



Cellular DFC Design: Technological Perspectives

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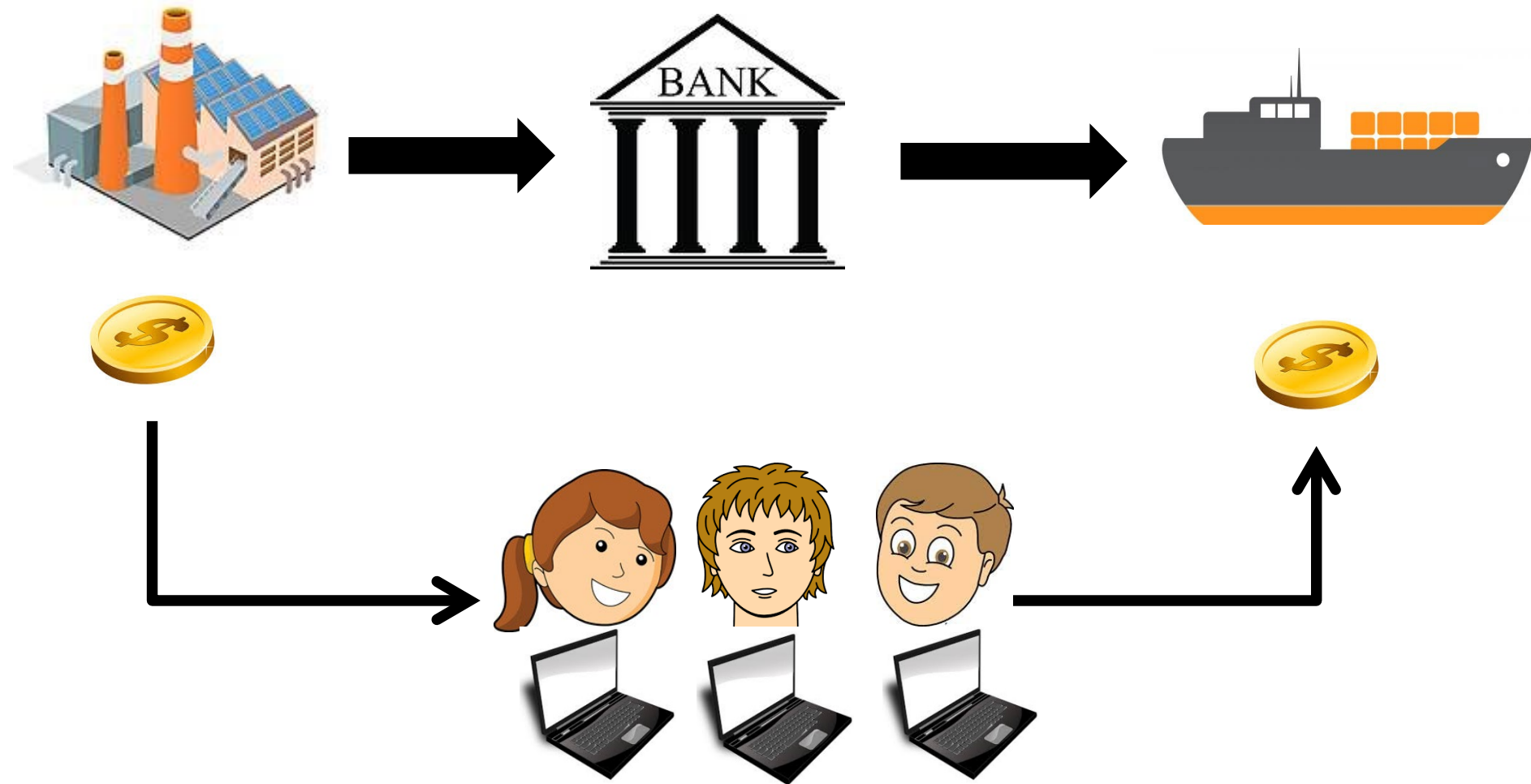


NUS
National University
of Singapore

School of
Computing

The Premise:

Decentralized Digital Payments



But, Why?

- Resilience, Auditability and Reconciliation
- “Tokenization”: Improves Liquidity, Fractionalization
- Levelling the playing field

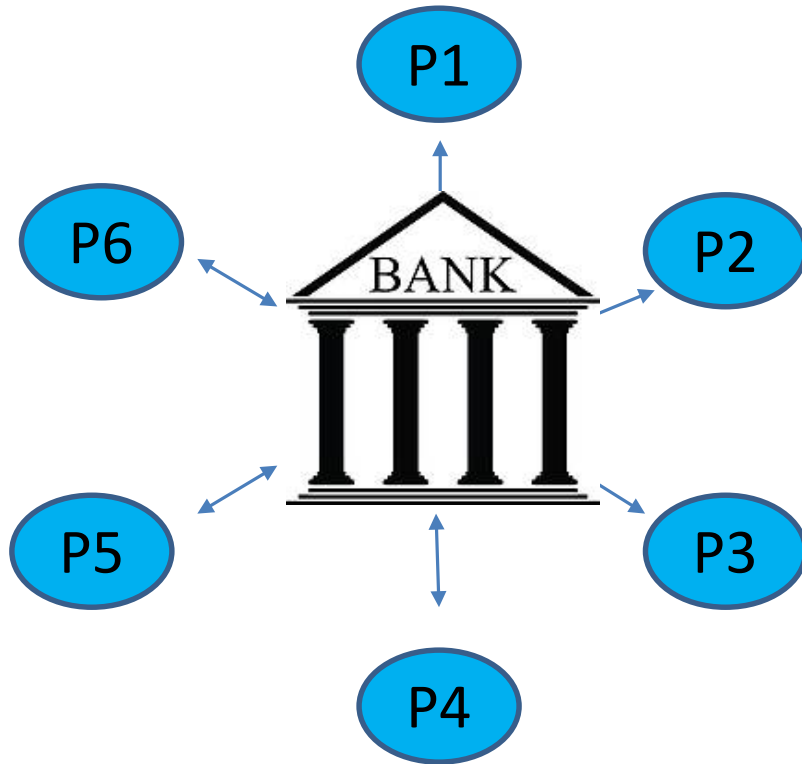
Better Resilience



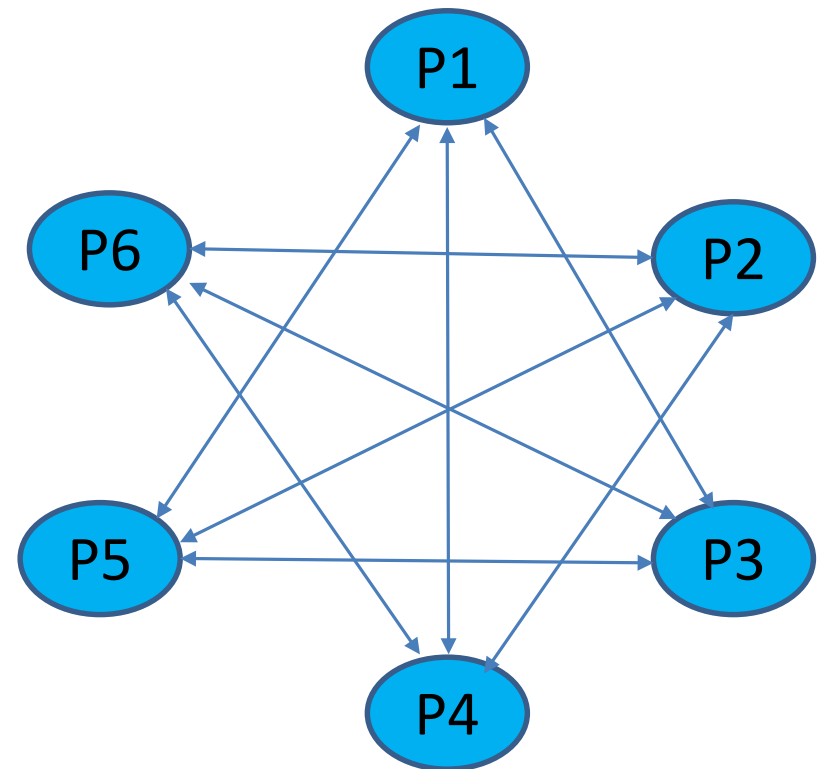
Better Resilience:

No Single Point of Failure

Centralized Operator



De-Centralized Operators



Tokenization

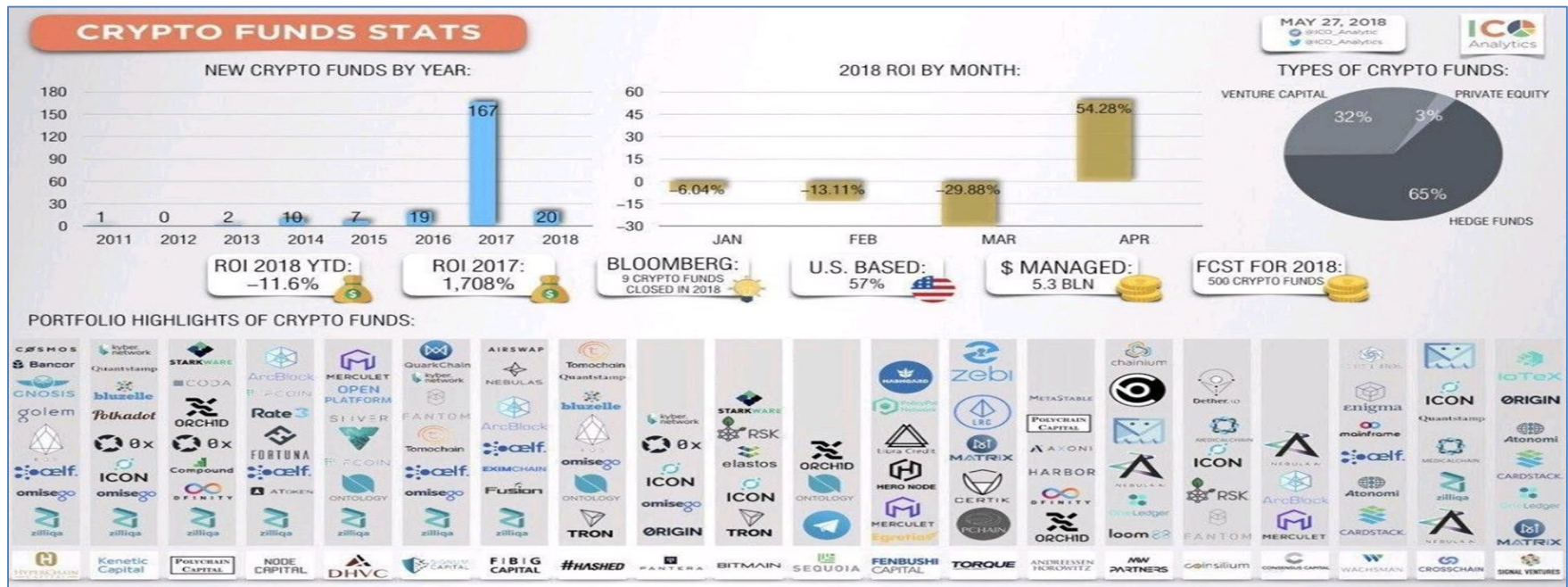
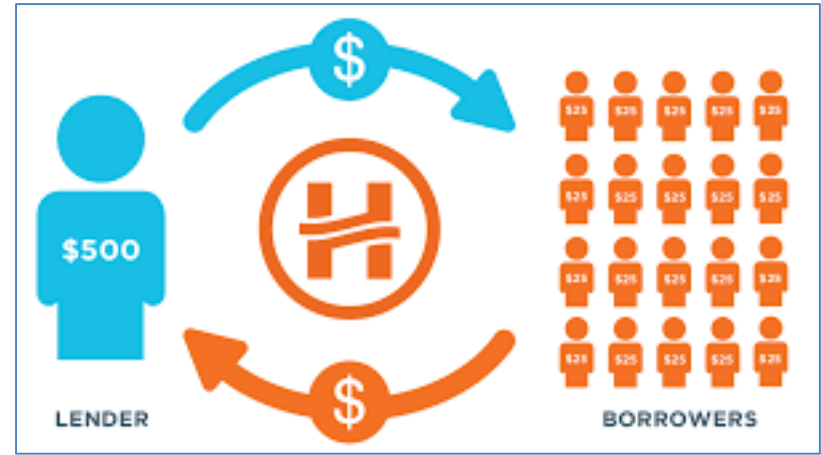


30 Million Dollar Real Estate Tokenized – Oct 2018

Tokenization

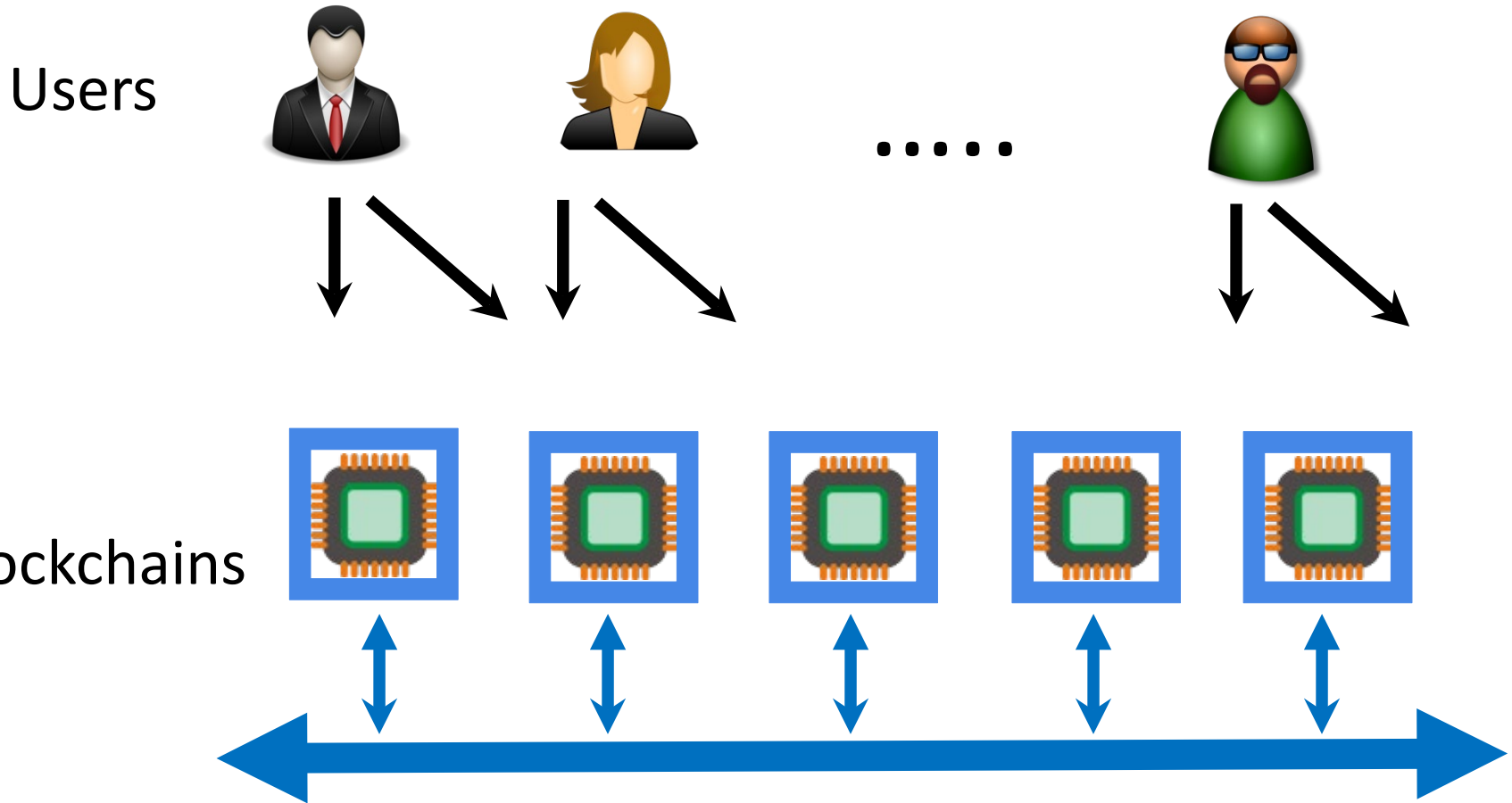
- Fractional Ownership
- Liquidity
- Processing

Leveling the Playing Field: Access to Capital / Services



Technological Advances

Blockchains: Resilience, Reconciliation, Tokenization



From Payments To General-Purpose Computing

The screenshot displays the IDEX exchange interface. At the top, there's a navigation bar with 'For Sale', 'Siring', 'Gen 0', and 'All Kitties'. Below this is a search bar and the IDEX logo. A green banner promotes 'Share in the success of IDEX and Aurora with the AURA staking token'. The main content area is divided into two sections. On the left, the 'MARKETS' section shows a list of trading pairs with columns for Coin, Price, Vol, Chg, and Name. On the right, the 'AURA / ETH' trading pair is selected, showing its price, 24-hour high/low, and change. Below this is a 'PRICE CHART' section with a candlestick chart and various technical indicators. A large black banner with white text is overlaid on the bottom half of the image.

Ethlance Participate in Ethlance's governance processes: [Introducing the district0x Network](#) How it works

For Sale Siring Gen 0 All Kitties

Search IDEX DAY ETH PRICE: \$600.23 USD GAS PRICE: 15 GWEI EXCHANGE HELP NEW WALLET UNLOCK WALLET

Share in the success of IDEX and Aurora with the AURA staking token [LEARN MORE](#)

MARKETS ☐ ☒ Only Search...

ETH

Coin	Price	Vol	Chg	Name
NPXS	0.00001302	4792.14	-1.31%	Pundi X
PAI	0.0002724	1832.89	-9.73%	PCHAIN
HOT	0.00000161	1437.45	-2.31%	HoloToken
REM	0.00003410	928.18	+4.52%	REMME
COU	0.00000059	827.05	-11.53%	Couchain

AURA / ETH
AURA Contract: [0xcdcf0f6...](#)

Last Price	24hr H	24hr L	24hr Change
0.00032812	0.00033199	0.00031301	+1.27263483%

24hr Volume: 126565.618941135184821425 AURA / 40.98401658699487643...

PRICE CHART DEPTH CHART QUICK BALANCES BENEFITS

IDEX: AURA 1 5 15 30 1h 2h 6h 1h

Aurora DAO, 60, IDEX 0 0'00032517 H 0'00032895 L 0'000316 C 0'00032812 eod delayed

Over 5 million decentralized apps!

NEXO	0.00027119	456.52	-8.97%	Nexo
SNTR	0.00000039	436.72	+2.46%	SilentNotary
EXC	0.00126515	426.54	+3.23%	Eximchain
BKX	0.0004698	376.68	-3.18%	BANKEX
PMNT	0.00000807	362.02	+93.54%	Paymon
MAN	0.00124550	294.63	-1.49%	MATRIX A...

charts by TradingView

Volume (false, 20) 4.29 n/a

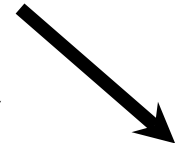
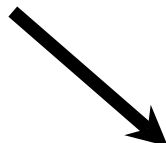
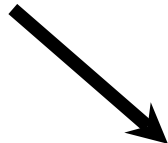
5y 1y 6m 3m 1m 5d 1d 17:22:15 (UTC-4) % log auto

Smart Contracts

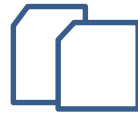
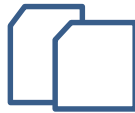
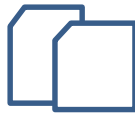
Users



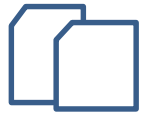
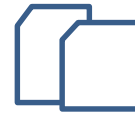
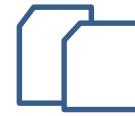
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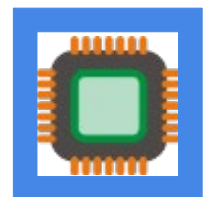
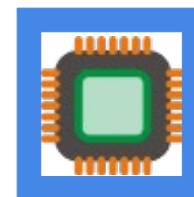
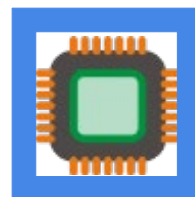
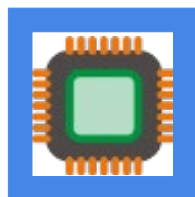
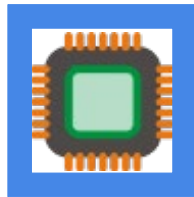
Smart Contracts
(Interacting agents)



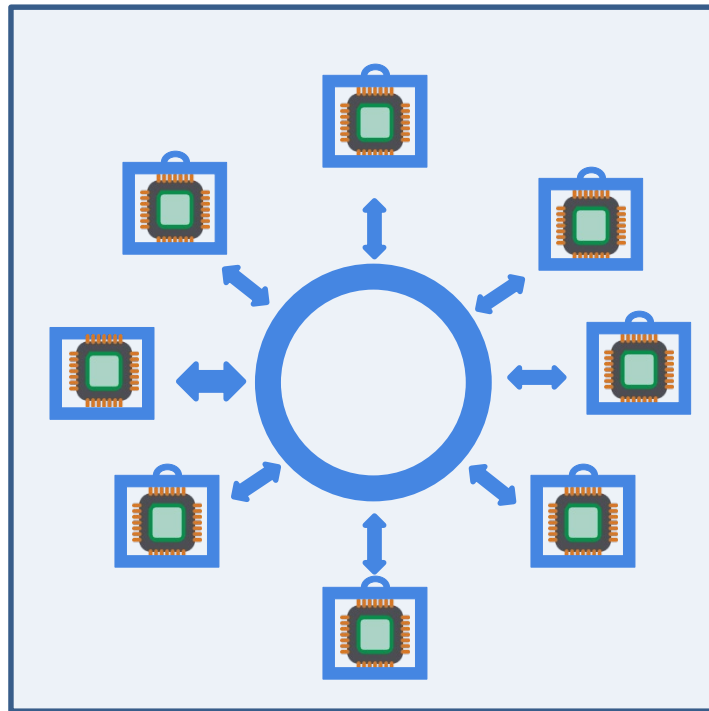
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Blockchains



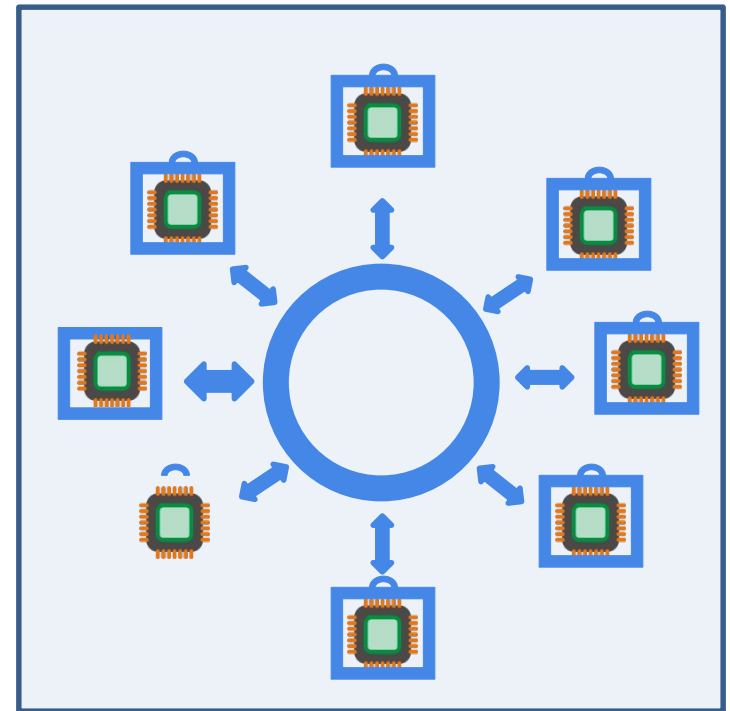
Interoperability & Atomicity



Hotel Booking



Atomic
Swaps



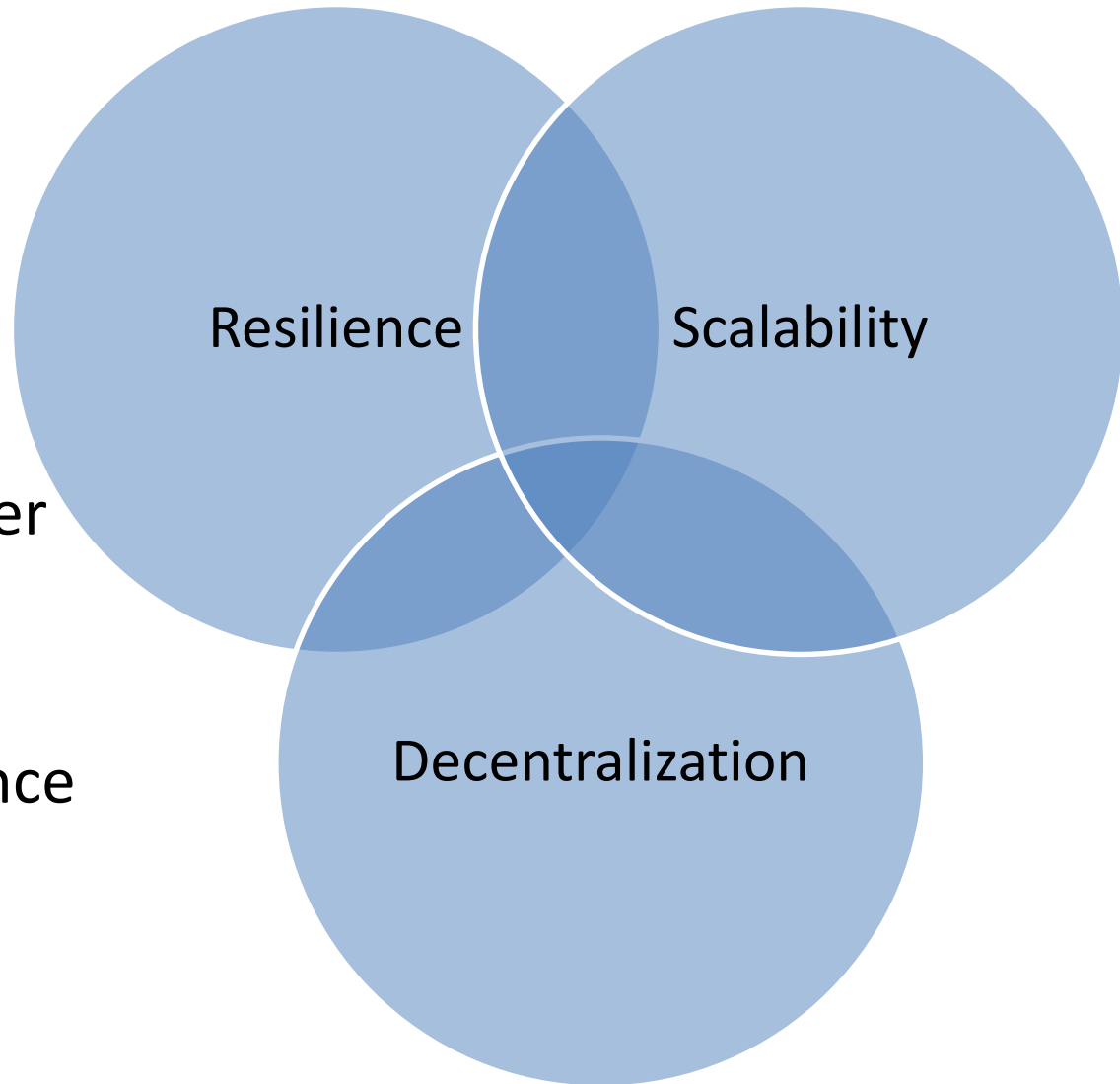
Flight Booking

Delivery versus Payment

Payment versus Payment

Scalability & Security

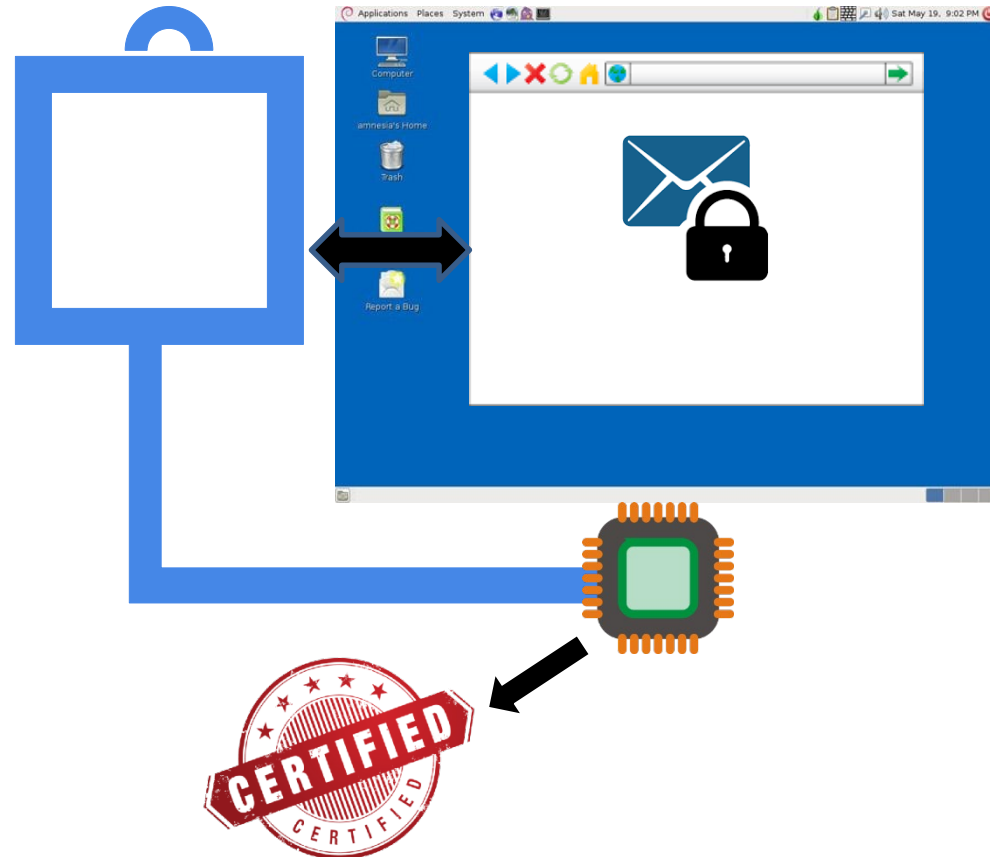
- Scalability (2015)
 - 10 transactions per second
- Scalability (2018):
 - 10,000 transactions per second (e.g. Zilliqa)
- High Resilience:
 - 20% - 50% fail. tolerance
- Latency at high decentralization:
 - 5-60 seconds



Privacy & Information Controls

- Allow information owners to control:
 - Who share with
 - What computation can be done
- Solutions:
 - Cryptographic methods
 - Trusted Execution Environments (TEEs)

Blockchain TEE



Enabling A New Experience

- **Resiliency** and **Auditability** of Information sources
- Real-time **Reconciliation**
- **Programmable** trust and actions
- Better speech & natural language **Interfaces**
- Smarter **Analytics**
- Strong information **Controls**
- Low barriers to **Innovation**

Questions?