Facilitating the Decentralised Exchange of Cryptocurrencies in an Order-Driven Market

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Agenda

1. **Centralised Exchanges *(CEX)* vs. Decentralised Exchanges *(DEX)***—Two different paradigms creating different risk profiles for traders

2. **Protocol**—Combining centralised and decentralised elements and the need for performance scoring

3. **Future Work**—Addressing the trade-off between anonymity and reliability in a decentralised environment via a zero-knowledge protocol

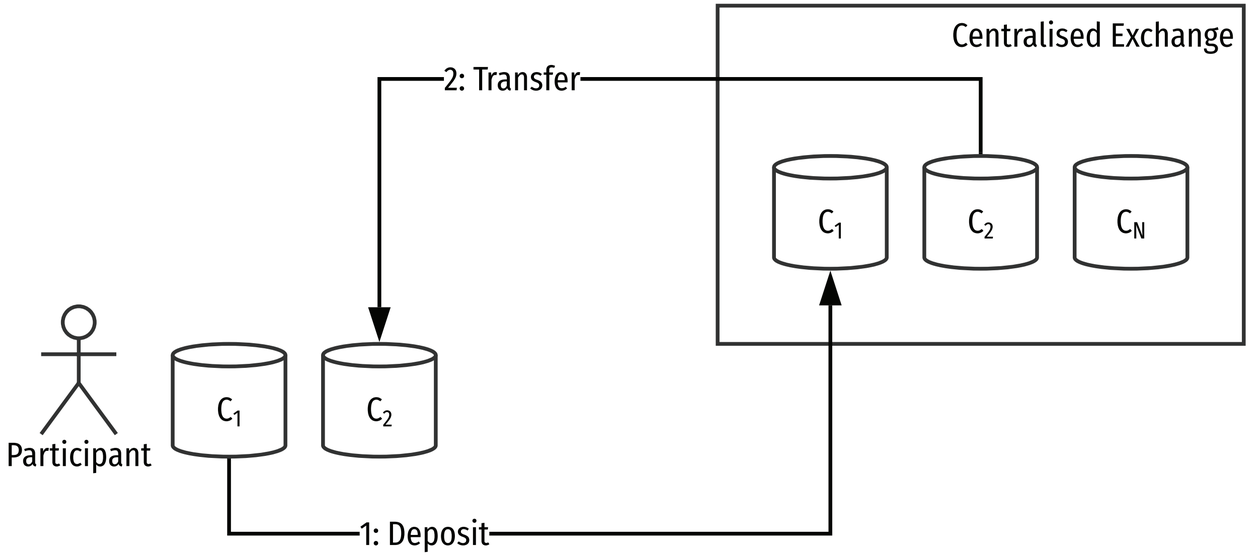
CEX by Trade Volume

	Name	Volume (24h)	Volume (7d)	Volume (30d)	No. Markets
1	BKEX	$3bn	$18.3bn	$74bn	100
2	Fatbtc	$2.8bn	$16.1bn	$66bn	114
3	BiKi	$2.4bn	$13.5bn	$57bn	92
4	BitForex	$2.4bn	$15.1bn	$60bn	153

USD rounded, CoinMarketCap (2019)

- All commercially relevant exchanges on the market today operate in a centralised manner
- Centralised exchanges provide market-making capabilities by holding a reserve of crypto-currencies, standing ready to buy currency and to sell
- Well understood model based on the same principles as foreign exchange spot trading of fiat currencies

Anatomy of a *CEX*



- Participants deposit currency into exchange account
- Exchange pays out funds at agreed rate to recipient account
- Business model reliant on fees and bid-ask-spread (Bundi and Wildi, 2019)

Risk of Misappropriation of Funds in Transit in *CEX*

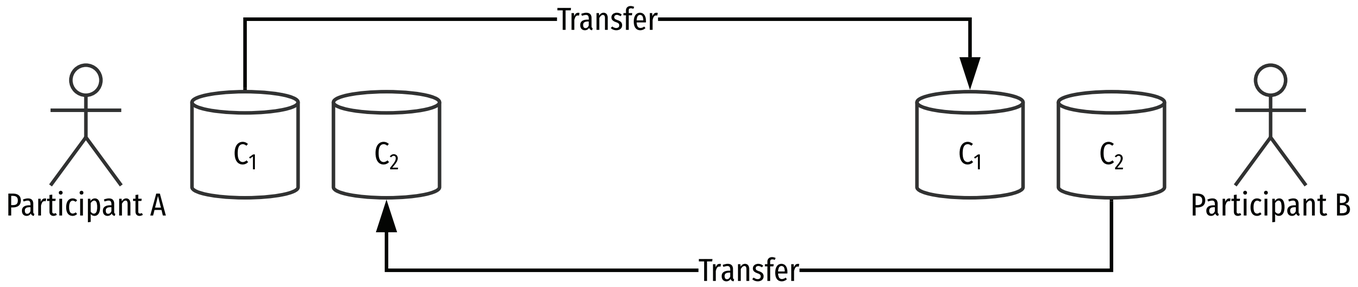
Chohan (2018) outlines collates high-profile incidents:

Year	Exchange	Impact
2011	Mt. Gox	$8m
	Bitomat	$220k
	MyBitcoin	$800k
2012	Bitcoinica	$460k
	Bitcoin Savings and Trust	$5.6m
	Bitfloor	$250k

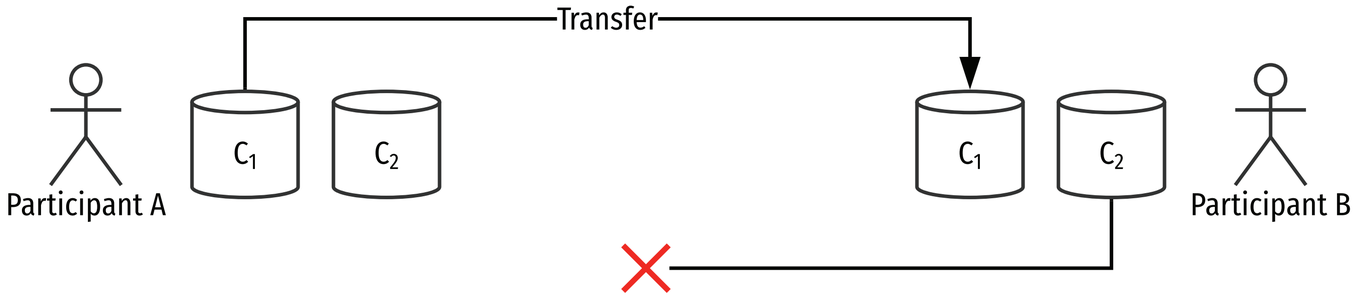
Year	Exchange	Impact
2012	Bitfloor	$250k
2013	Instawallet	$4.6m
	Inputs.io	$730k
	Global Bond Limited	$5m
2014	Mt. Gox	$390m
2015	Bitstamp	$5.1m

USD rounded

Naïve *DEX*

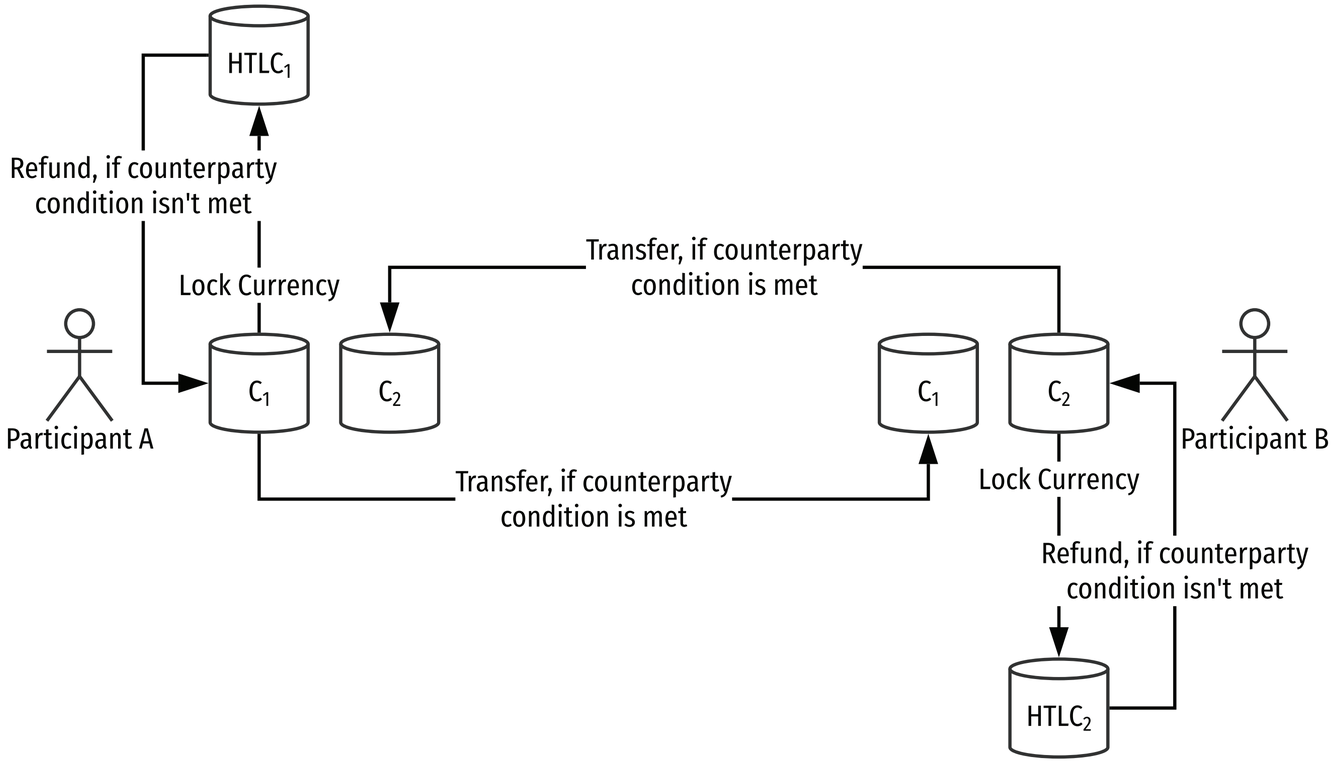


- *A* transfers a previously agreed amount of C_1 to *B* who in turn transfers a previously agreed amount of C_2 back to *A*
- Transactionality of transfers is key



Transactional *DEX*

- The prevalent paradigm utilised to enable ‘atomic’ swaps between different cryptocurrencies are ‘Hashed Time-Locked Contracts’ (HTLC)
- Most commercially relevant cryptocurrencies can be connected via HTLC (Griffith, 2019)



Exchange Paradigms

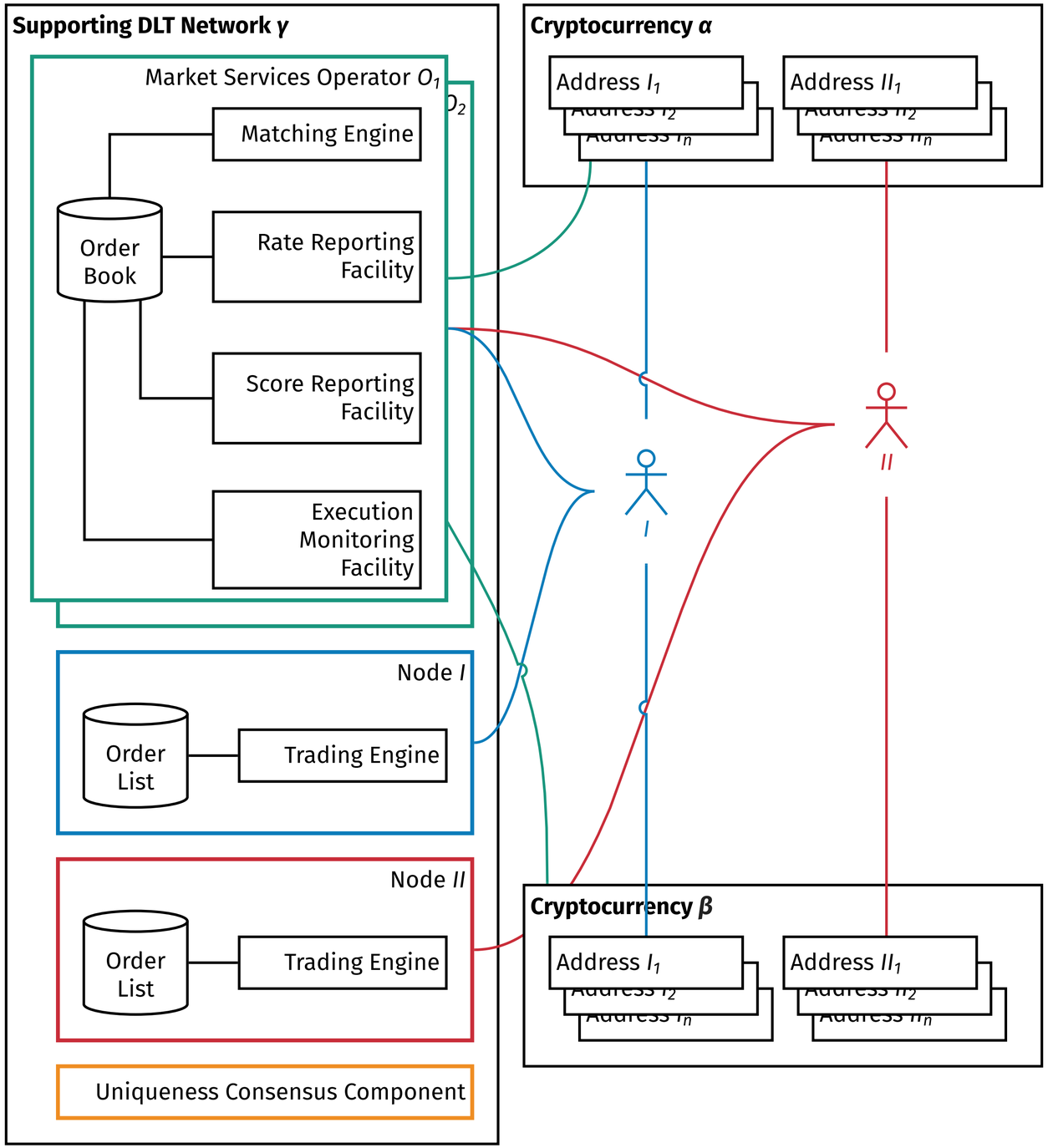
Within paradigms, different aspects are beneficial to traders:

Aspect	CEX	DEX
Risk of misappropriation of funds in transit	High	**None**
Exclusion of participants	Feasible	**Unfeasible**
Direct trading costs	Prevalent	**None**
Trading partner discovery	**Trivial**	Complex
Exchange rate transparency	**Transparent**	Opaque
Opportunity costs due to tied capital	**Low**	High

Protocol Implementation

- Multi-stage protocol that facilitates HTLC-based decentralised exchanges
- Designed to alleviate the downsides of decentralised exchanges:
  - Complicated trading partner discovery
  - Opaque exchange rates
  - Opportunity costs incurred from failed trades
- Introduces a ‘supporting distributed ledger’ to facilitate trades
- Supporting ledger is not involved in the actual execution of trades, thus maintaining the advantages of decentralised exchanges
  - No risk of misappropriation of funds in transit
  - No direct trading costs
  - Censorship resistancy

System Design



Conclusion

- We show how combining centralised elements with decentralised technology can ease trading partner discovery, thus lowering the friction during the preliminary phase of a trade
- We show how performance scoring can lower opportunity costs by reducing the risk of trades falling through

Future Work

- Performance scoring is the main driver for centralisation
- Can we do better, i.e. make performance scoring work in a decentralised fashion?
- Zero-knowledge proofs for successful/failed trade volumes?

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