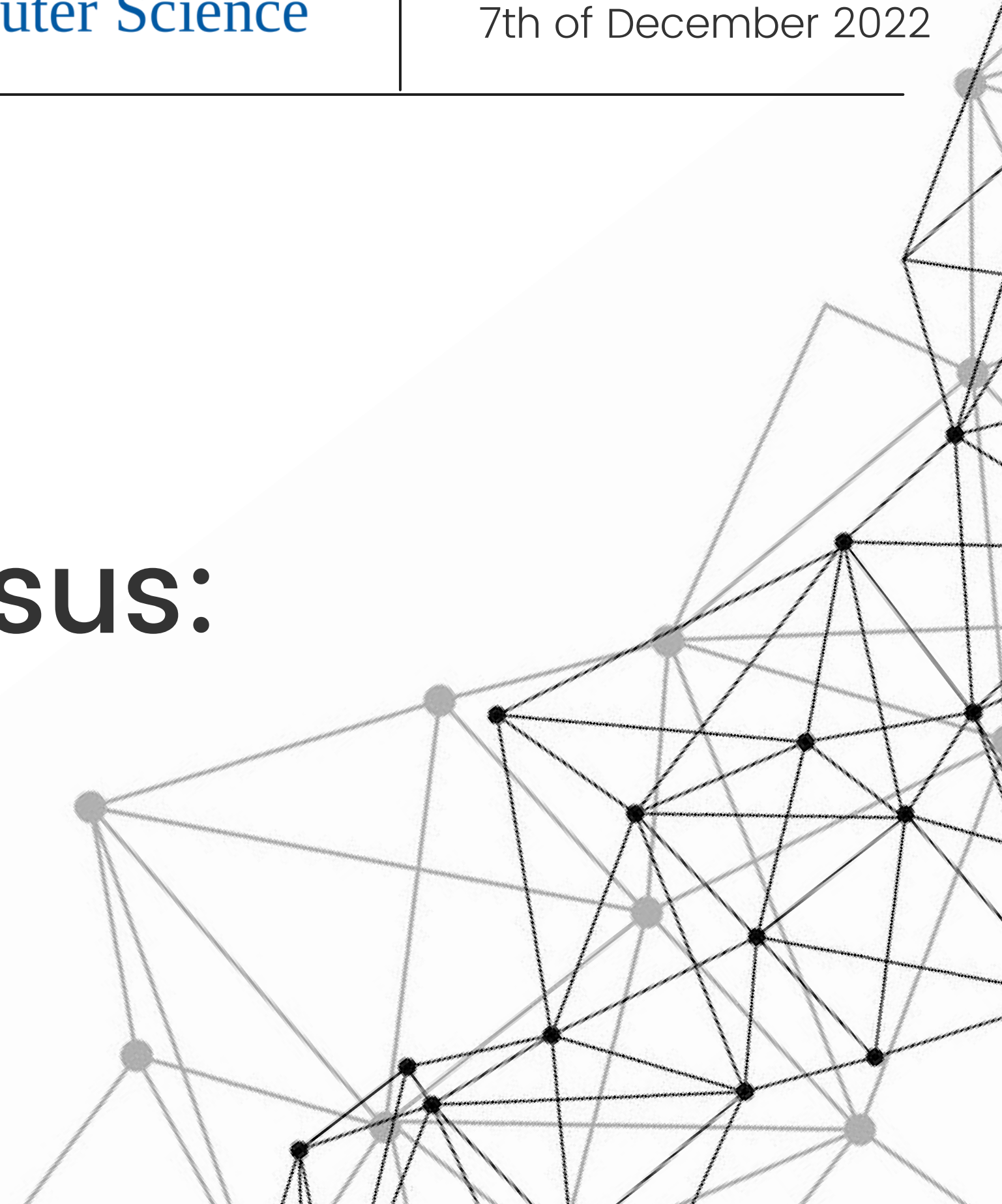




The Units of Permissionless Consensus:

Towards Mobile and Edge Computing

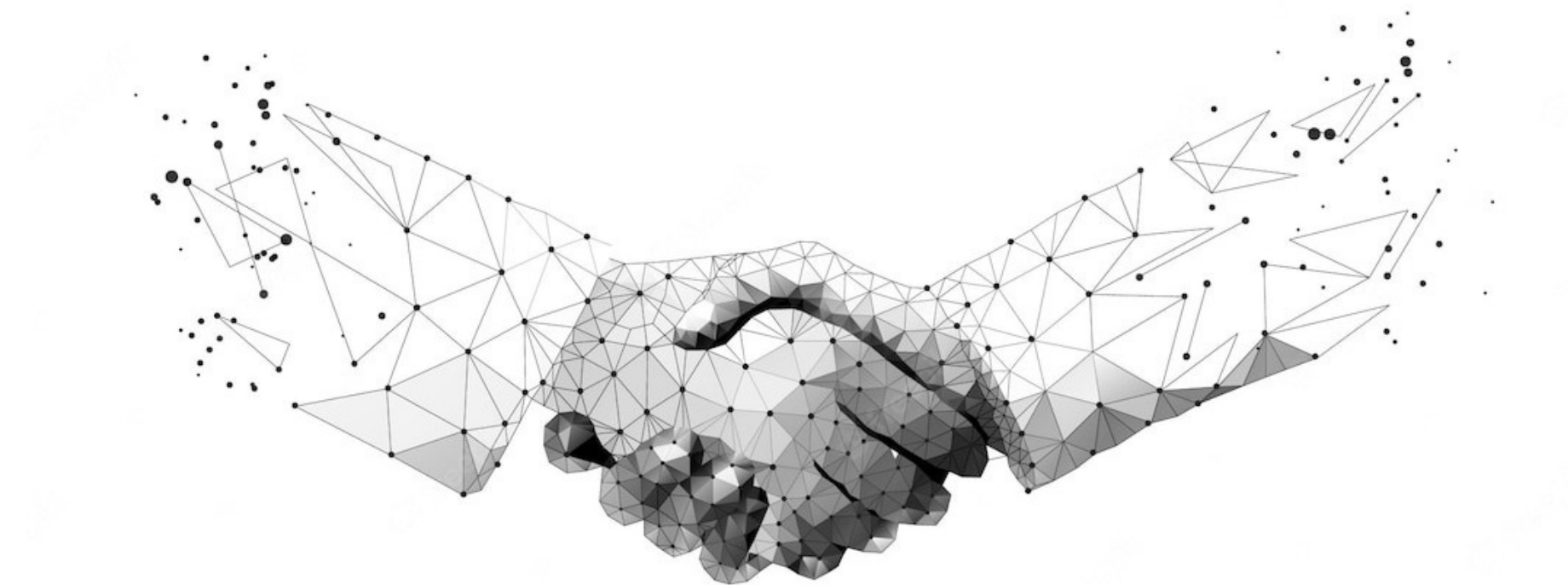
Eduardo Ribas Brito



[1] Reaching Agreement in the Presence of Faults.
M. Pease, R. Shostak, and L. Lamport, 1980

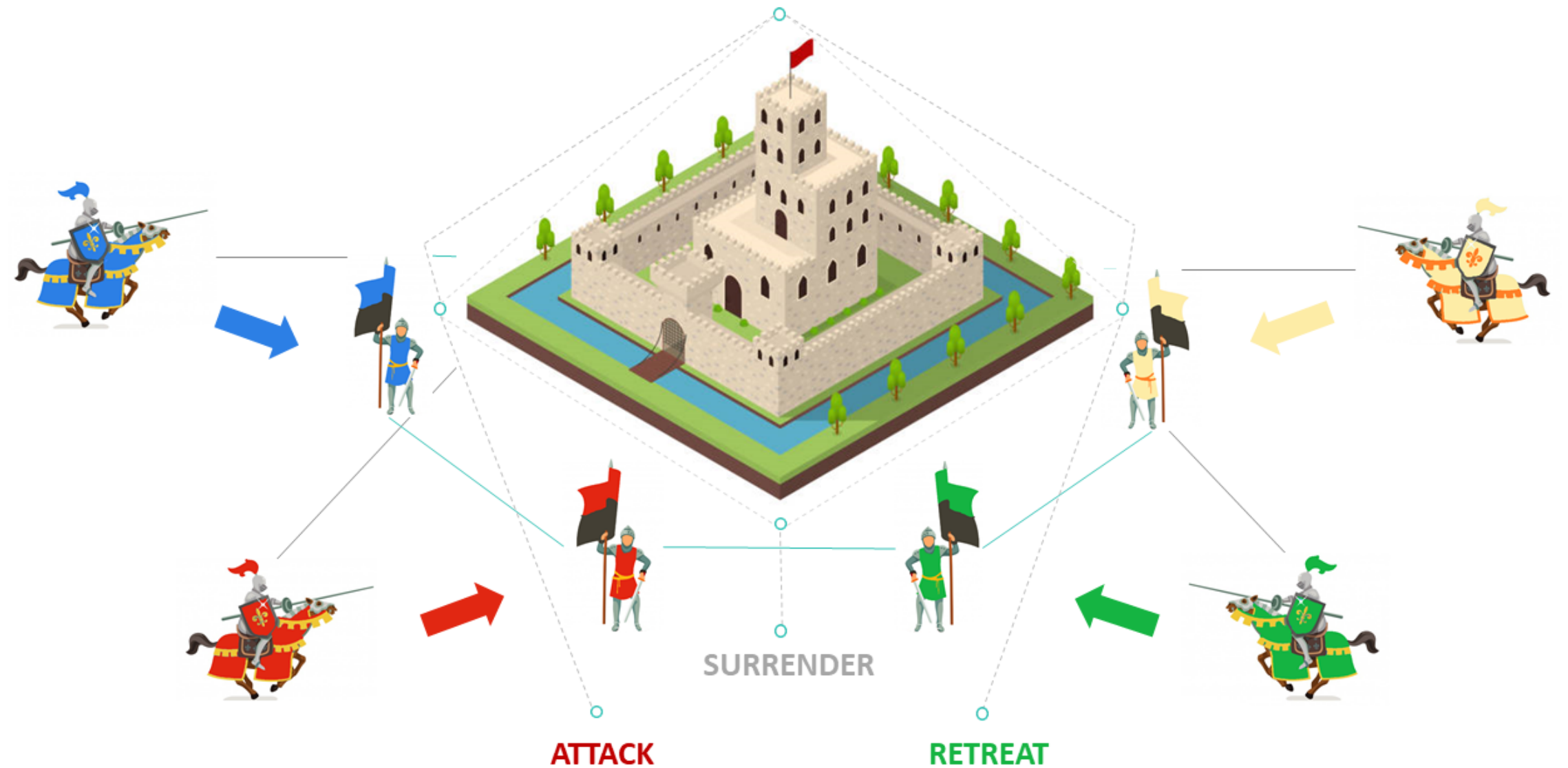
Consensus is...

Reaching an agreement between multiple parties in the potential presence of faulty individuals.



[2] The Byzantine Generals Problem.
M. Pease, R. Shostak, and L. Lamport, 1982.

The Byzantine Generals Problem



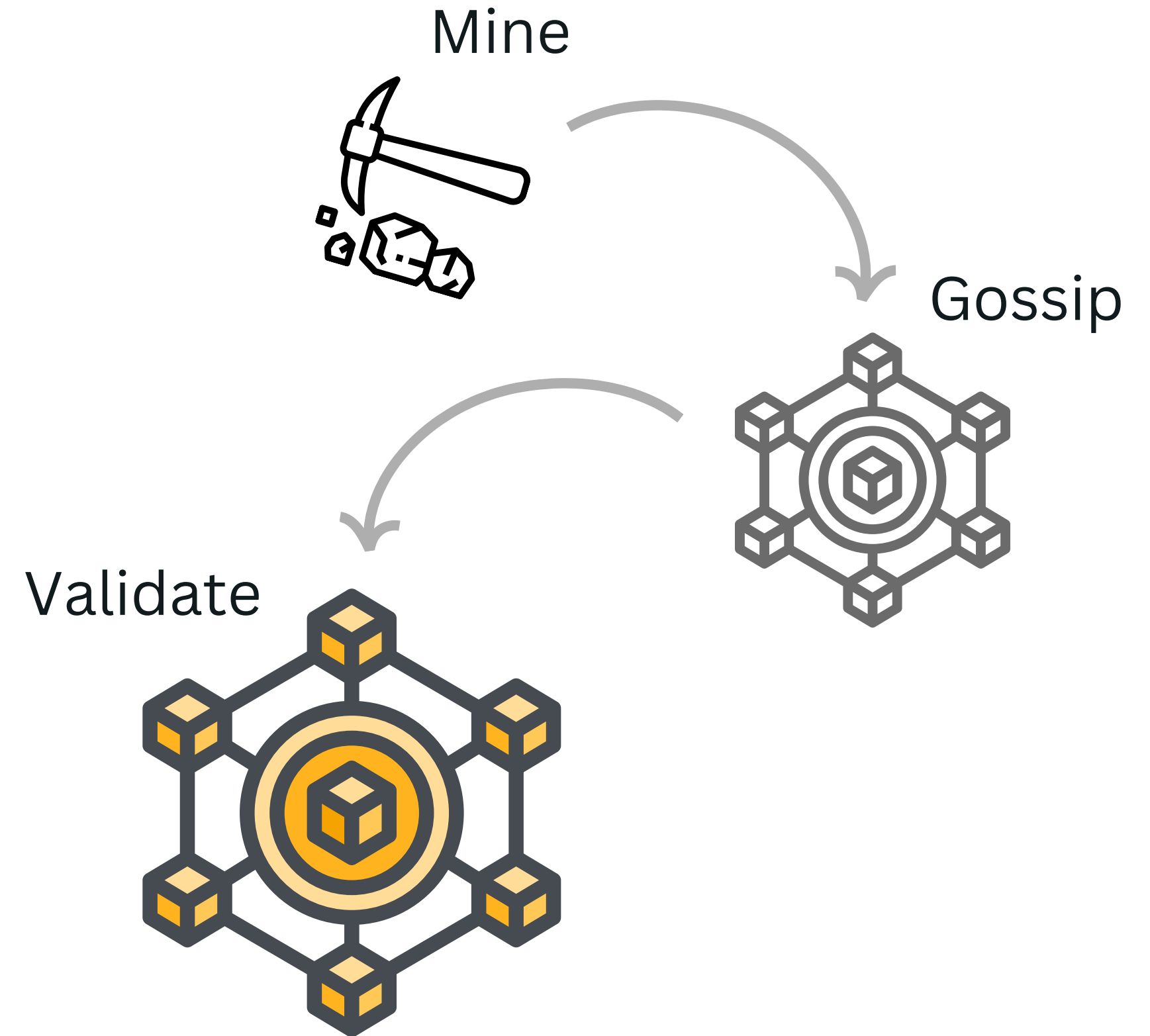
[3] Bitcoin: A peer-to-peer electronic cash system.
Satoshi Nakamoto, 2008.

Permissioned vs Permissionless



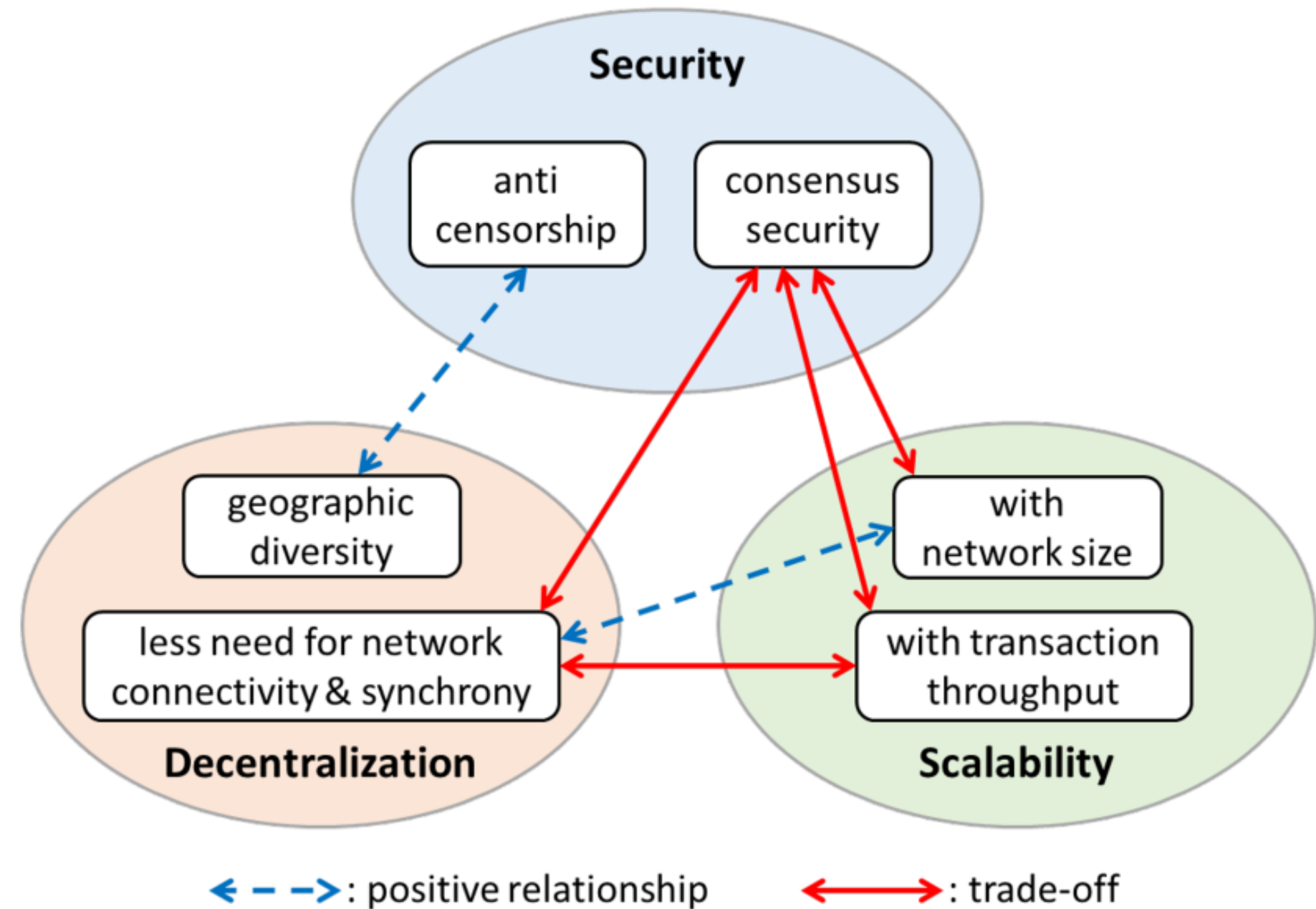
[4] A survey of distributed consensus protocols for blockchain networks.
Yang Xiao, Ning Zhang, Wenjing Lou, and Y. Thomas Hou. 2020.

The Building Blocks of Permissionless Consensus



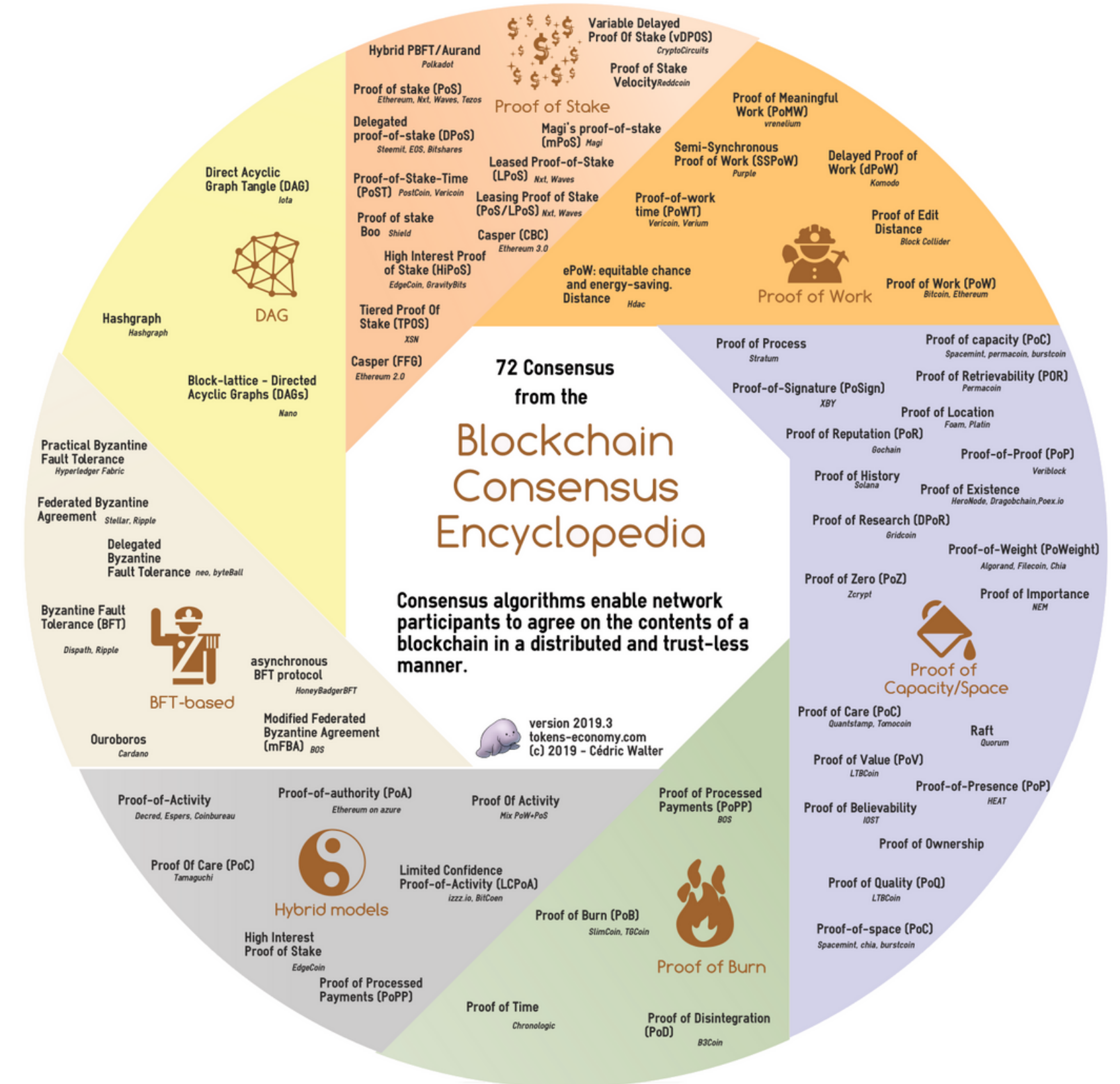
[5] A survey on consensus mechanisms and mining strategy management in blockchain networks.
Wenbo Wang, Dinh Thai Hoang, Peizhao Hu, Zehui Xiong, Dusit Niyato, Ping Wang, Yonggang Wen, and Dong In Kim.

Trade-offs and Trilemma



[6] A comprehensive review of blockchain consensus mechanisms.
Bahareh Lashkari and Petr Musilek.

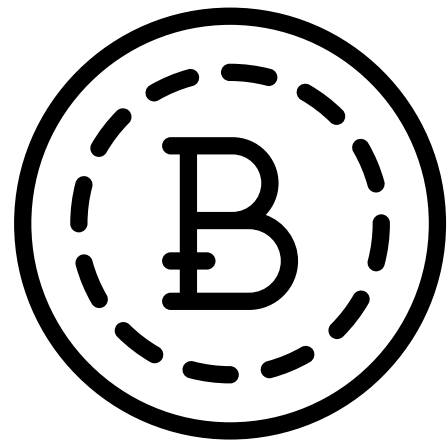
The Chaotic Diversity of Consensus Algorithms



[7] Deconstructing blockchains: A comprehensive survey on consensus, membership and structure.
Christopher Natoli, Jiangshan Yu, Vincent Gramoli, and Paulo Esteves-Verissimo.

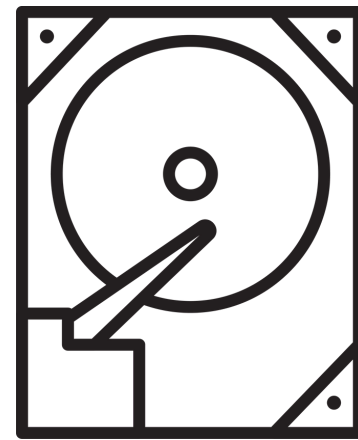
Alternatives to Proof-of-Work

Proof-of-Stake



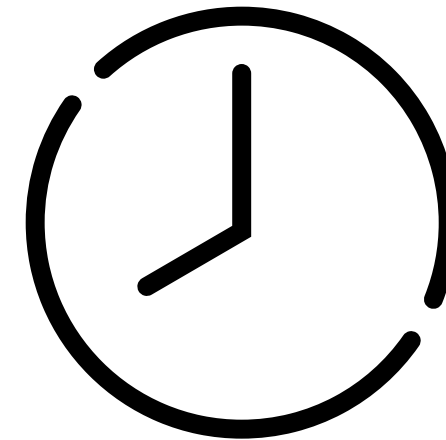
Chain-based
Committee-based
BFT-based
Delegated PoS
Proof-of-Authority

Proof-of-Space



Proof-of-Capacity
Proof-of-Retrievability

Proof-of-Elapsed-Time



Trusted Execution Environments
Proof-of-Stake

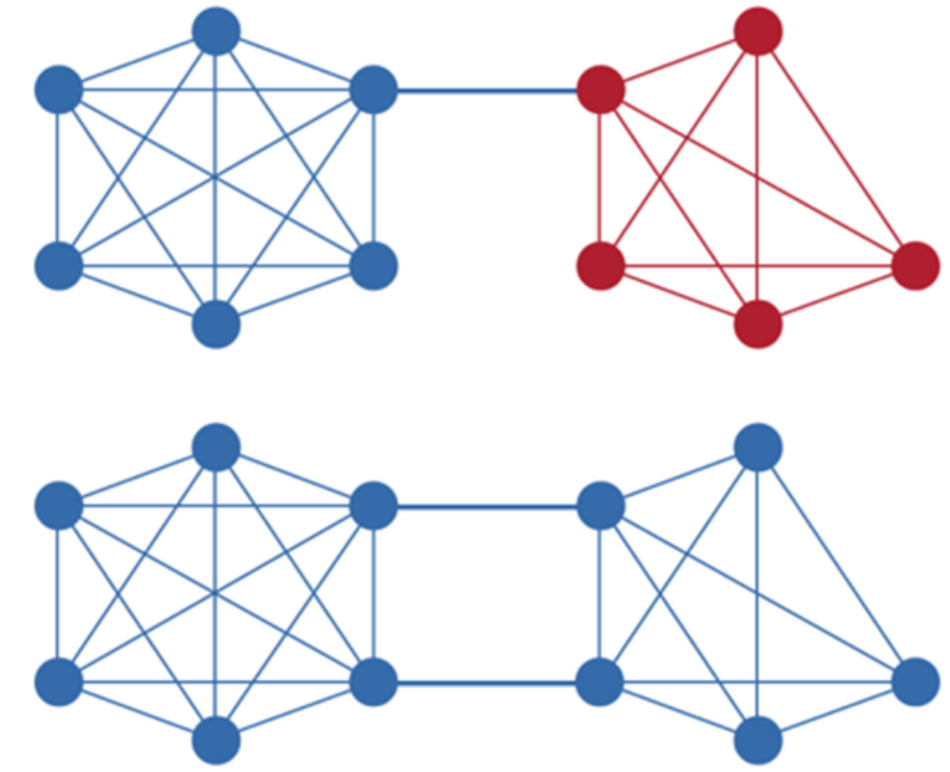
Proof-of-Location



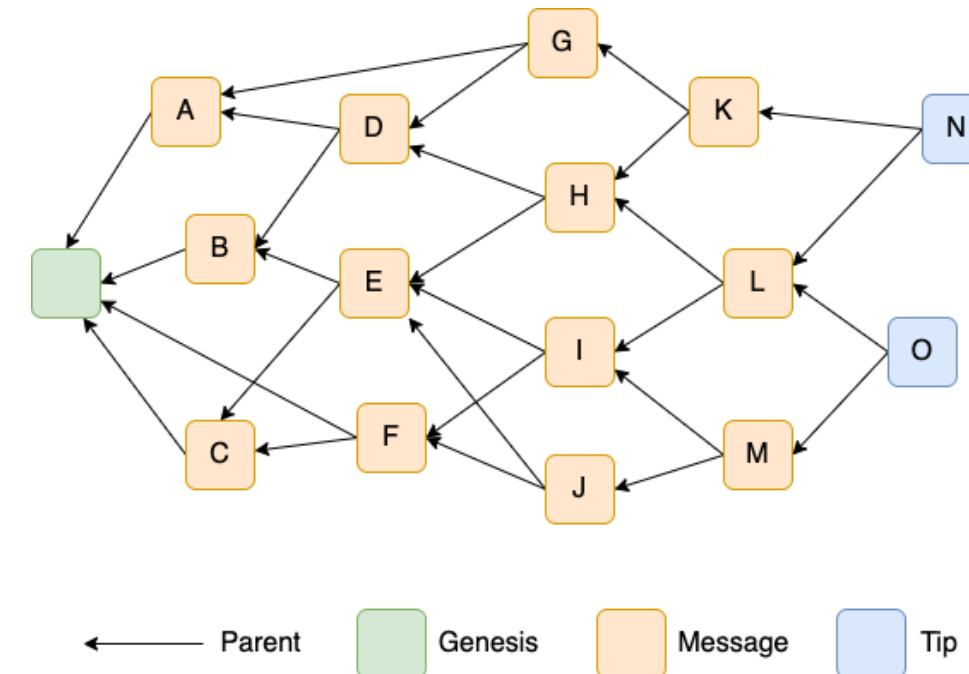
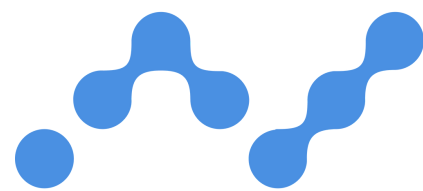
Location Validation
Close Proximity

[8] Analysis of the XRP ledger consensus protocol.
Brad Chase and Ethan MacBrough.

XRP Ledger
Consensus
Protocol



Different Approaches



DAGs
blockDAG
vs
txDAG

[9] A survey on consensus methods in blockchain for resource-constrained IoT networks.
Mehrddad Salimitari, Mainak Chatterjee, and Yaser P. Fallah.

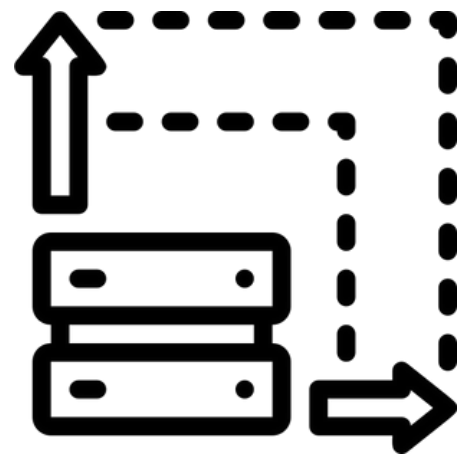
Permissionless Consensus in Resource-Constrained Networks



[10] Blockchain for mobile edge computing: Consensus mechanisms and scalability.
Jorge Peña Queralta and Tomi Westerlund.

Challenges

Scalability

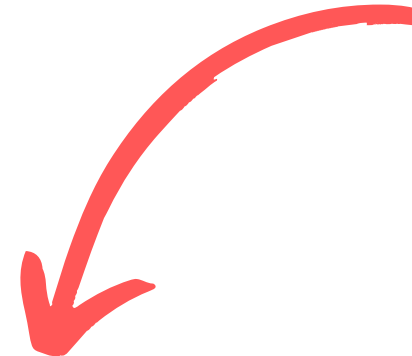
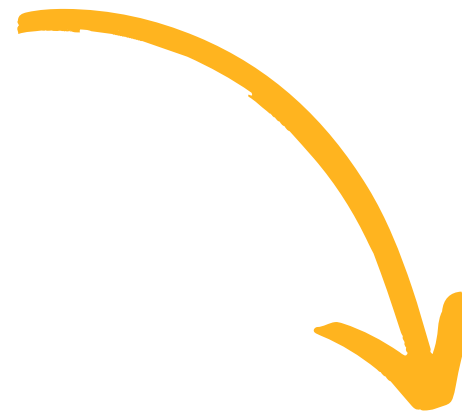


Security

Privacy



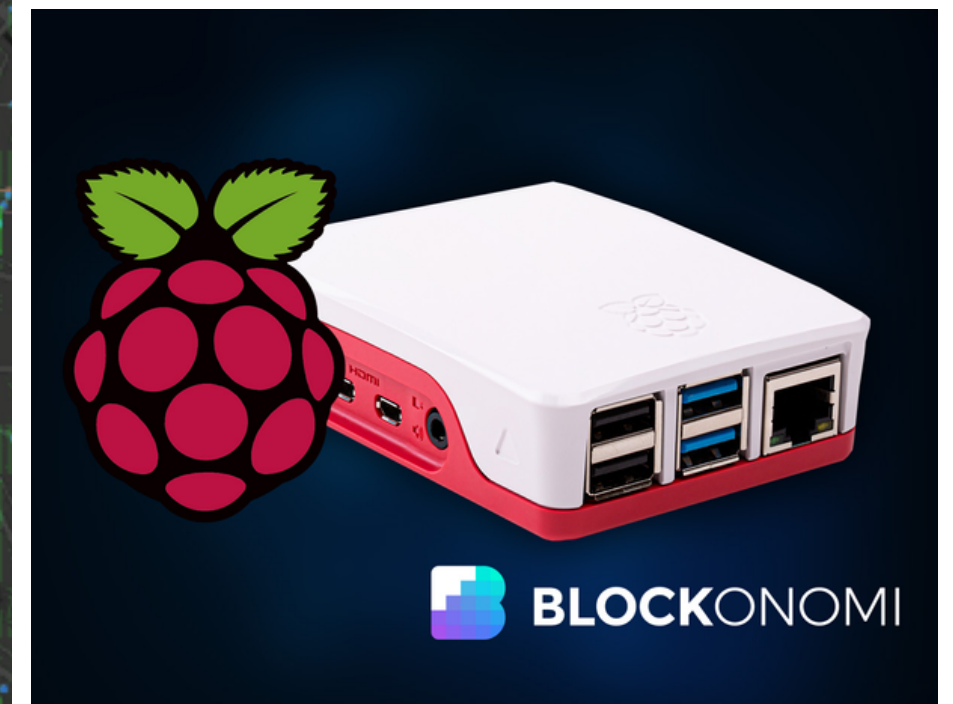
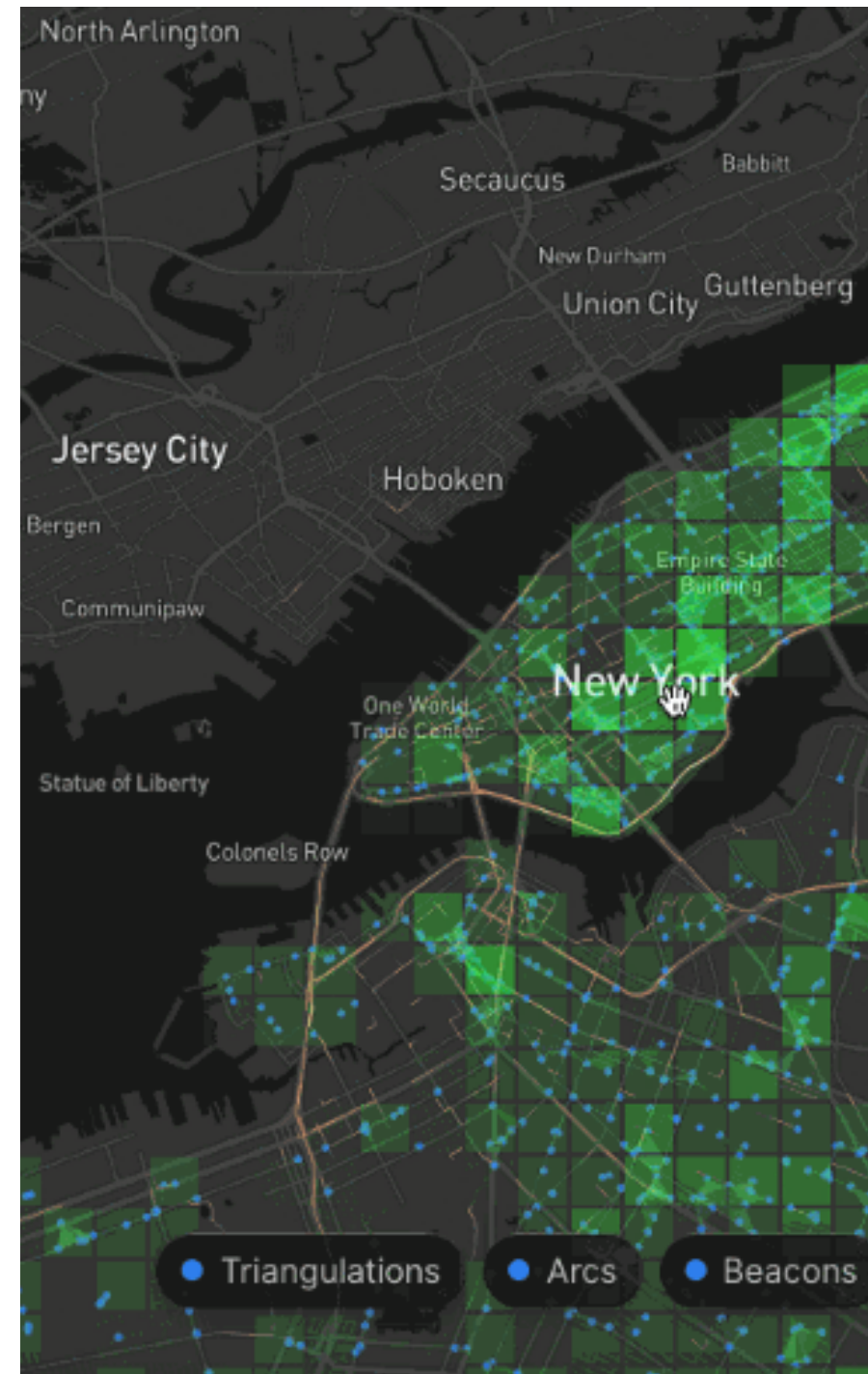
Decentralization



[11] Decentralized consensus for edge-centric internet of things: A review, taxonomy, and research issues. Kimchai Yeow, Abdullah Gani, Raja Wasim Ahmad, Joel J. P. C. Rodrigues, and Kwangman Ko.

Permissionless Consensus Protocols for the edge

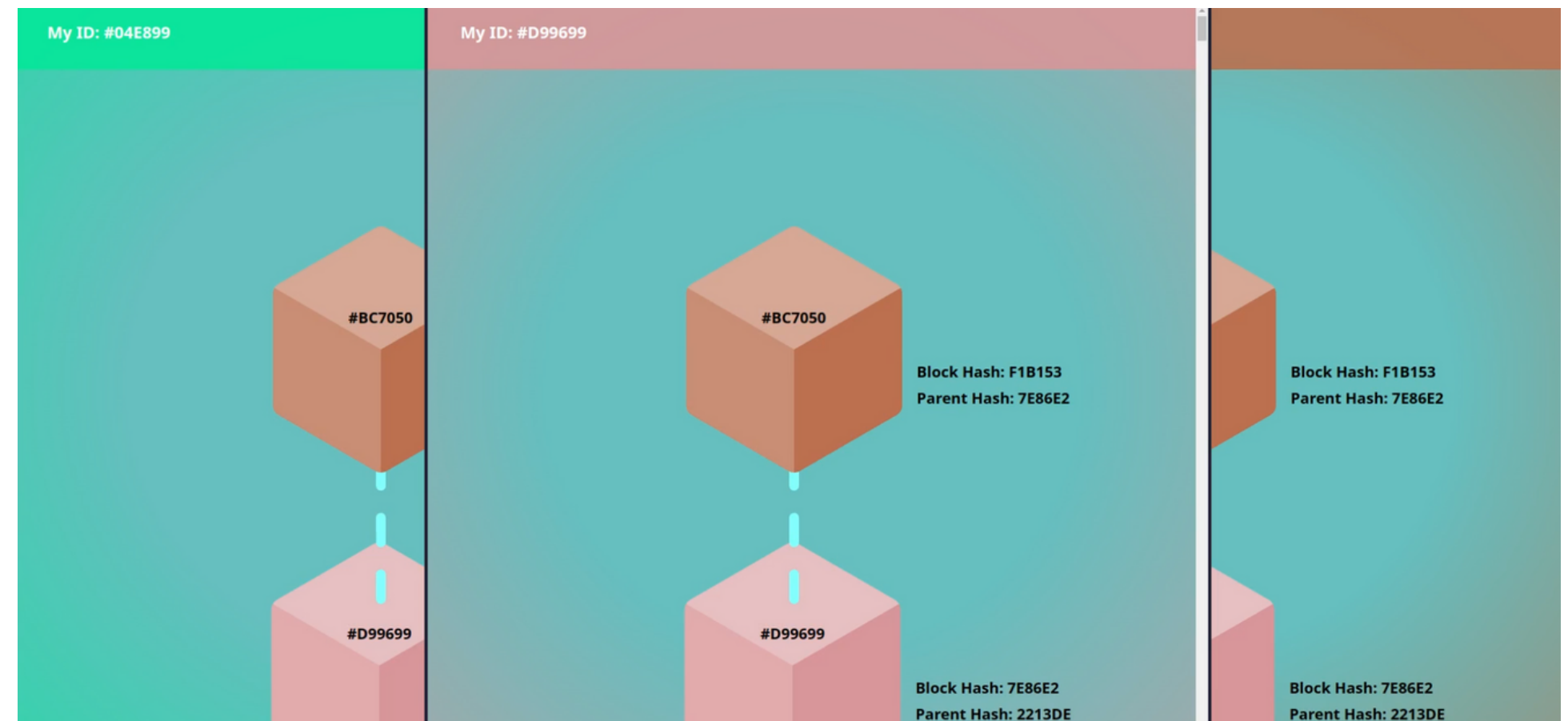
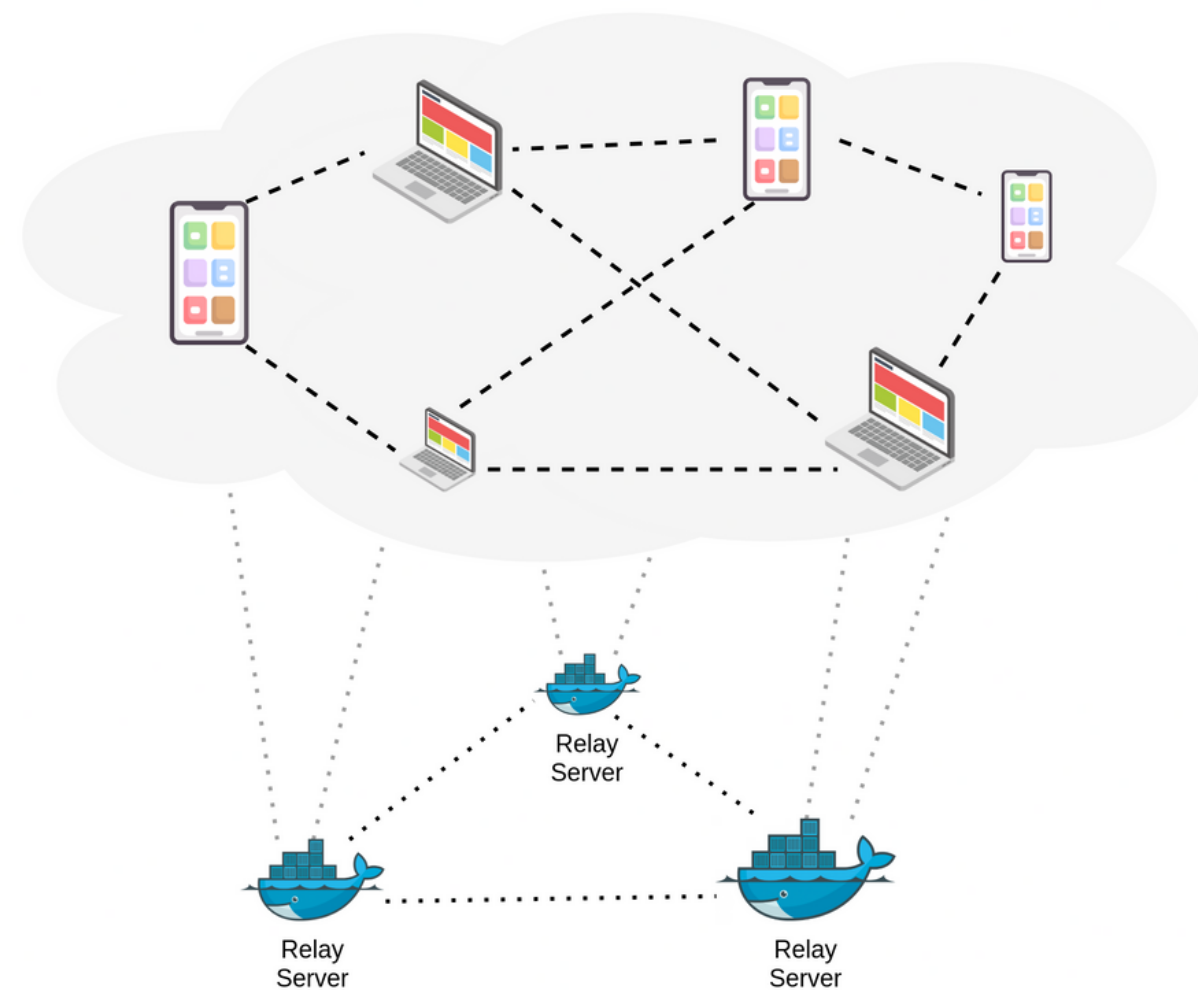
Resource Consumption
Openness
Heterogeneity
Fault Tolerance
Security



[12] github.com/edurbrito/dist-sys-seminar

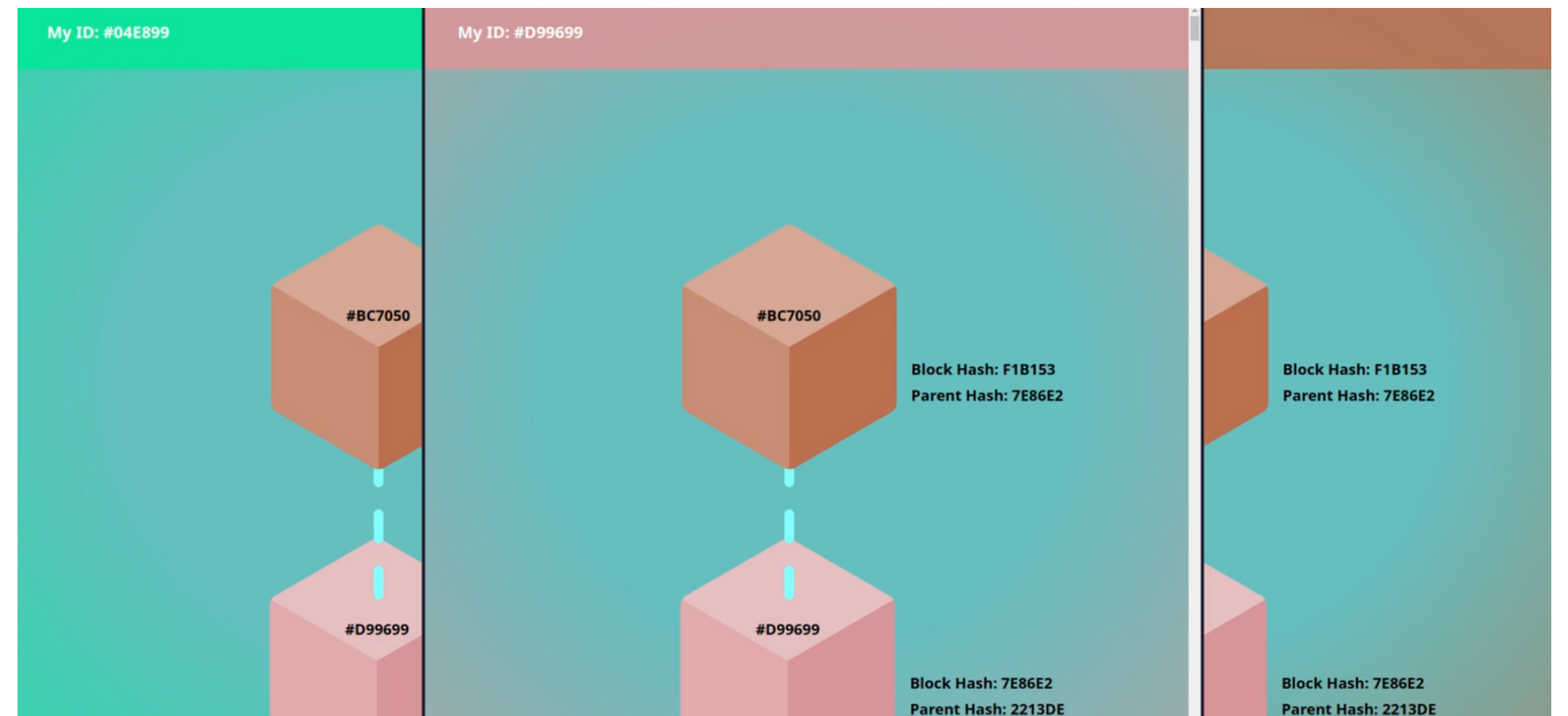
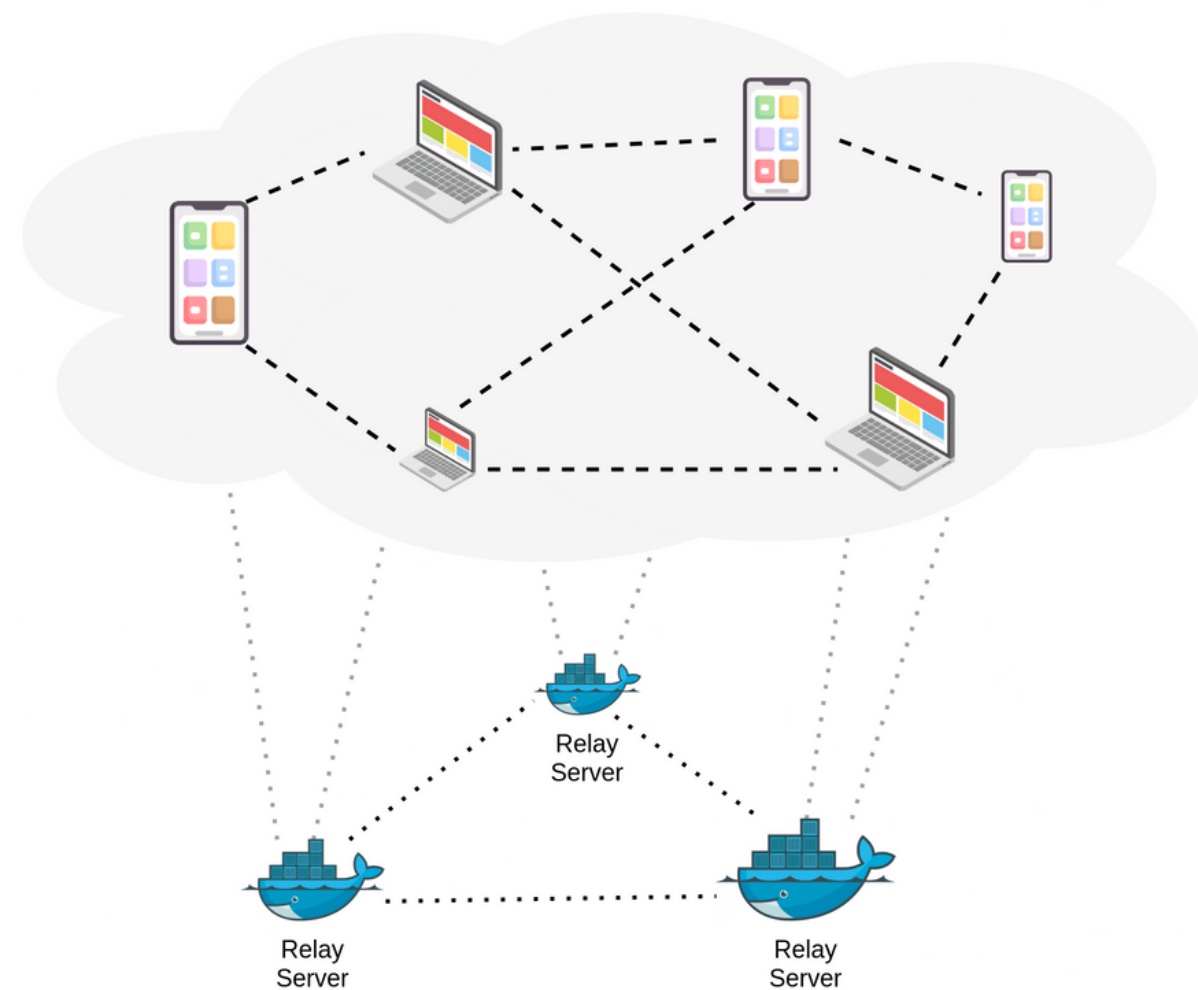
In-Browser Proof-of-Work

at <http://172.17.89.25:8888>



[12] github.com/edurbrito/dist-sys-seminar

In-Browser Proof-of-Work





The Units of Permissionless Consensus:

Towards Mobile and Edge Computing

Eduardo Ribas Brito

