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Tokenizing Real World Assets

- A Massive Opportunity
- How we are missing it
- And, how to grab it

Definitions

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Tokens

Tokens or digital tokens are digital bearer assets ~~on a blockchain or a DLT~~.

Virtual Tokens

Tokens that do not have any real world representations. Often created by blockchain protocols.

Asset-backed Tokens

Tokens that are ownership titles to real-world assets.

Tokenization

Process of maintaining custody of a real world asset and representing it as a digital bearer asset.

Virtual Tokens are Easy

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Creating virtual tokens that are not pegged to any real world assets is well understood.

Two Requirements

- Secure Double-Spend prevention.
- No centralized control over transaction processing.

Nakamoto consensus algorithm successfully addressed the above two requirements.

Large Interest in Tokenizing Real World Assets

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Real World Assets

- Equities
- Bonds
- Real Estate
- Commodities
- Retail Currencies (paper money)
- Wholesale Currencies (inter-bank money)

Perceived Benefits of Tokenization

- Efficiency gains via automation
- Efficiency gains via disintermediation
- Instant global settlements
- Reduced liquidity requirements

Attempts at Tokenization: Equities

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Exchanges Experimenting with Tokenization of Equities [1]

- Warsaw Stock Exchange
- Australian Stock Exchange
- Deutsche Boerse
- Indian National Stock Exchange
- Japan Exchange Group
- Korea Exchange
- London Stock Exchange
- Luxembourg Stock Exchange
- Moscow Exchange
- Nasdaq
- Santiago de Chile Exchange
- Nasdaq
- SIX
- TMX Group

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements.

Attempts at Tokenization: Bonds

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Bonds Issued on Ethereum

- In 2017, Nivaura issued an Ether-denominated Bond using the UK FCA regulatory sandbox [1].
- In 2019, Societe Generale issued a bond on Ethereum [2].

Bonds Issued on DLT

- In 2018, the World Bank created the first legally binding bond on DLT [3].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements.

Attempts at Tokenization: Real Estate

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Real Estate Tokens issued on Ethereum

- In 2018, Propellr and Fluidity launched the tokenization of USD30m Manhattan property on Ethereum [1].

- In 2019, Equisafe investment platform tokenized a luxury property on Ethereum [2].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements.

Attempts at Tokenization: Commodities

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Several Gold-backed crypto-currencies exist

- Paxos Gold (PAXG)
- Perth Mint Gold Token (PMGT)
- Digix Global (DGX)
- Tether Gold (XAUT)
- Meld Gold by Algorand

Oil backed crypto-currency

- In 2017, Venezuela announced Petro, a crypto-currency backed by its oil reserves [1].

Perceived benefits include instant settlements for payments and trading activities.

Attempts at Tokenization: Retail Currencies

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Fiat-backed stablecoins

- Total market-cap of stablecoins is approximately $35B [1].
- Some regulators demand that stablecoins may only be issued by licensed entities and only be traded within regulated exchanges, e.g., Singapore based xSGD [2].

Retail CBDC

- China is testing its retail CBDC in Suzhou. Phone-to-phone offline, in-person payments [3].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.

Attempts at Tokenization: Inter-bank Money

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Inter-bank Stablecoins

- JP Morgan Coin for inter-bank settlements [1].

Wholesale CBDC

- Various Central Bank initiated projects around the world. Project Ubin [2], Project Jasper [3], eKrona [4], etc.

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.

Observations

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Strong Interest in Tokenization

Across all asset-classes.

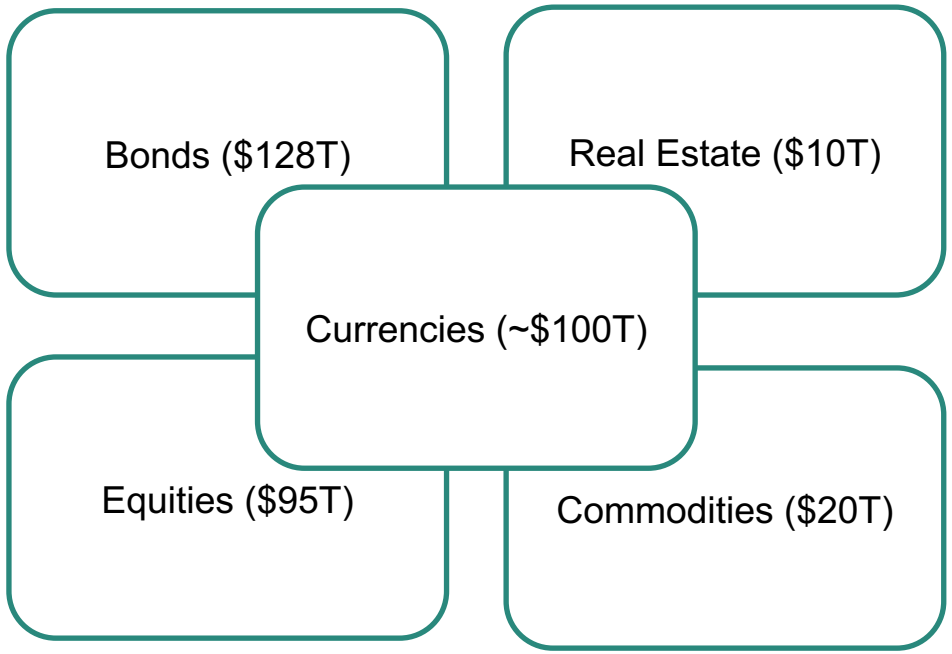
Retail Use-cases are Flourishing

Regulatory over-sight on person-to-person transactions is minimal in several jurisdictions.

Institutional Use-cases are Stymied (not for lack of trying)

There are strong confidentiality and compliance requirements for institutional use-cases.

The Institutional Opportunity



In comparison, present day tokenized world, which primarily comprises of virtual tokens, is valued at $1T.

Institutional Asset-backed Tokens are Hard

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Not two, but four requirements

Four Requirements

- Secure Double-Spend prevention
- No centralized control over transaction processing
- *Confidentiality – Parties not involved in a transaction should not be aware of it.*
- *Compliance – Adherence to data residency, data hygiene and financial reporting guidelines.*

New requirements necessitate a new design. Blockchain inspired approaches will fail.

Current Attempts are Blockchain Inspired

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Let's look at three examples.

ConsenSys Quorum

Permissioned version of Ethereum.

IBM Hyperledger Fabric

IBM's permissioned Blockchain.

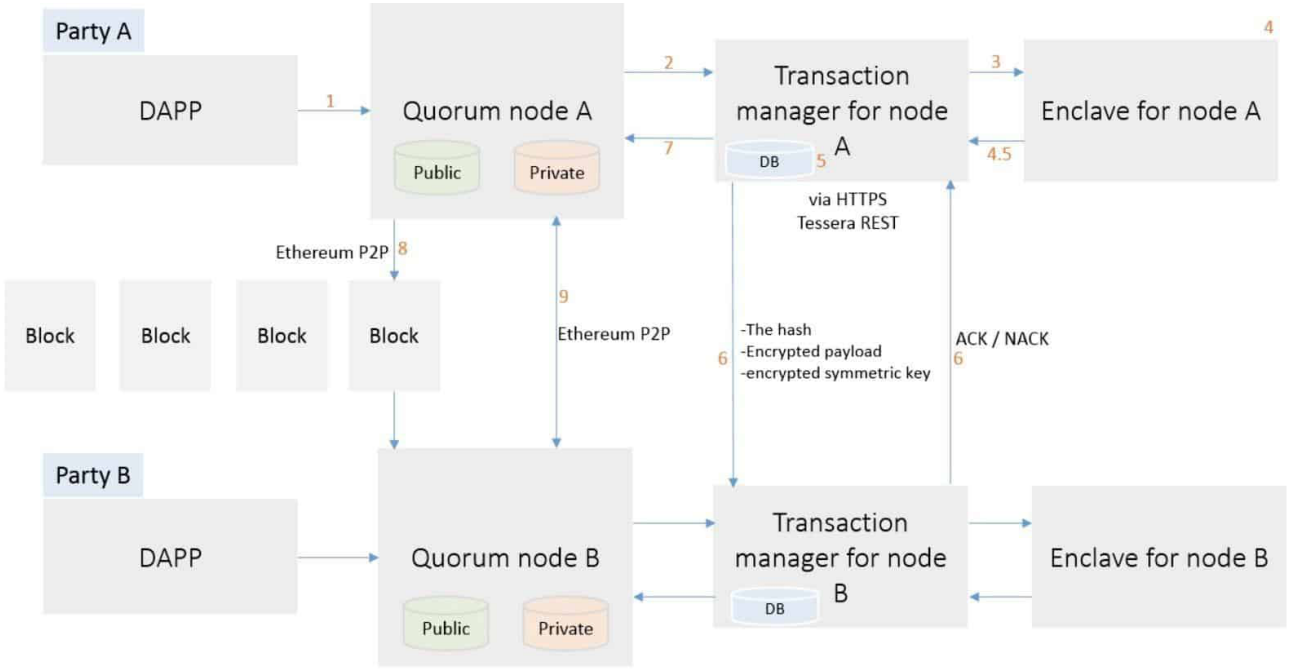
R3 Corda

Distributed Ledger Technology (DLT).

None of these designs jointly satisfy the four requirements.

ConsenSys Quorum

Permissioned version of Ethereum. Also has a confidential transactions mode.

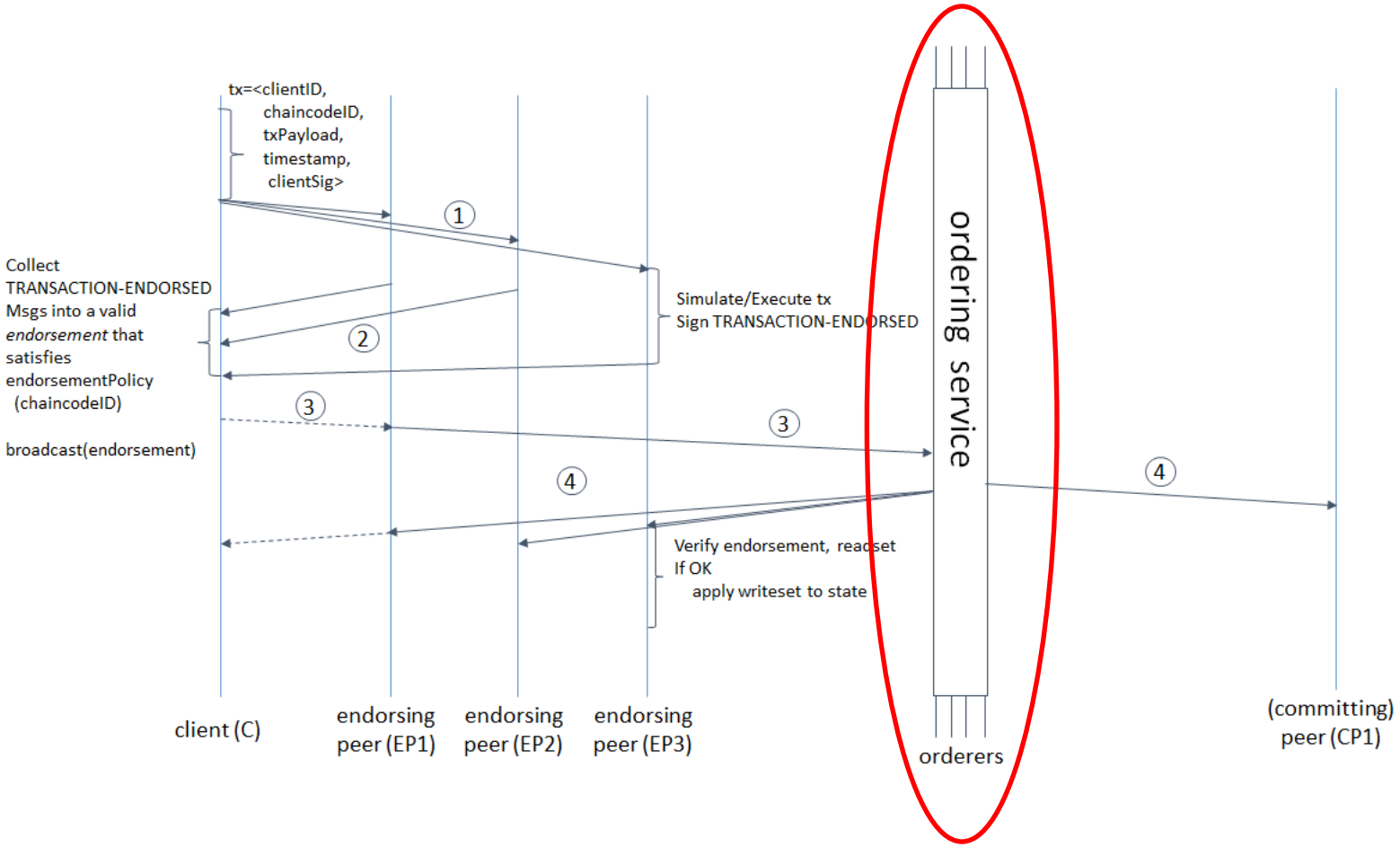


- Payload of confidential transactions is sent to parties involved in transaction. Payload hash is sent to all members to aid ordering via consensus.
- **Problem:** Payload hash does not contain enough information to ensure double-spend prevention when only two parties are involved in a tx. Confidential digital asset transfers are impossible.

JP Morgan, the creator of Quorum, recently sold it to ConsenSys [1]. We believe Quorum is not being used in JPM Coin.

IBM Hyperledger Fabric

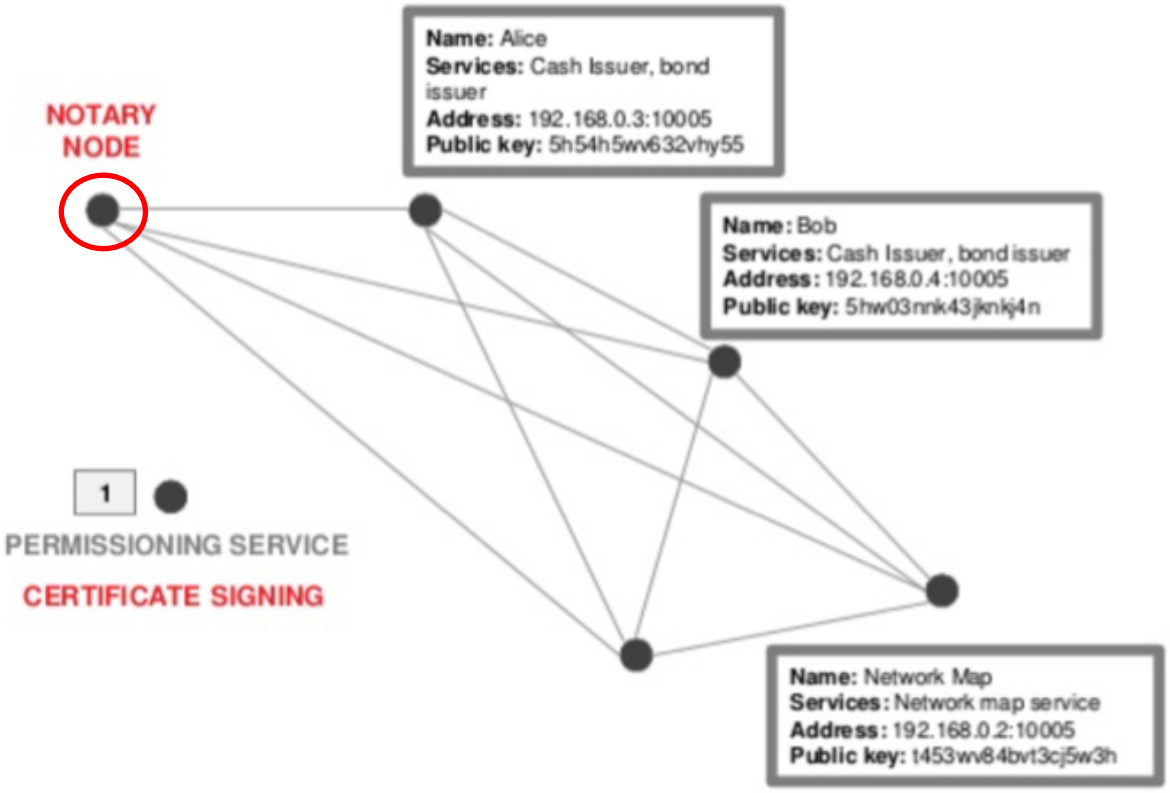
Philosophy: Blockchains are replicated databases.



- **Problem:** If ordering service is operated by a centralized entity, decentralization requirement is not satisfied.
- **Problem:** If ordering service is operated by a decentralized set of peers then confidentiality and compliance requirements are not satisfied.

  Cross-org replication of data, even encrypted data accrues tremendous liabilities on enterprises.

R3 Corda



- The notary service is essentially a transaction ordering service.
- **Problem:** The notary service is centralized. Decentralization requirement is not satisfied.

Half Epsilon's Approach

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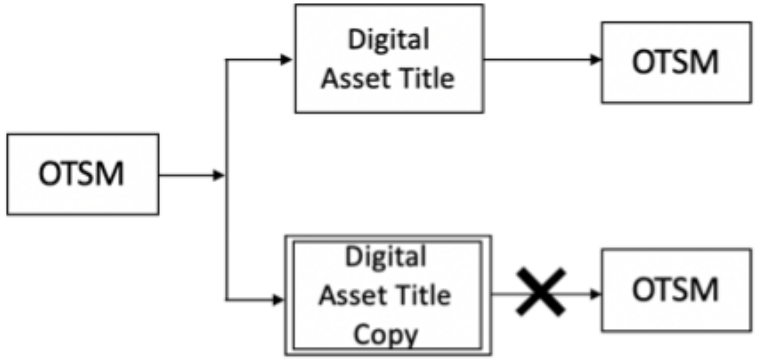
1. Ignore the Blockchain / DLT hype
2. Re-solve the double-spend prevention problem to satisfy the four requirements

This is very hard! But, we did it.

Product: One Time Spend Machine

OTSM – A Special Purpose
FIPS 140-2 Level 3 HSM



OTSM prevents a digital asset from being spent multiple times.

	OTSM
Confidentiality	Yes
Security	Yes
Decentralization	Yes
Compliance	Yes

OTSM enables direct institution-to-institution transfers of Tokens. No blockchain / DLT. Satisfies the four requirements.

The Bottom Line

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Every solution to the double-spend prevention problem brings in massive change.

Think Digital Banking

Enabled by resilient databases.

Think Crypto-economics

Enabled by Nakamoto consensus.

Think One-tap Payments

Enabled by secure ICs in stored value cards and mobile phones.

Now, Think Institution-grade Tokenization of Real world assets

Enabled by Half Epsilon OTSM.

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Thank You!

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