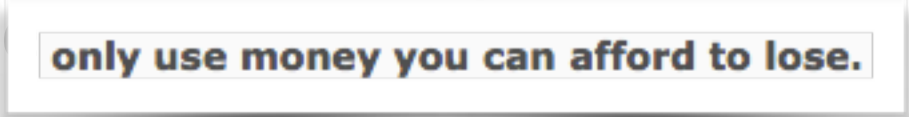
No help from law enforcement

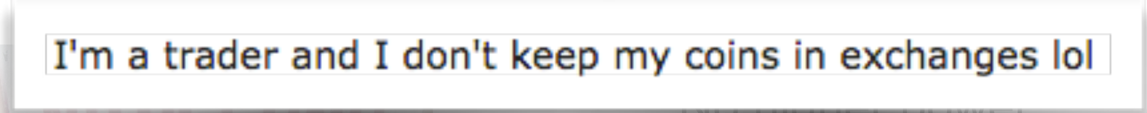
Trust in Bitcoin Exchanges


storing your financial assets with unregulated "financial institutions" is a bad idea.

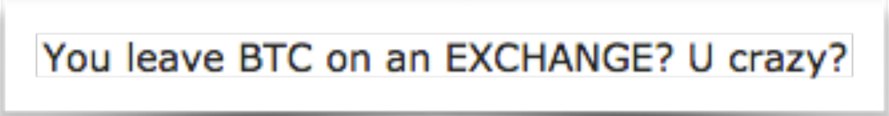
18 of 40 exchanges folded


if you're banking your bitcoin with the exchange then you're a dolt,

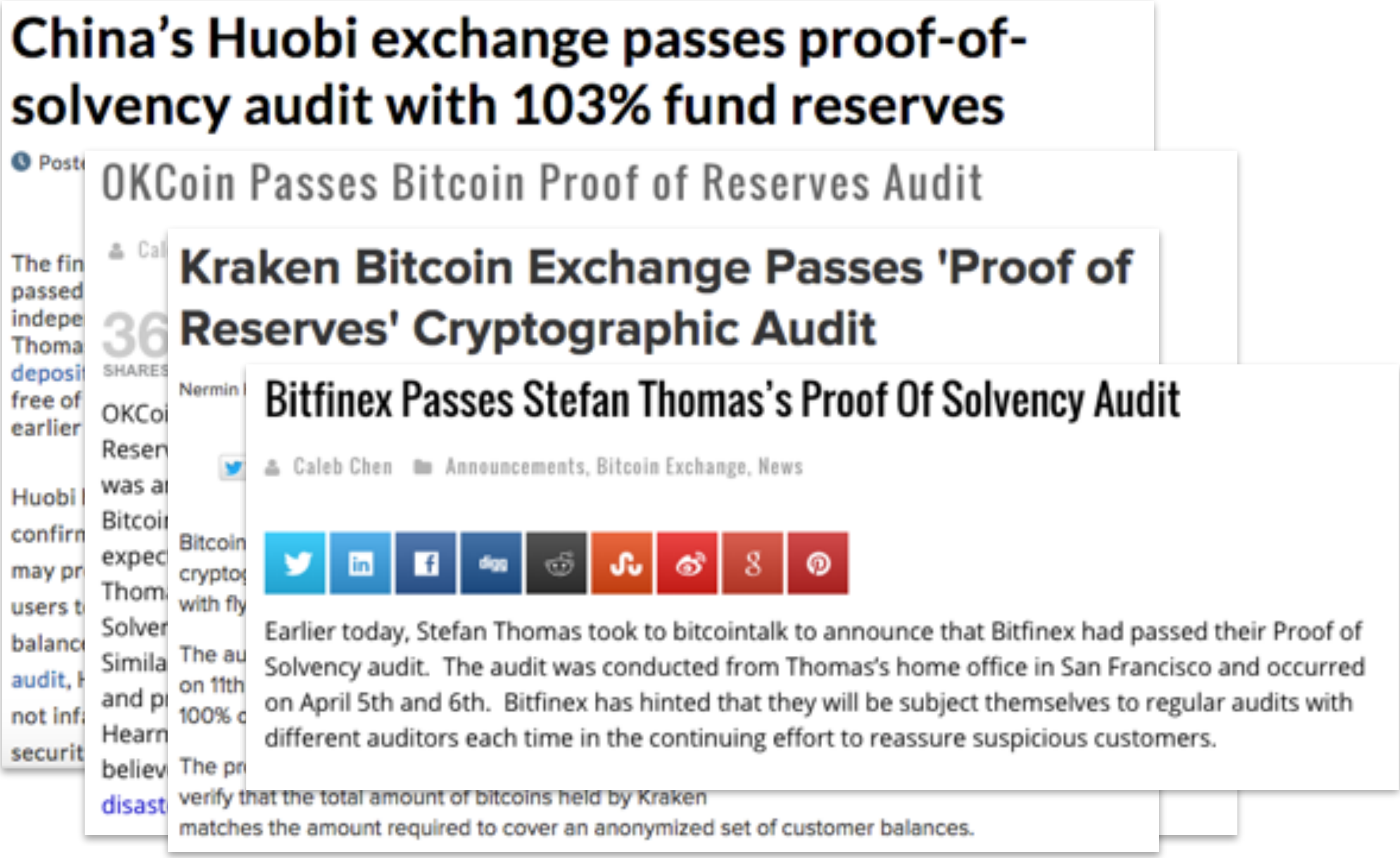

only use money you can afford to lose.


I'm a trader and I don't keep my coins in exchanges lol

No higher power


You leave BTC on an EXCHANGE? U crazy?

Legitimacy of Bitcoin Exchanges



China's Huobi exchange passes proof-of-solvency audit with 103% fund reserves

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Kraken Bitcoin Exchange Passes 'Proof of Reserves' Cryptographic Audit

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Bitfinex Passes Stefan Thomas's Proof Of Solvency Audit

Caleb Chen Announcements, Bitcoin Exchange, News

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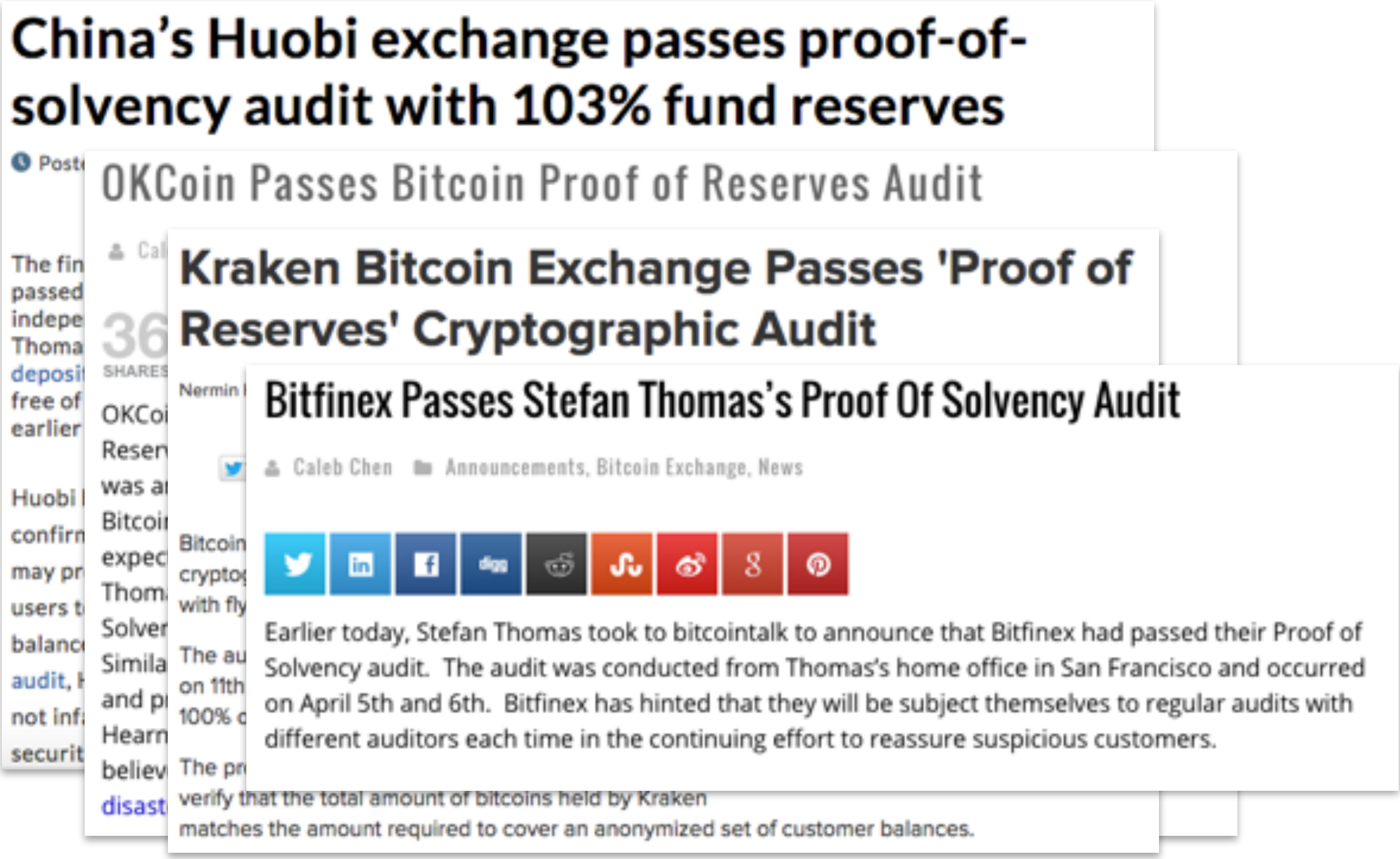

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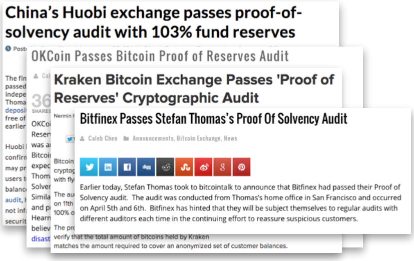

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Third-party audit

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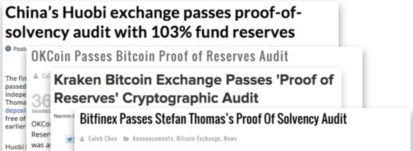

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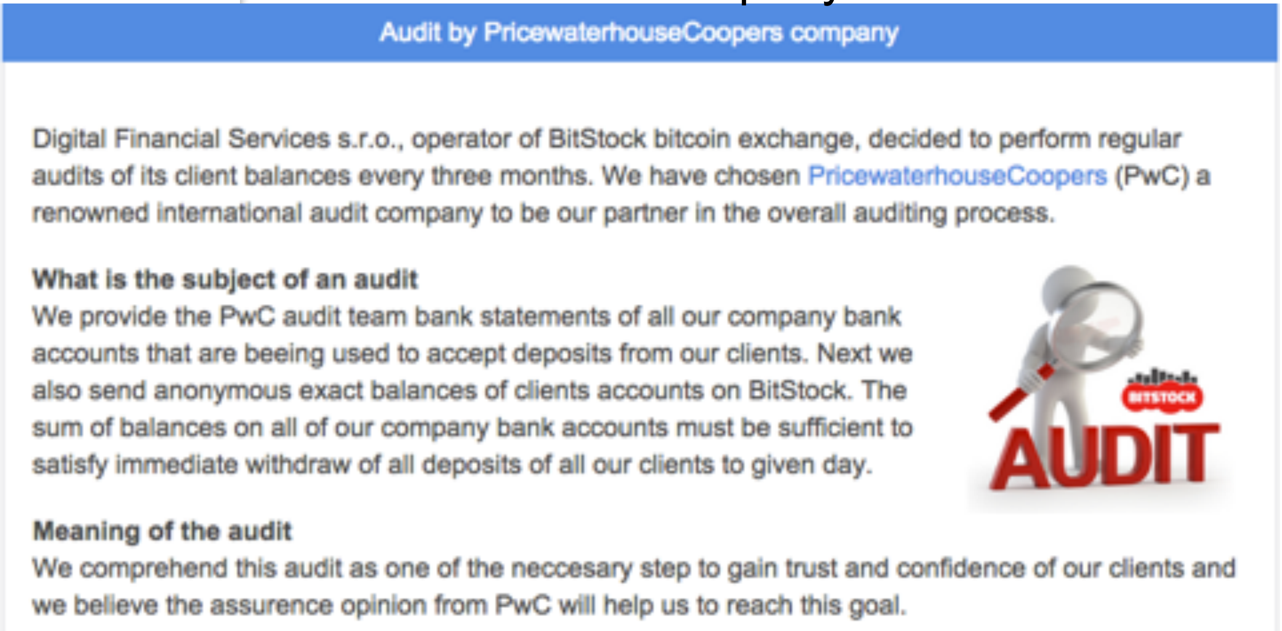

Audit by PricewaterhouseCoopers company

Digital Financial Services s.r.o., operator of BitStock bitcoin exchange, decided to perform regular audits of its client balances every three months. We have chosen PricewaterhouseCoopers (PwC) a renowned international audit company to be our partner in the overall auditing process.

What is the subject of an audit

We provide the PwC audit team bank statements of all our company bank accounts that are beeing used to accept deposits from our clients. Next we also send anonymous exact balances of clients accounts on BitStock. The sum of balances on all of our company bank accounts must be sufficient to satisfy immediate withdraw of all deposits of all our clients to given day.

Meaning of the audit

We comprehend this audit as one of the neccesary step to gain trust and confidence of our clients and we believe the assurence opinion from PwC will help us to reach this goal.

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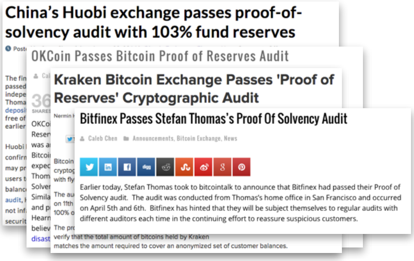

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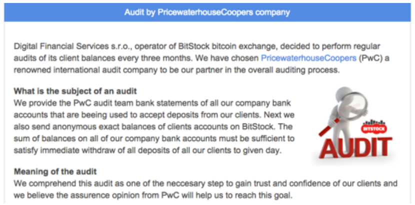

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Renowned third-party audit (PwC)

Trust in third party 👎 Cost 👎 Frequency 👎 Privacy 👎

Automated Software-Based Audit

≥

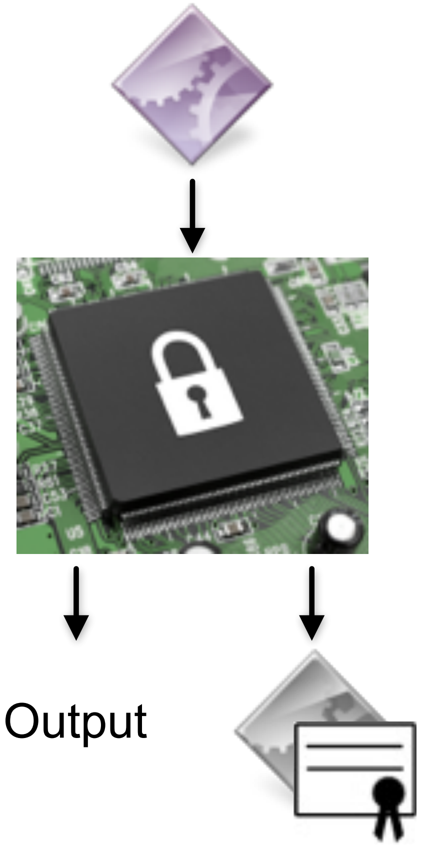
Solvency

Assets

Liabilities

Privacy

Trusted Computing

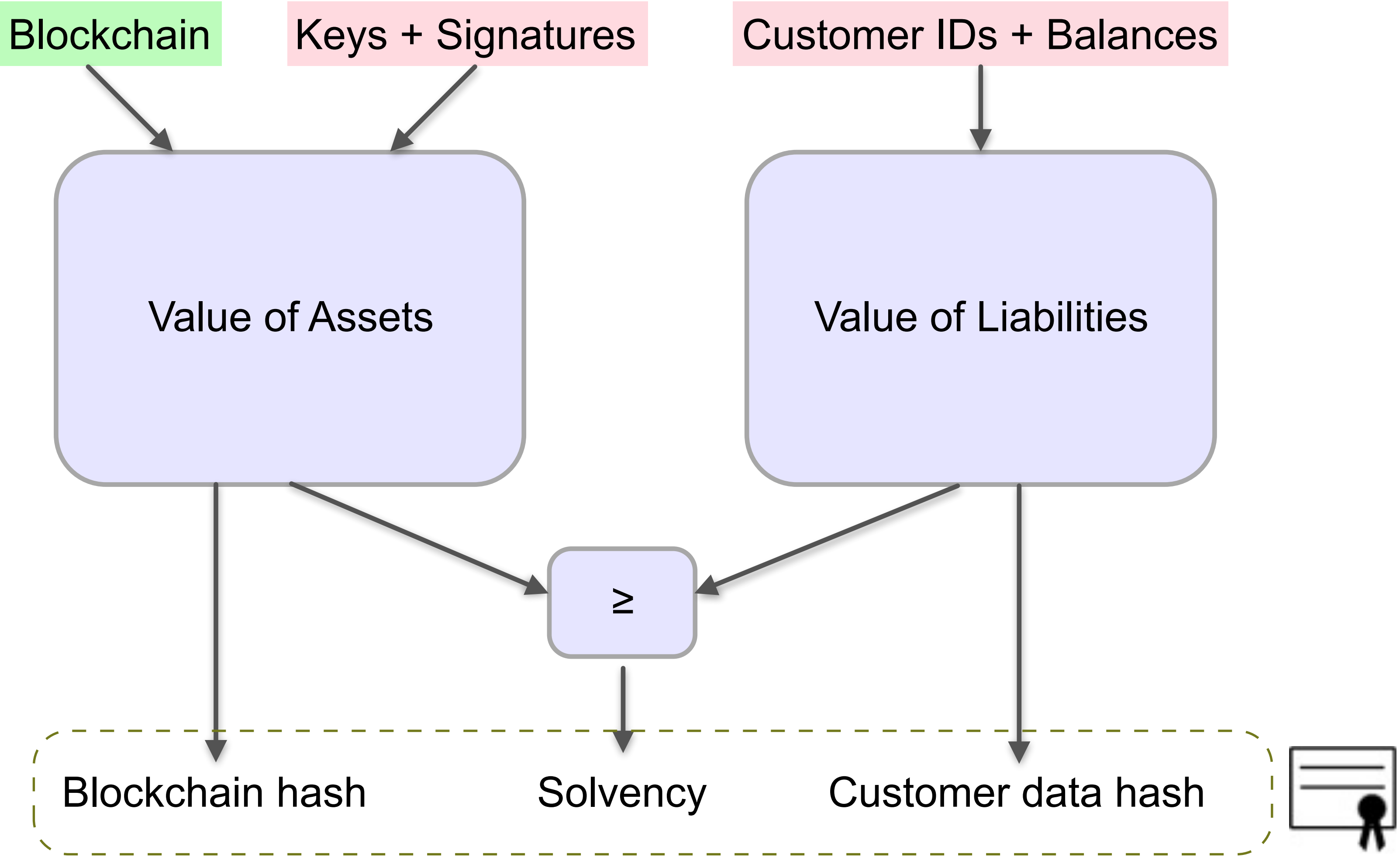


Executable

Trusted Execution

Result + Proof of Execution

Overview of Audit Process



Blockchain

Keys + Signatures

Customer IDs + Balances

Value of Assets

Value of Liabilities

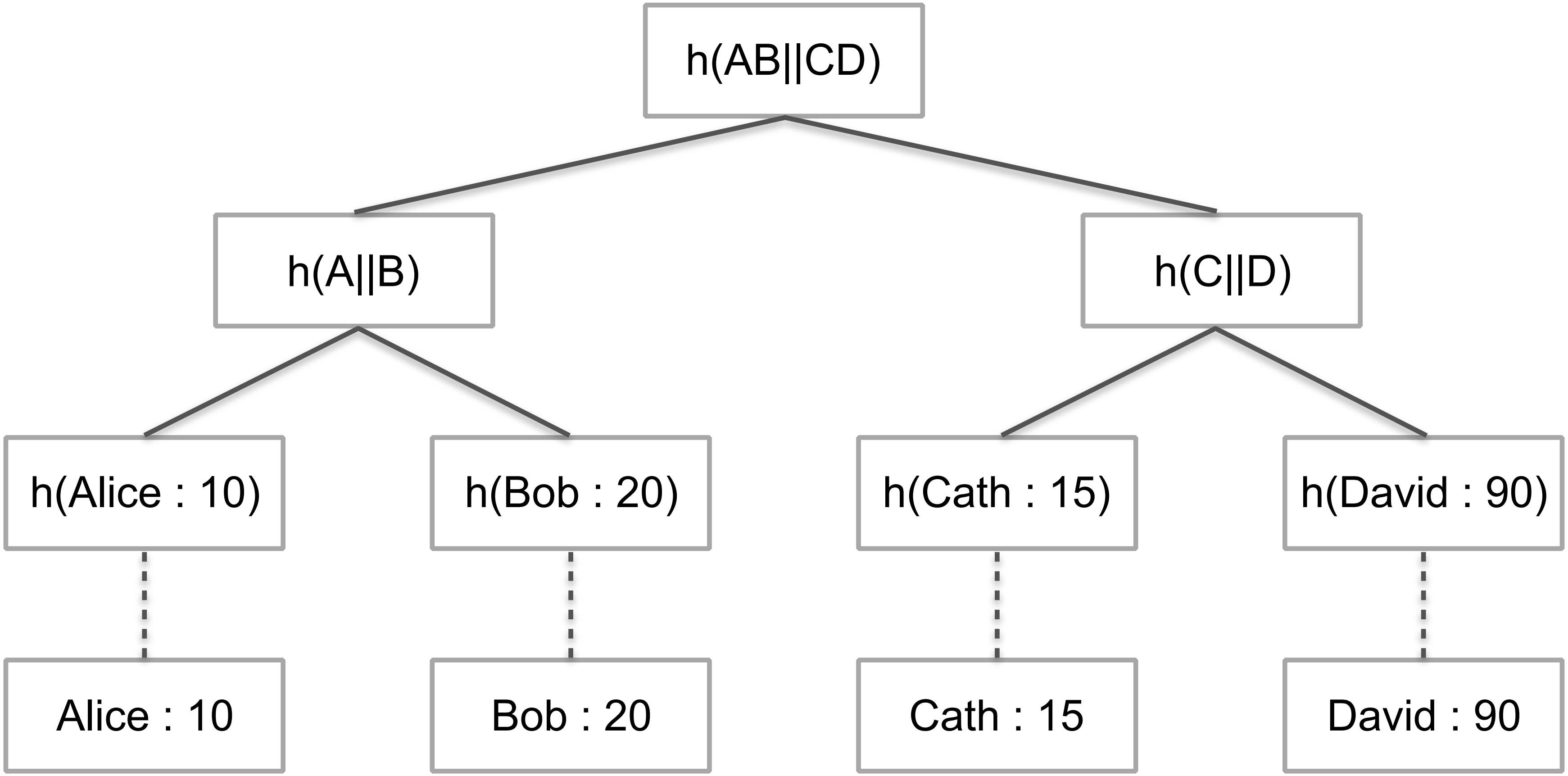
≥

Blockchain hash

Solvency

Customer data hash

Customer Verification



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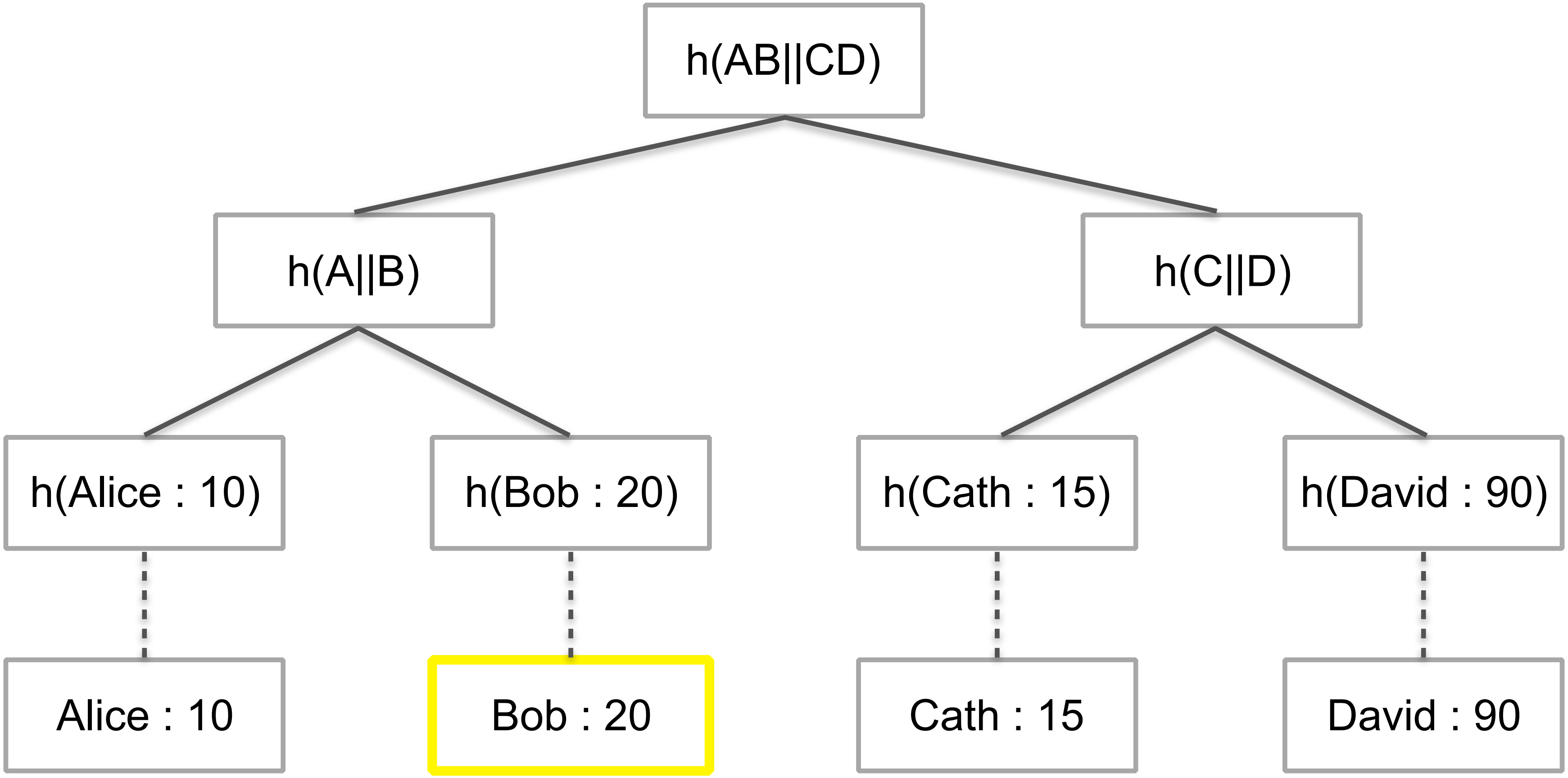

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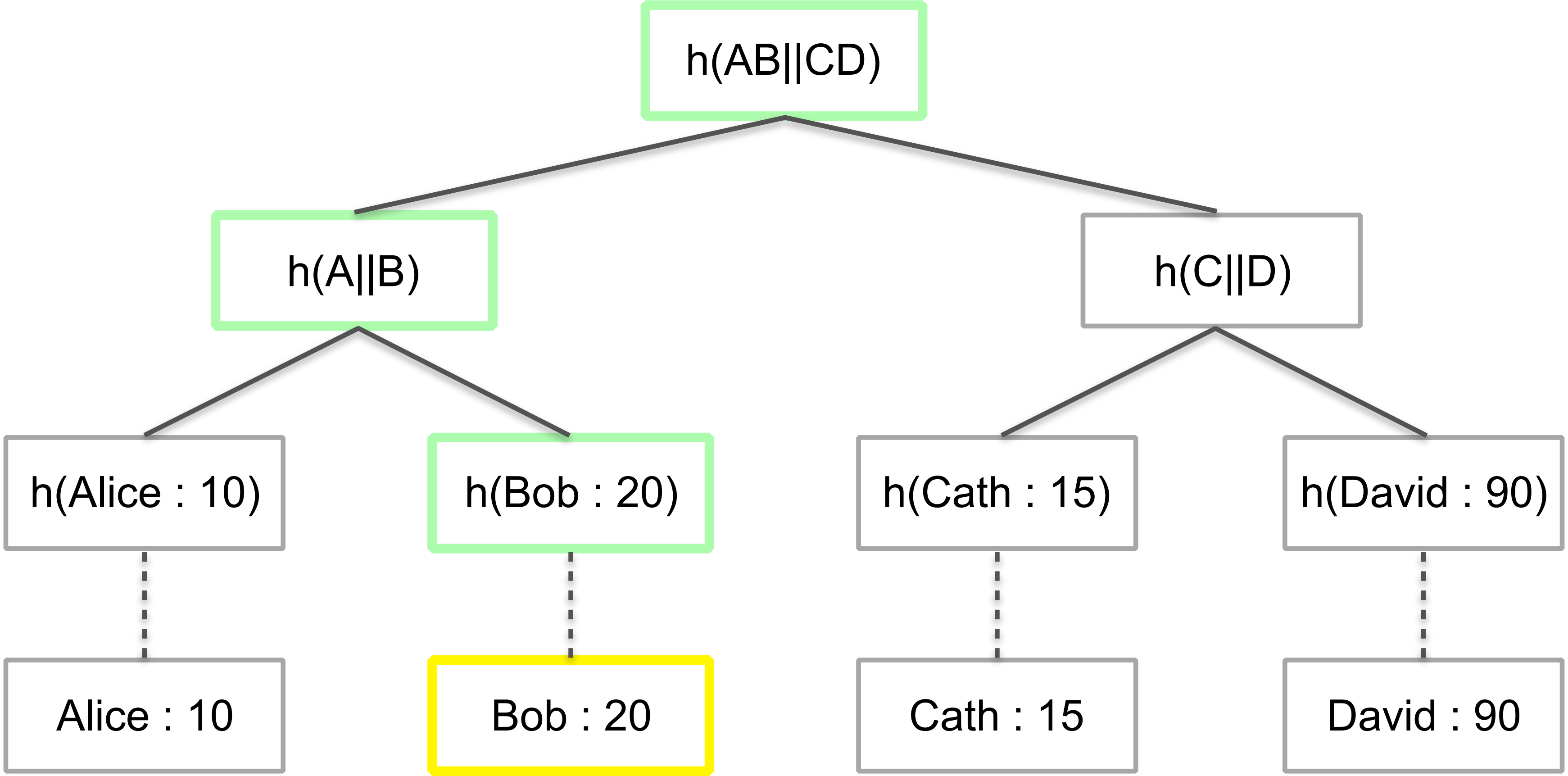

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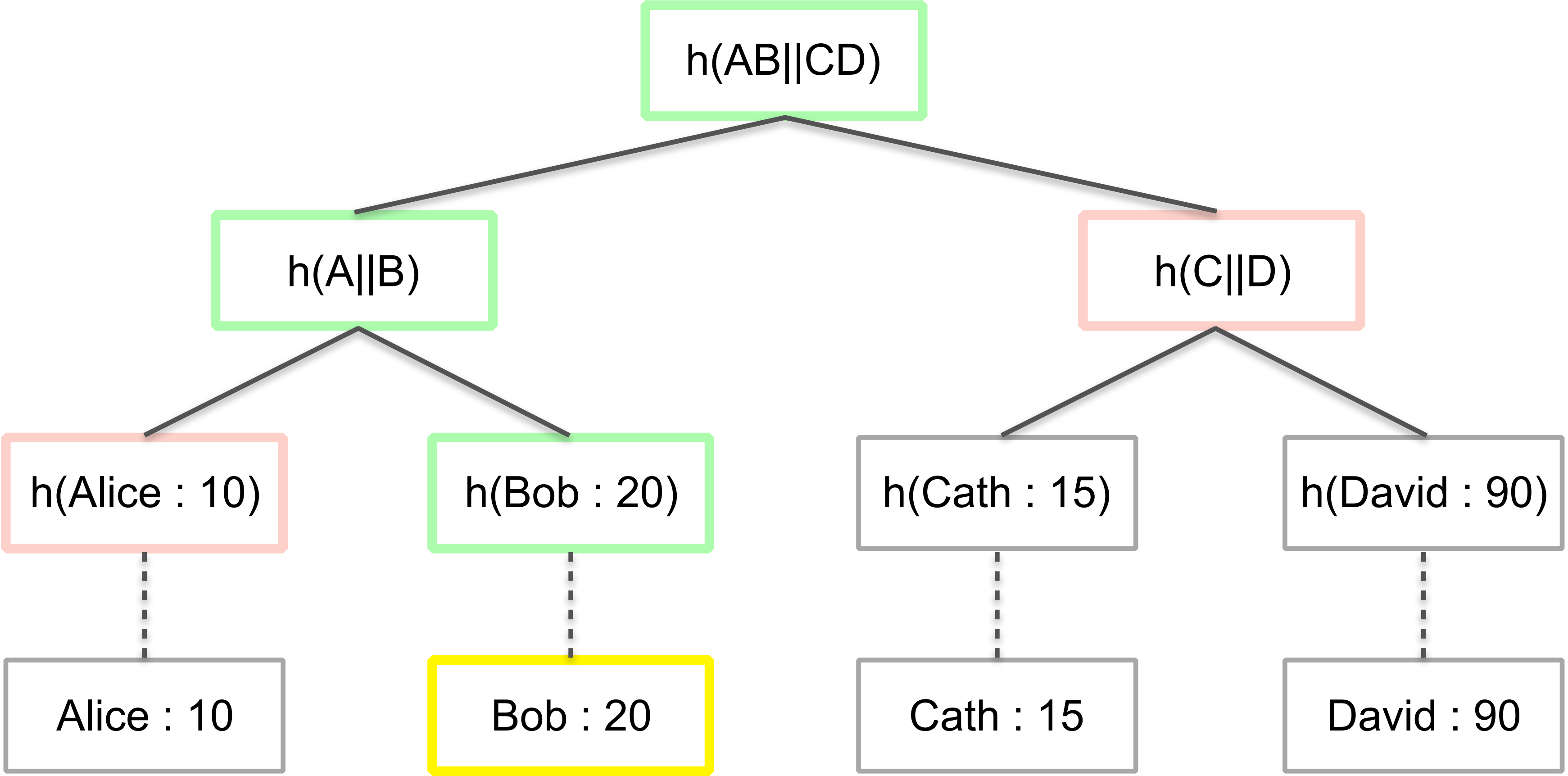
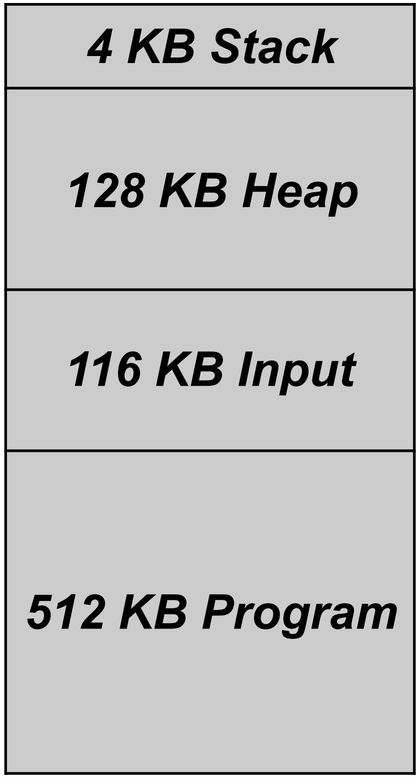


Limitations of Trusted Execution Platform



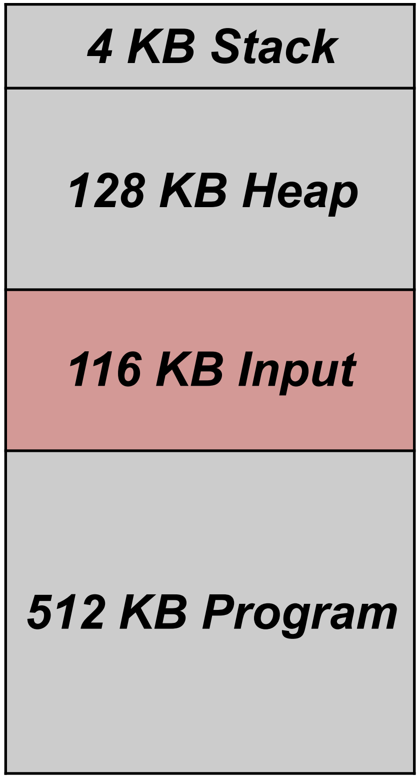
4 KB Stack

128 KB Heap

116 KB Input

512 KB Program

Limitations of Trusted Execution Platform



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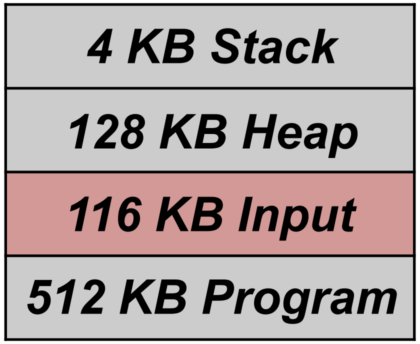

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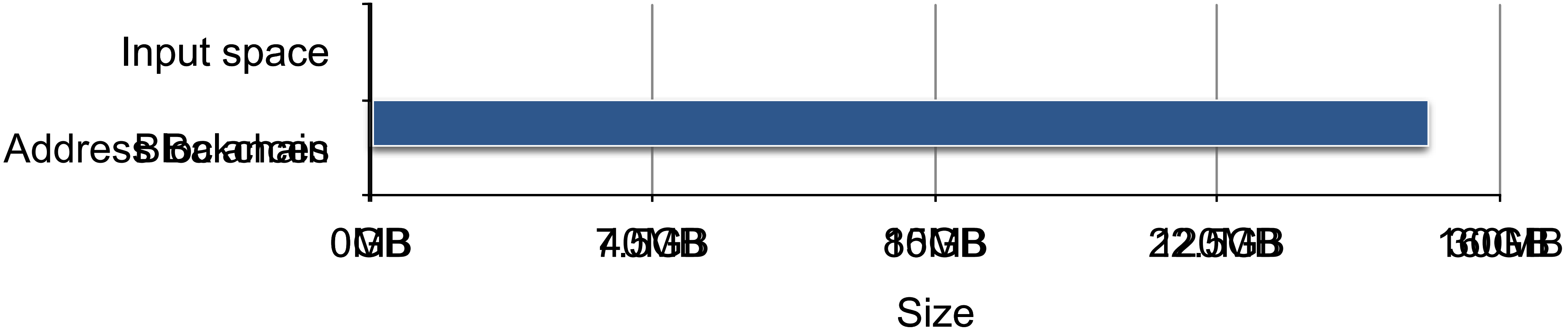

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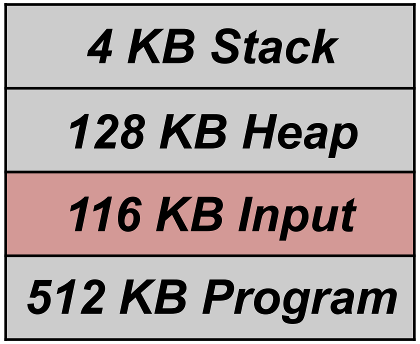

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Memory constraints

Limitations of Trusted Execution Platform

4 KB Stack
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512 KB Program

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Limitations of Trusted Execution Platform

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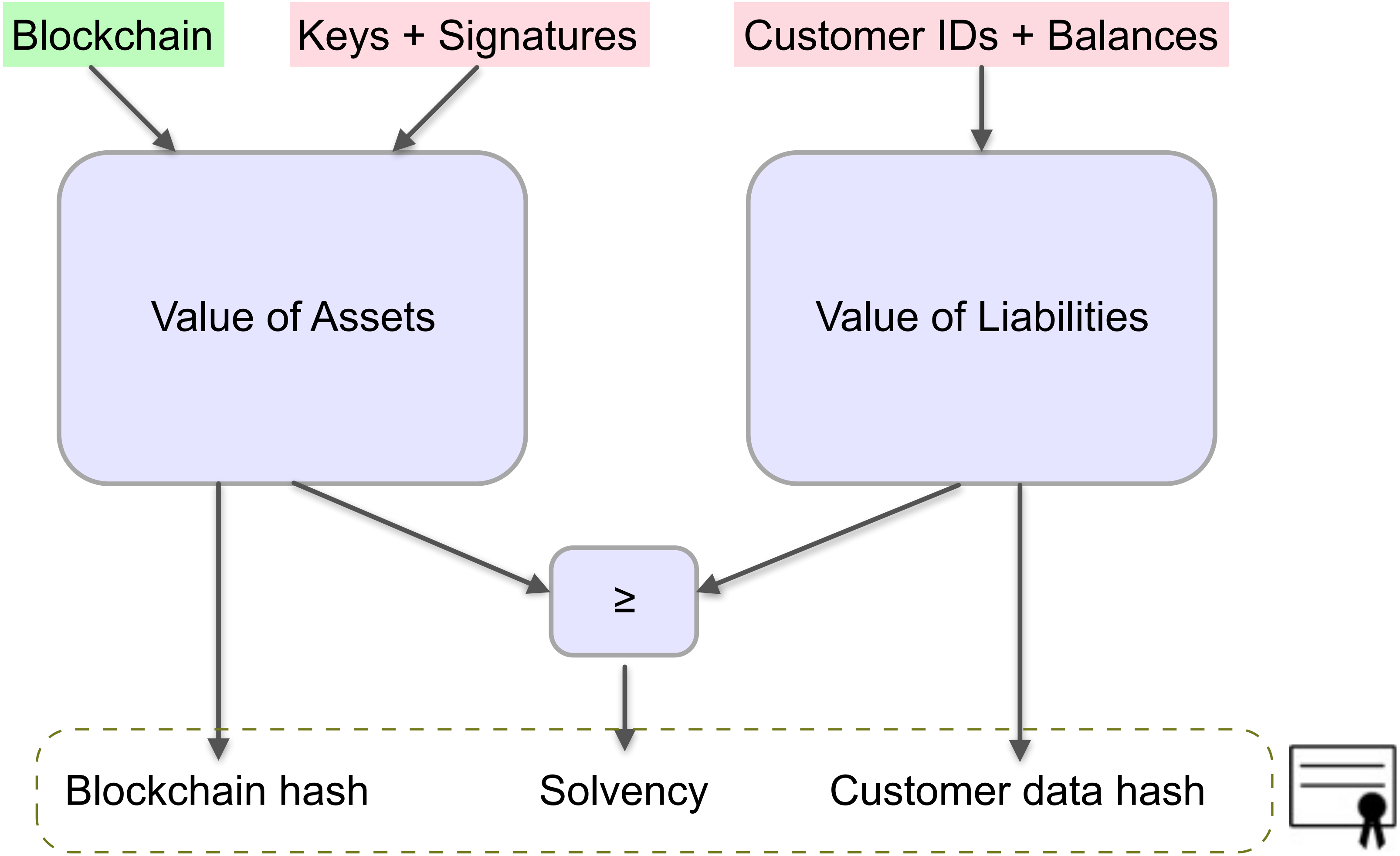
Memory constraints

Time constraints

- 200ms-1s overhead
- 0.5-1s cooldown

Overview of Audit Process



Blockchain

Keys + Signatures

Customer IDs + Balances

Value of Assets

Value of Liabilities

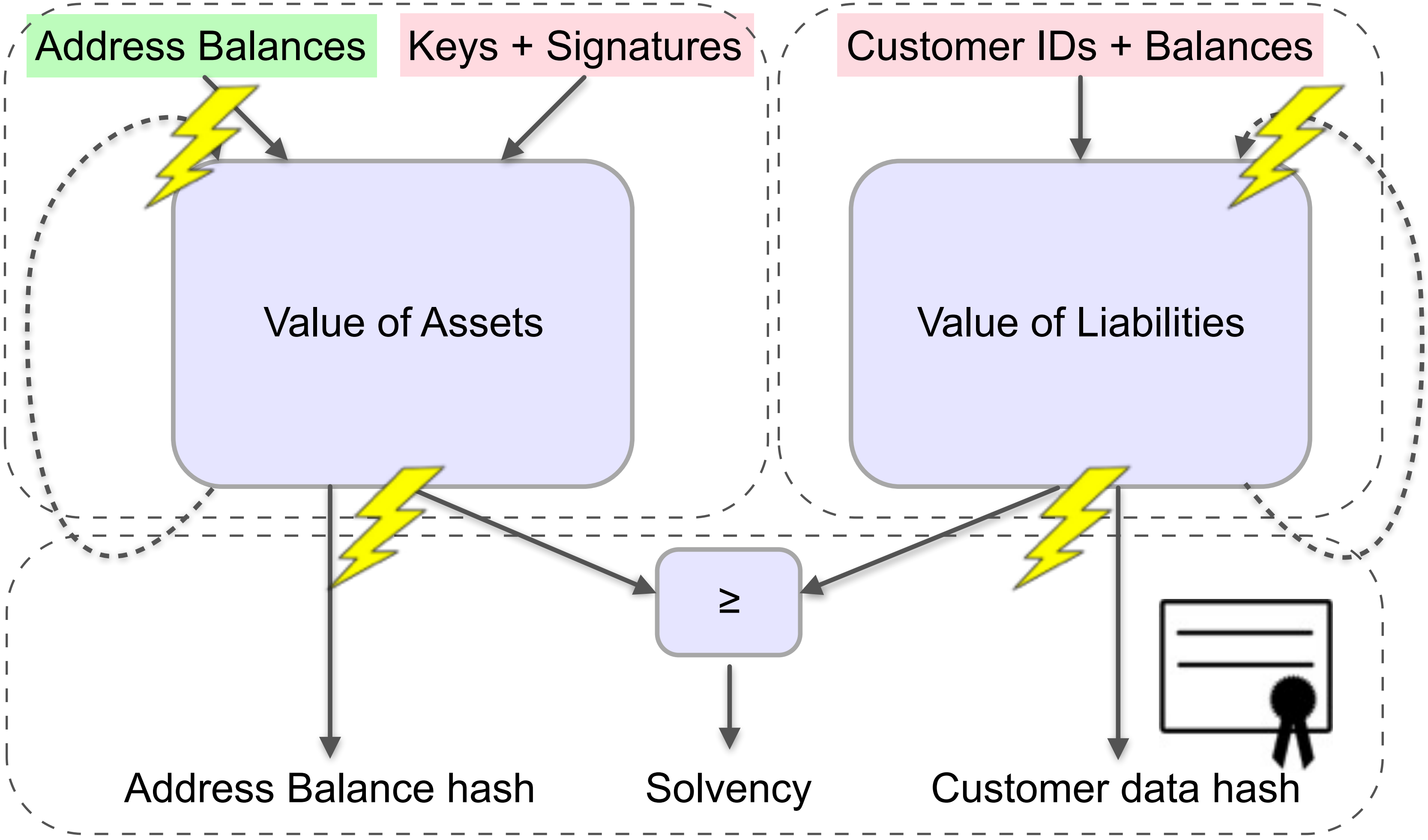
≥

Blockchain hash

Solvency

Customer data hash

Overview of Audit Process



Address Balances

Keys + Signatures

Customer IDs + Balances

Value of Assets

Value of Liabilities

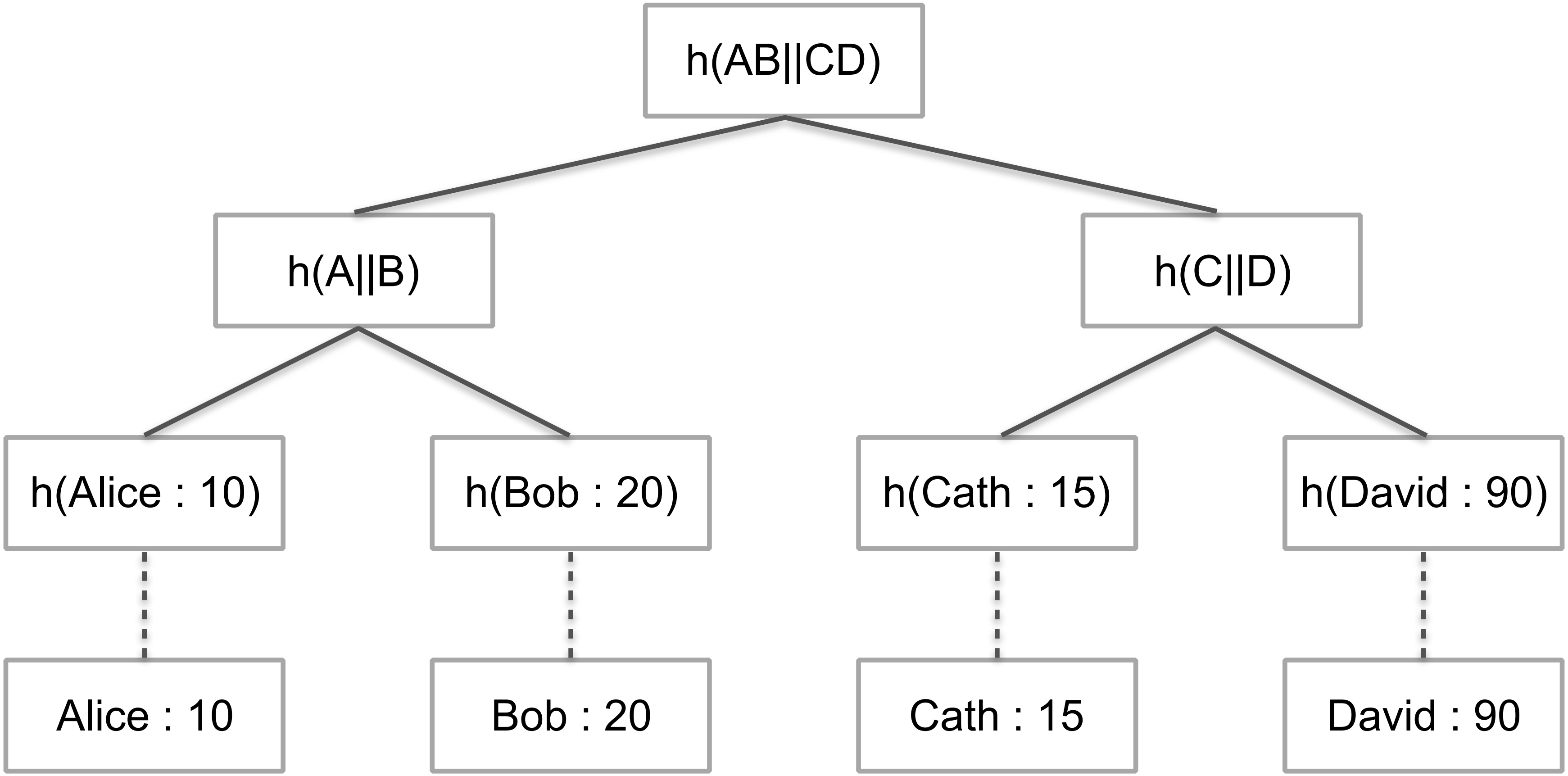
≥

Address Balance hash

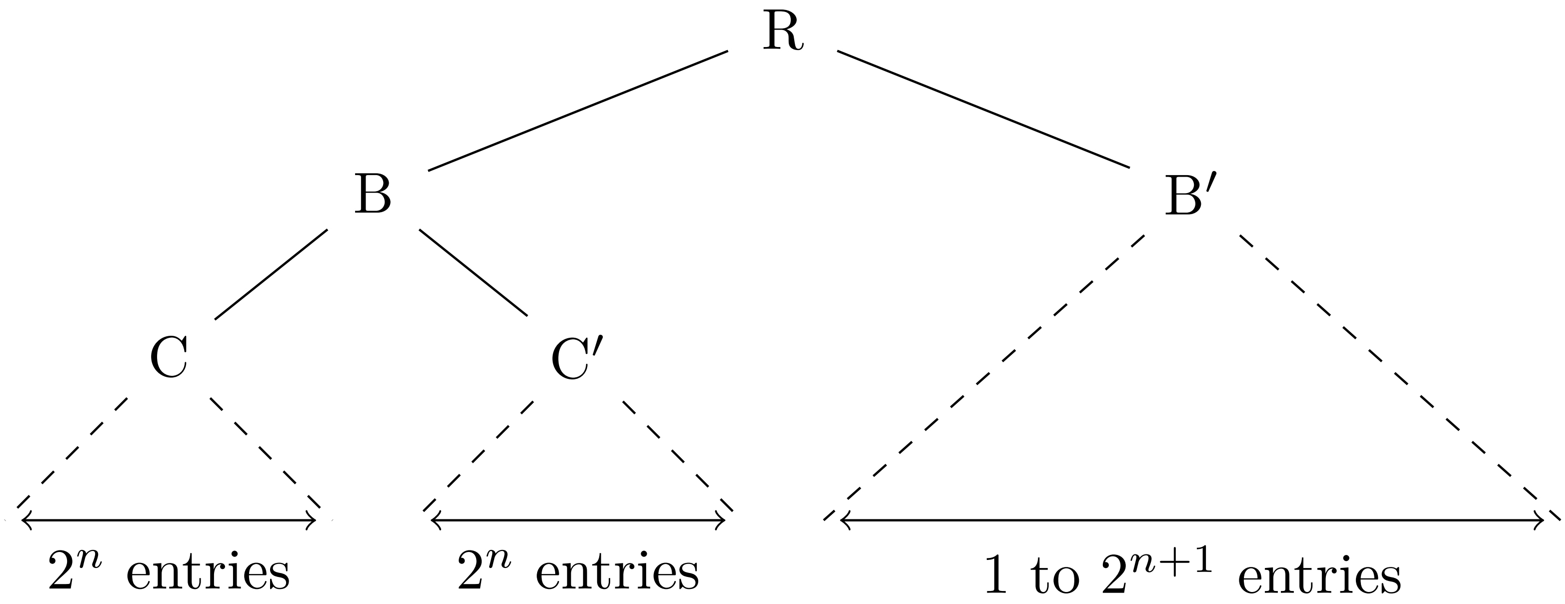
Solvency

Customer data hash

Iterative Customer Verification



Iterative Merkle Tree



Summary

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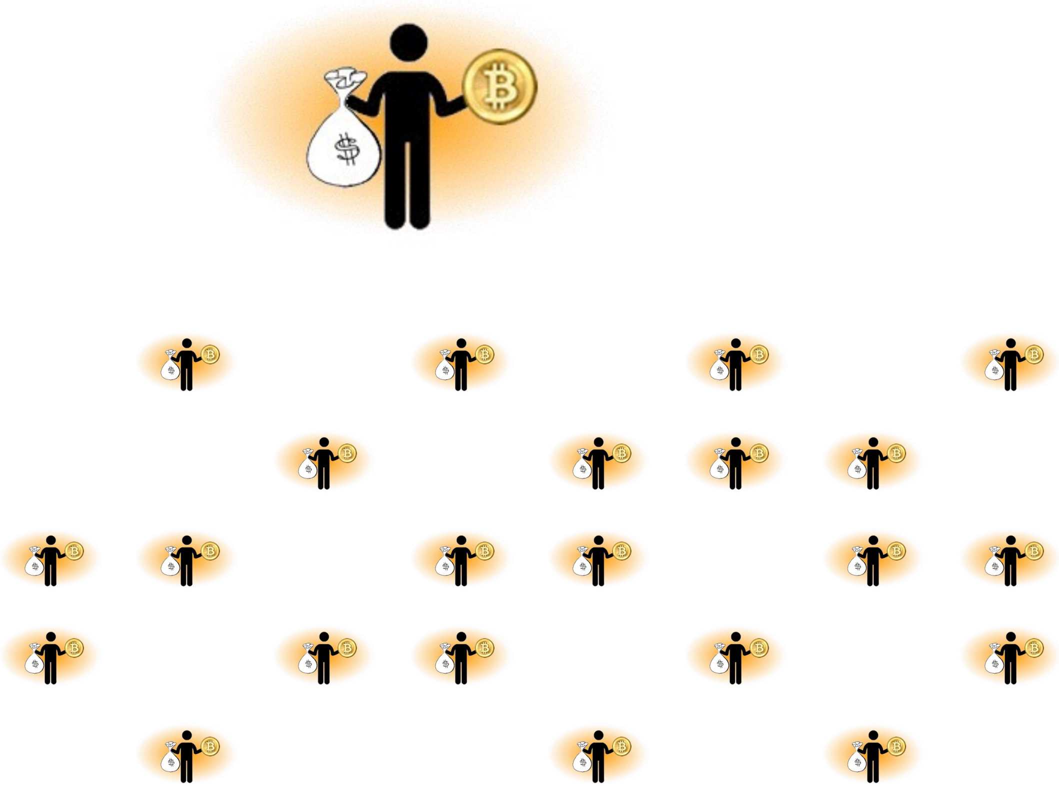

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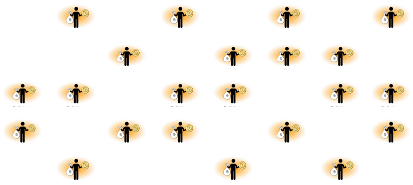

Summary

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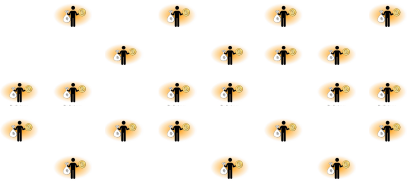
Assets

Liabilities

Summary



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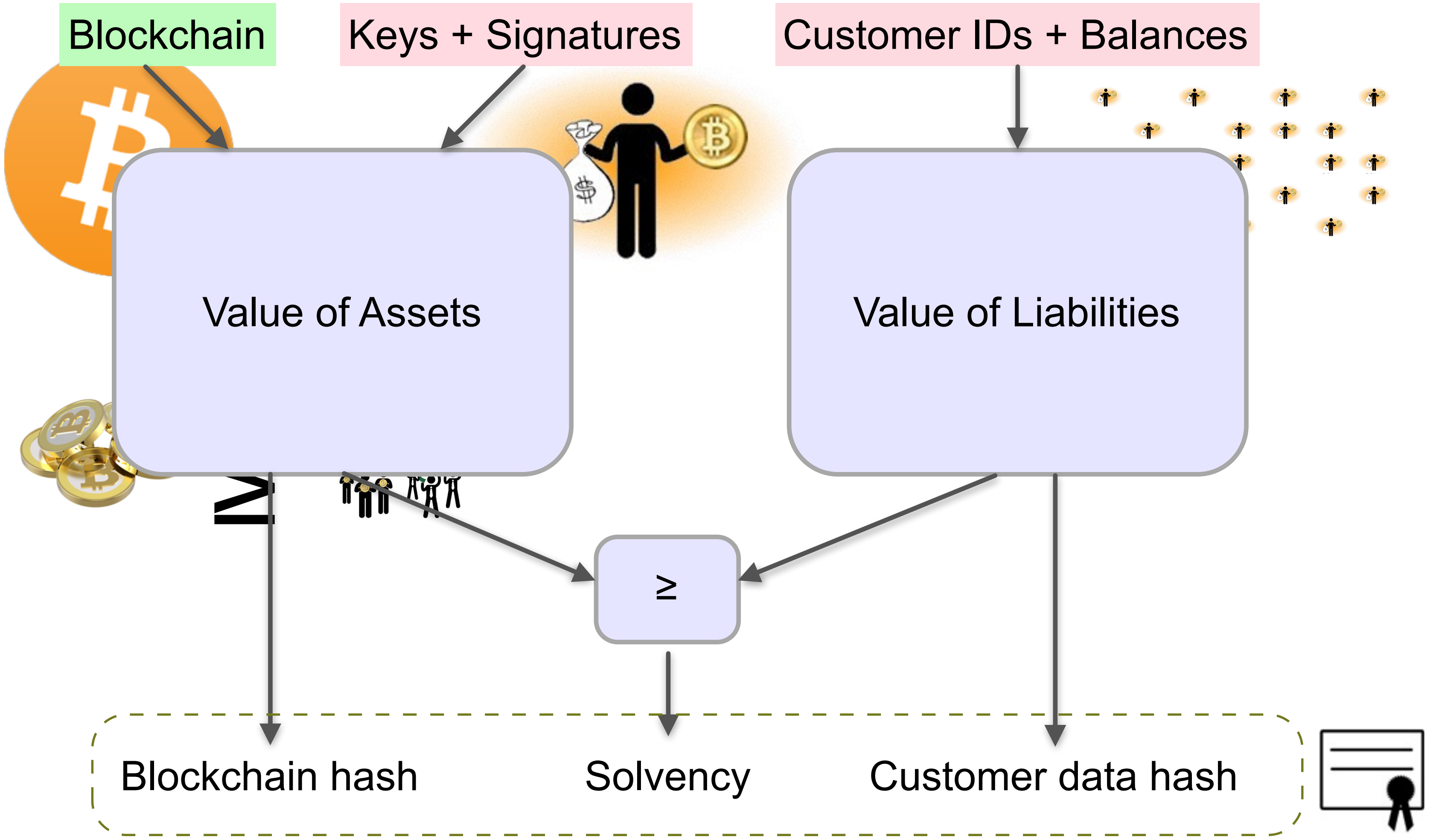

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Keys + Signatures

Customer IDs + Balances

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Value of Liabilities

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Blockchain hash

Solvency

Customer data hash

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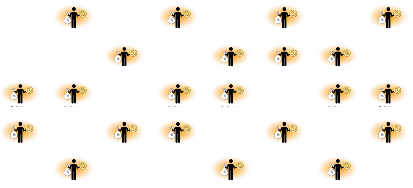

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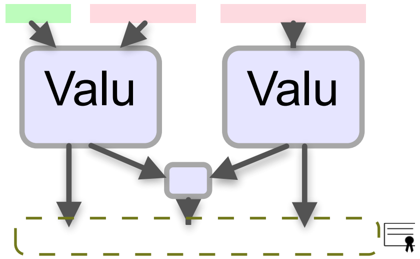

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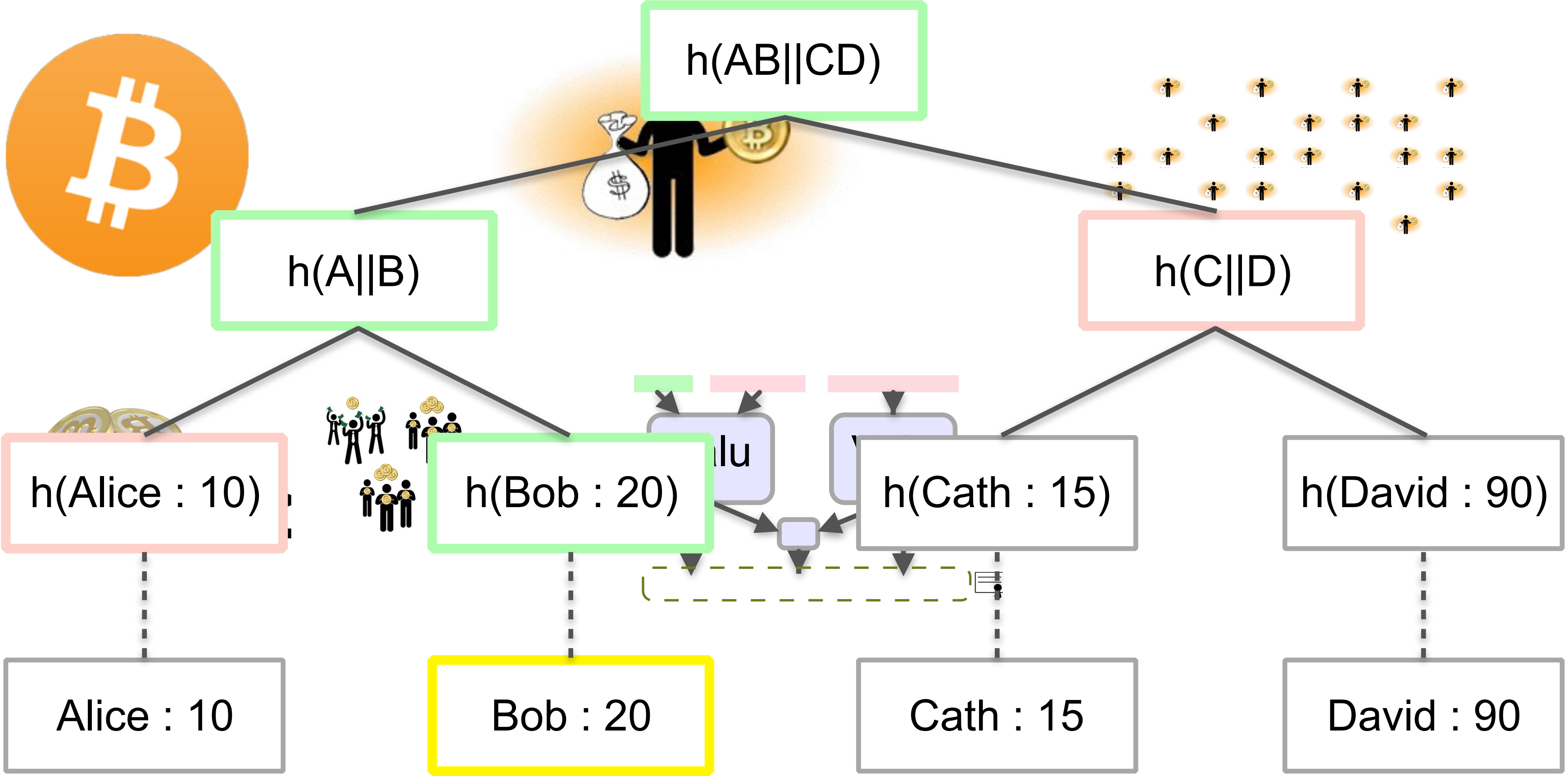
h(AB||CD)
h(A||B)
h(C||D)
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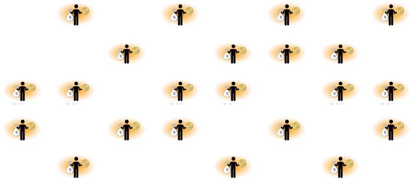
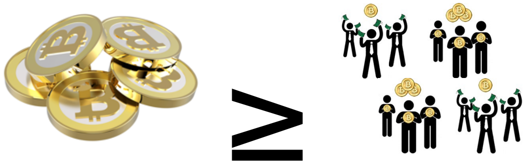
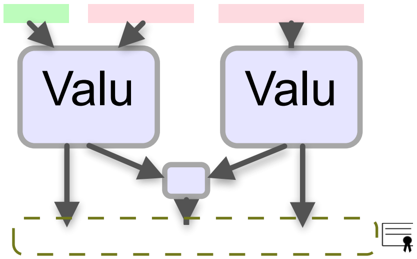
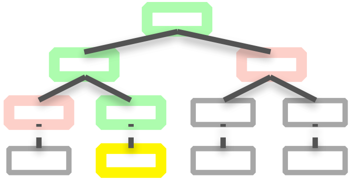
h(Alice : 10)
h(Bob : 20)
h(Cath : 15)
h(David : 90)
Alice : 10
Bob : 20
Cath : 15
David : 90

Summary









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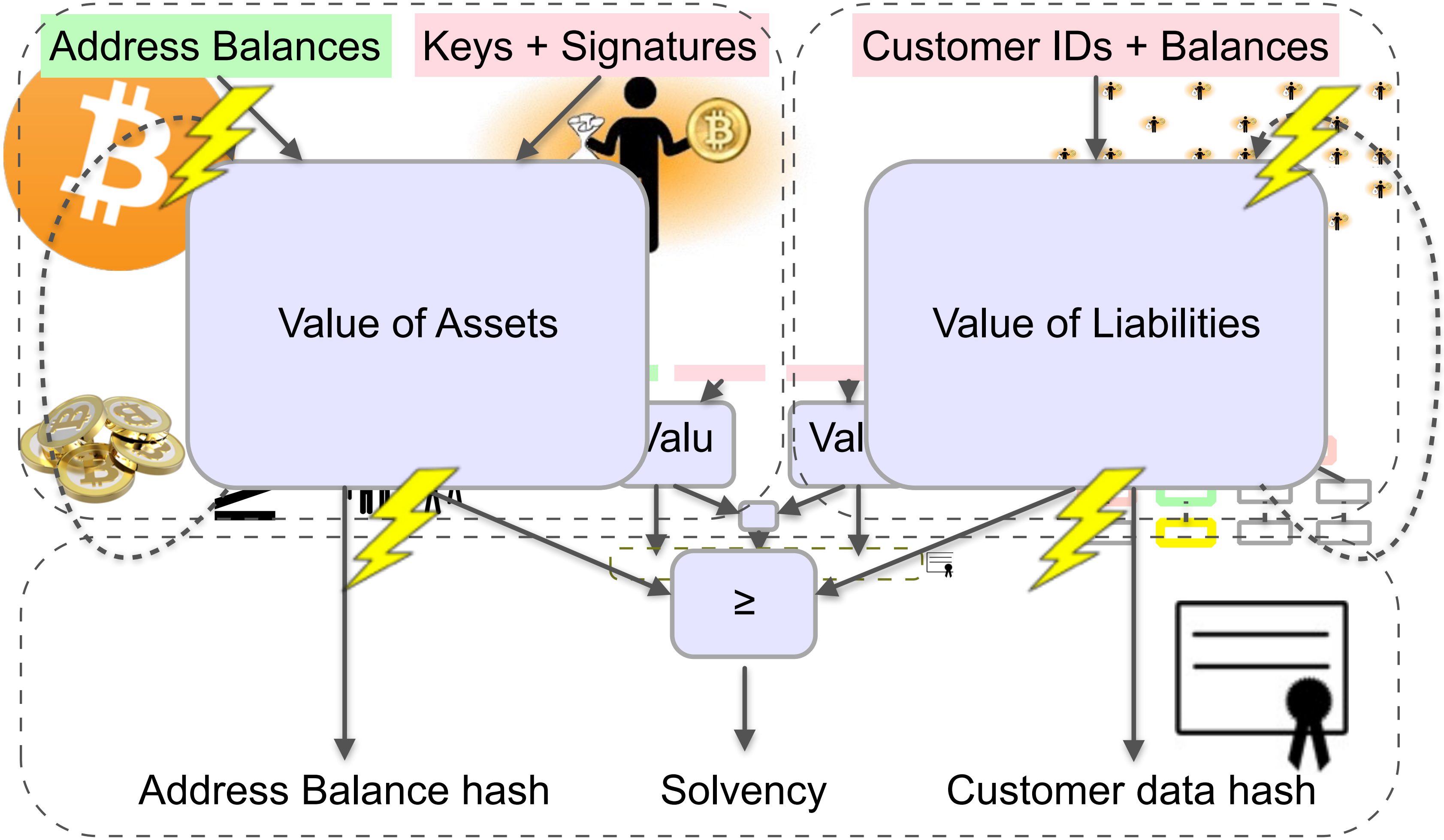
Address Balances
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Customer IDs + Balances
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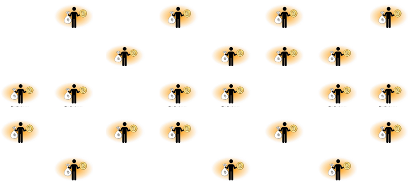
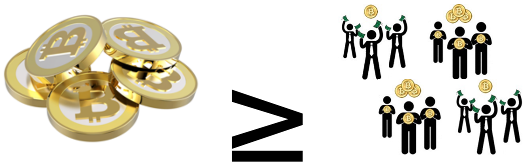
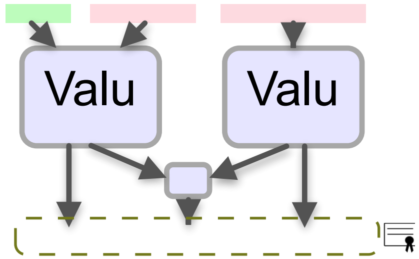
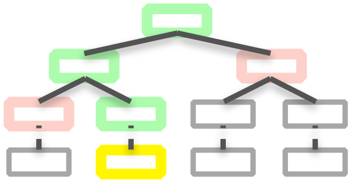
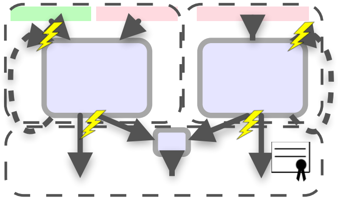
Summary











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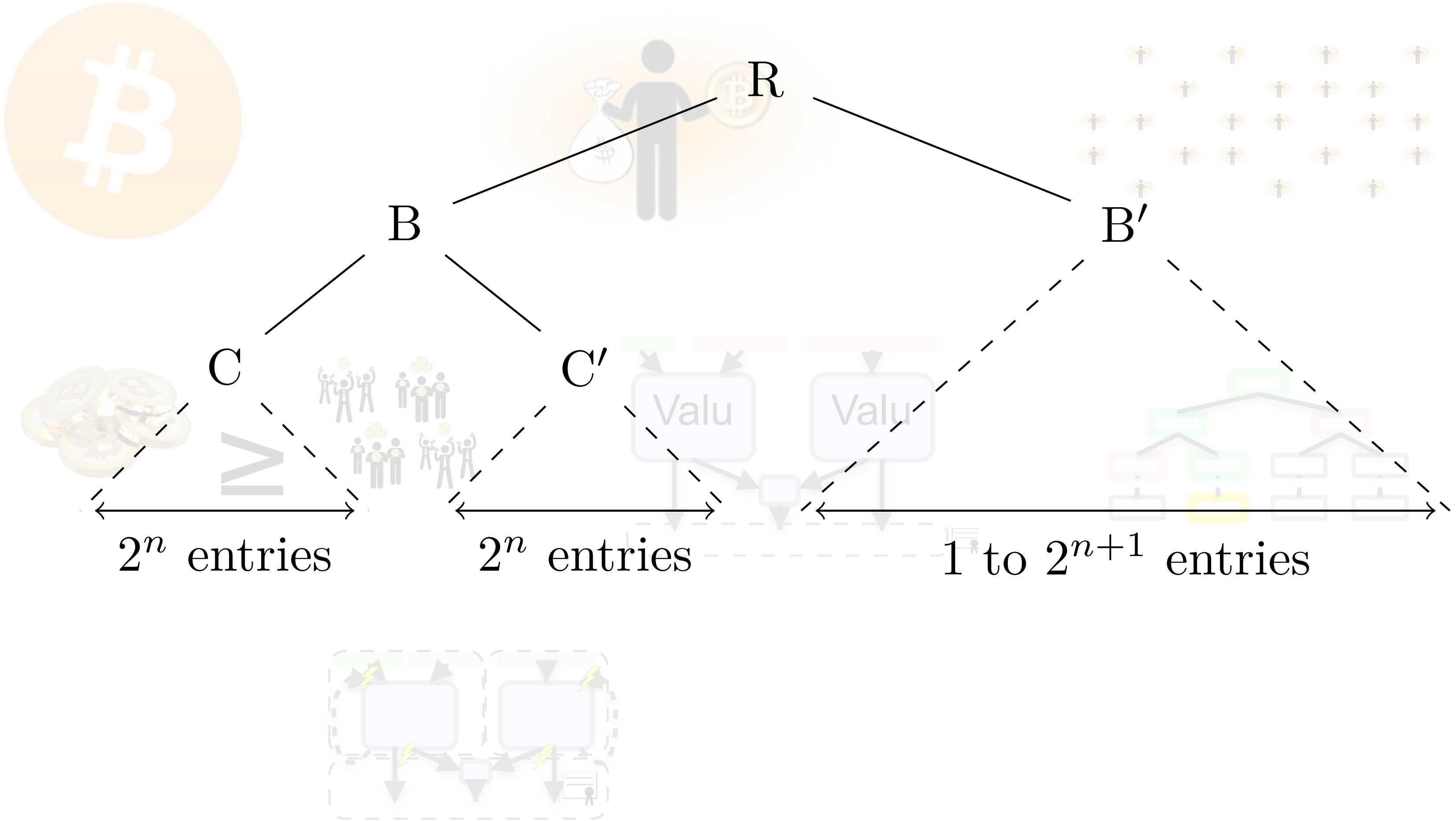

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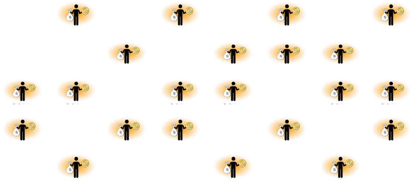

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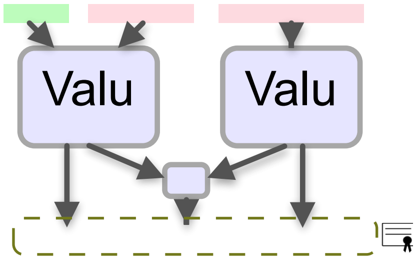

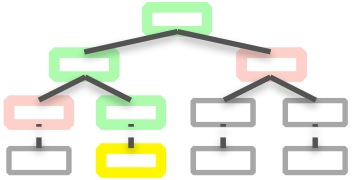

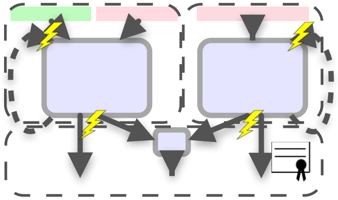

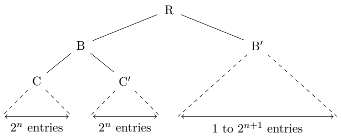

Thank you

Questions?