

# RIETI Blockchain Symposium

ネクスト・ブロックチェーン：次世代産業創成のエコシステム

**Next Blockchain: Creation of a new ecosystem for  
future industries**

## Practical IoT Applications on Blockchain

**Steven PU (Founder & CEO, Taraxa.io)**

October 7, 2019

主 催：独立行政法人経済産業研究所（RIETI）  
Research Institute of Economy, Trade and Industry (RIETI)

# Practical IoT Applications on Blockchain

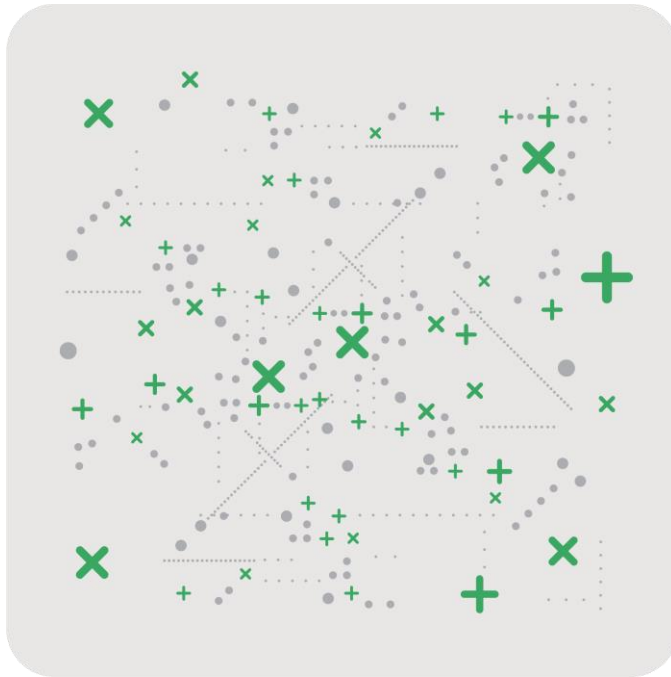
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# Introduction



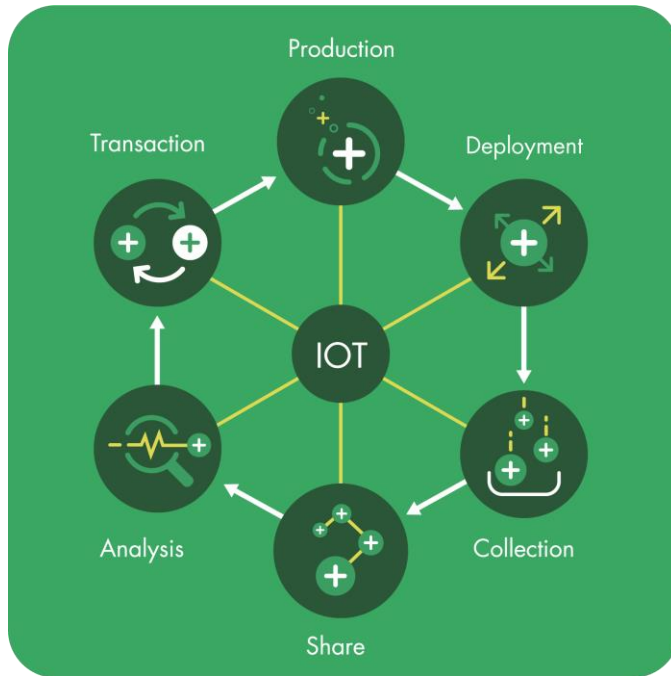
# IoT devices require a trust mechanism to be truly valuable



- IoT is growing at a crawl
- Short-term pain: IoT devices lack identity & trust, breaking business models
- Long-term pain: autonomous device systems require economic independence for security & scalability

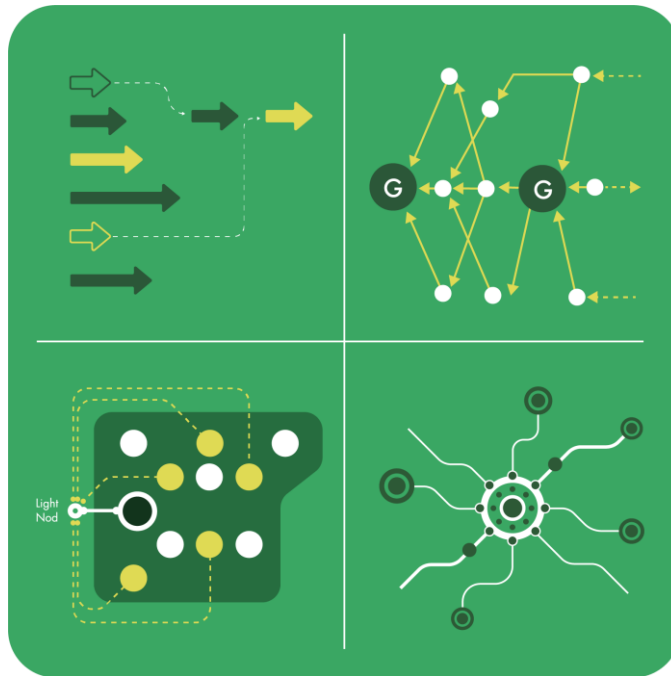


# Blockchain technology endows devices with identity, economic awareness, and independence



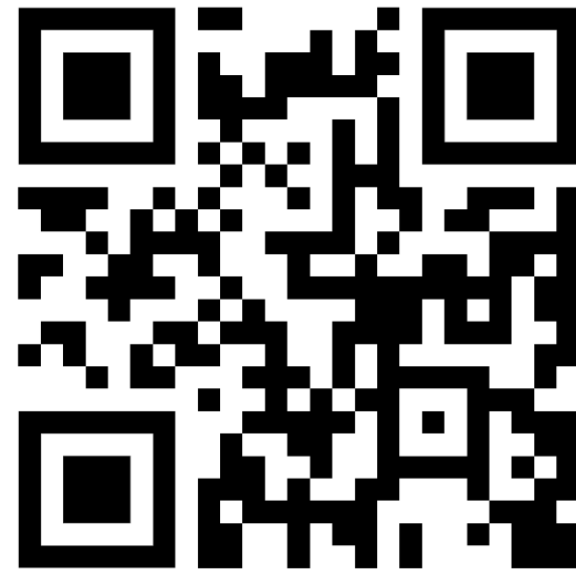
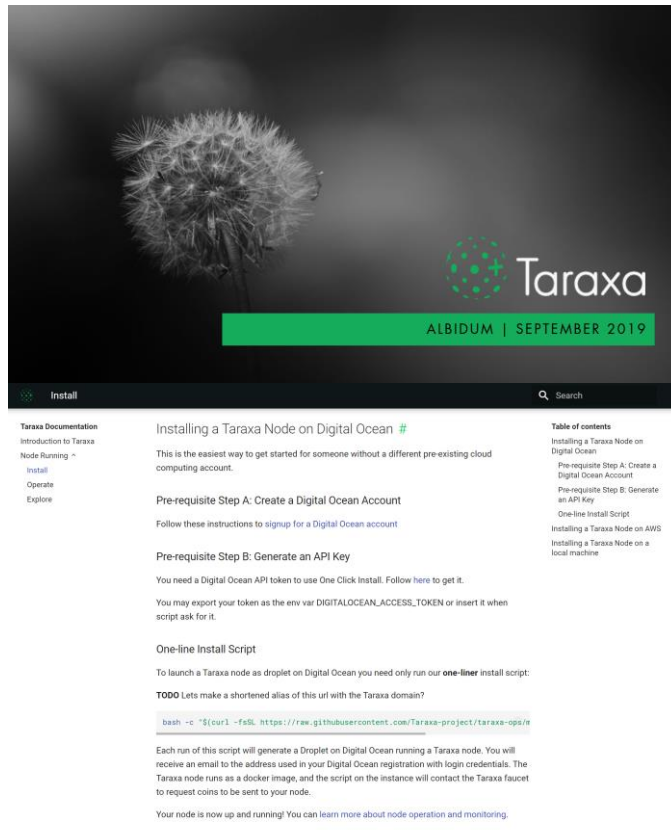
- Unique identities to establish data provenance and make attestations
- Ability to own assets and make economic decisions
- Independence and self-governance

# Taraxa built a public ledger to gain technical expertise in the emerging infrastructural technology



- Rapidly-finalized DAG
- Concurrency inspired by STM
- Fuzzy sharding
- Trustless light nodes
- Adaptive protocol

# We just released an early alpha version of the testnet Albidum in September 2019



Discord Discussion / Instructions

We are deeply honored to have co-authored the book "Next Blockchain" in partnership with RIETI







# Applications



The background image shows an arcade environment. In the foreground, a person in a dark suit is seated at a game machine, looking at the screen. To the left, another person in a white shirt is seated at a different machine. The arcade is filled with various game machines, including what appear to be racing and shooting games. The lighting is dim, typical of an arcade, with the machines providing the primary light source. A green semi-transparent box is overlaid on the right side of the image, containing white text.

## Trusted Devices Enable Fair Business Models

Collaborating with one of the largest arcade leasing companies in Japan to prevent lessor and channel fraud with IoT data anchoring.



## Open Standards to Encourage Collaboration

Collaborating with one of the world's largest industrial conglomerates to create open standards for its supply chain partners.





## Decentralized Permission & Certifications Enable Data Democratization

Collaborating with one of the largest automotive manufacturers in the world to build a decentralized, encrypted, and private mobility data market.





## “Coopertition” Through Open Standards

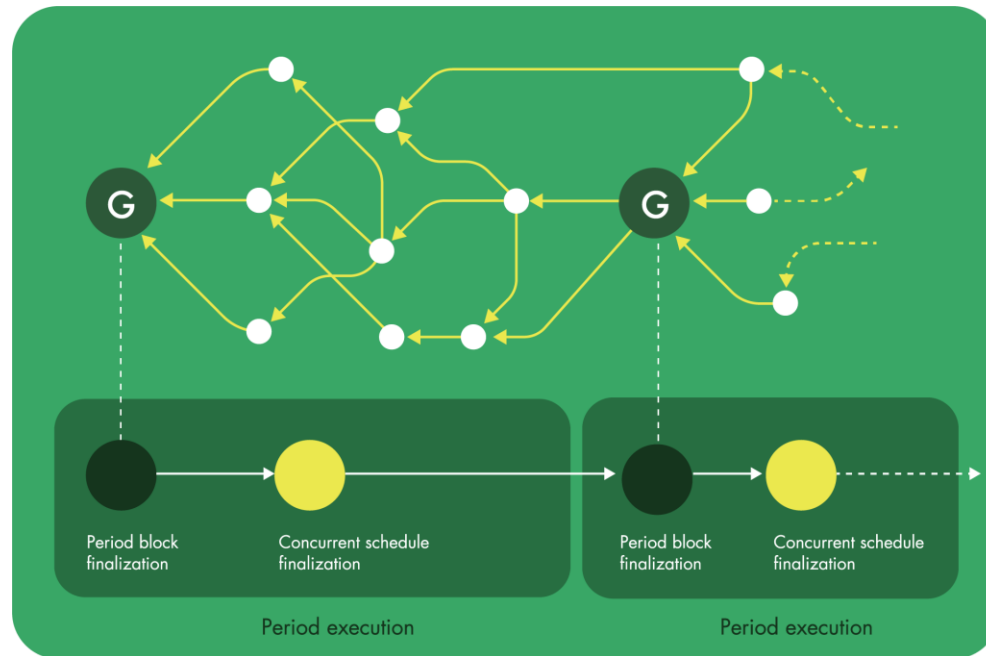
Collaborating with two of the largest parking operators in Japan to leverage parking sensors to raise ROI and issue assets in a decentralized, cross-operator ecosystem.





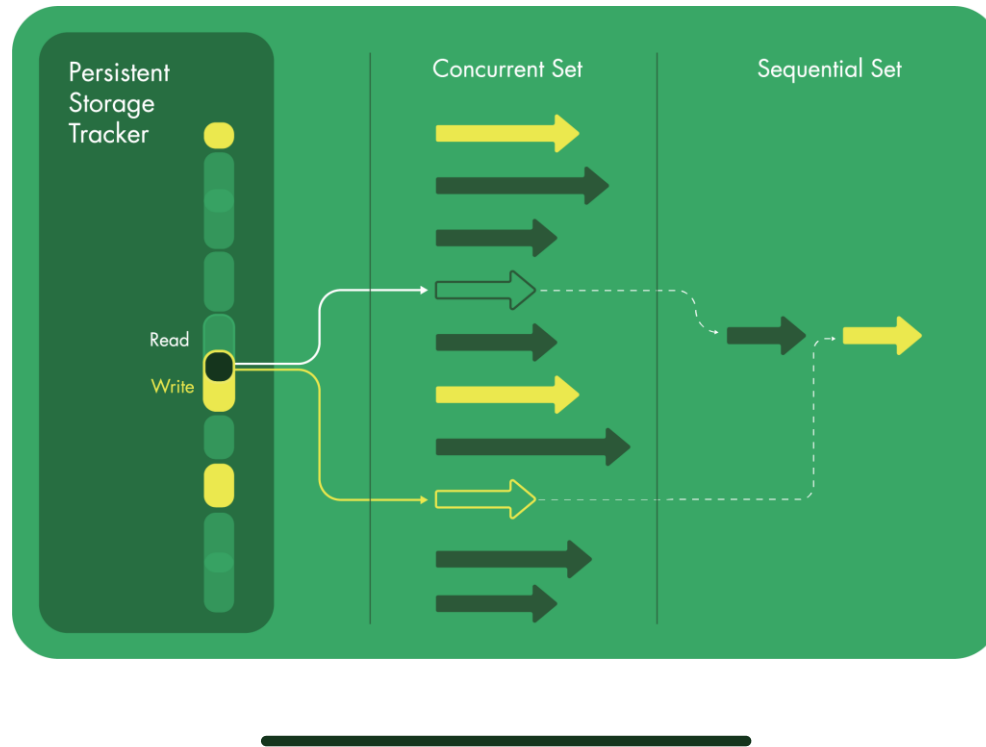
# Technology

# Rapidly-finalized DAG



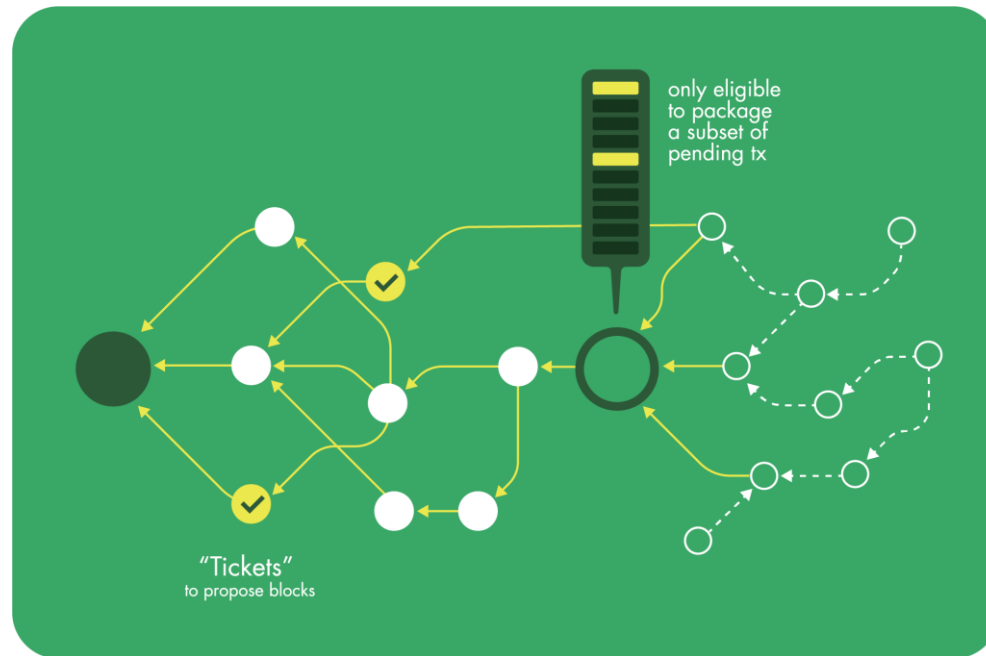
- The block DAG is great for achieving horizontal concurrency, but it lacks true finality.
- True finality is especially important for smart contracts, most of which could incur cascading impact on the blockchain across numerous accounts.
- Taraxa introduces an asynchronous VRF-powered PBFT process to achieve true finality.

# Concurrency inspired by STM



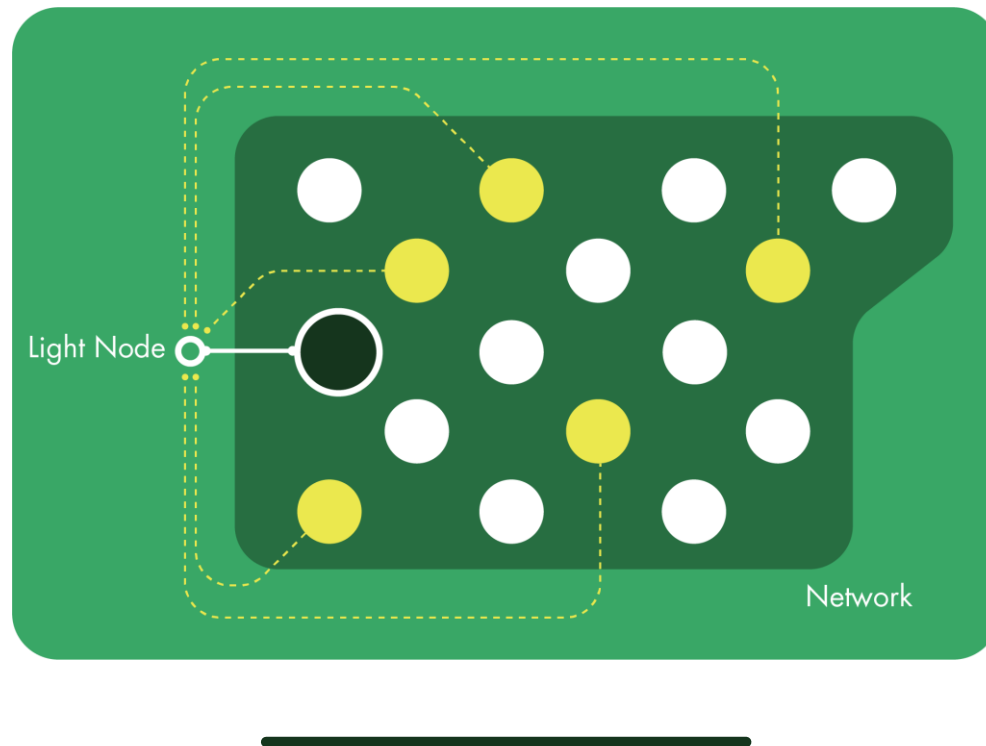
- Inspired by the principles of software transactional memory (STM)
- Taraxa achieves node-level concurrency by speculative parallelization of transaction processing, with conflict minimization achieved from built-in concurrent data structures.

# Fuzzy sharding



- To maximize block utilization, the network automatically and with minimal overhead defines block proposal eligibility as well as jurisdictions for pending transactions for each full node via a process governed by cryptographic sortition.
- The process is "fuzzy" to minimize the need for real-time coordination with minimal waste.

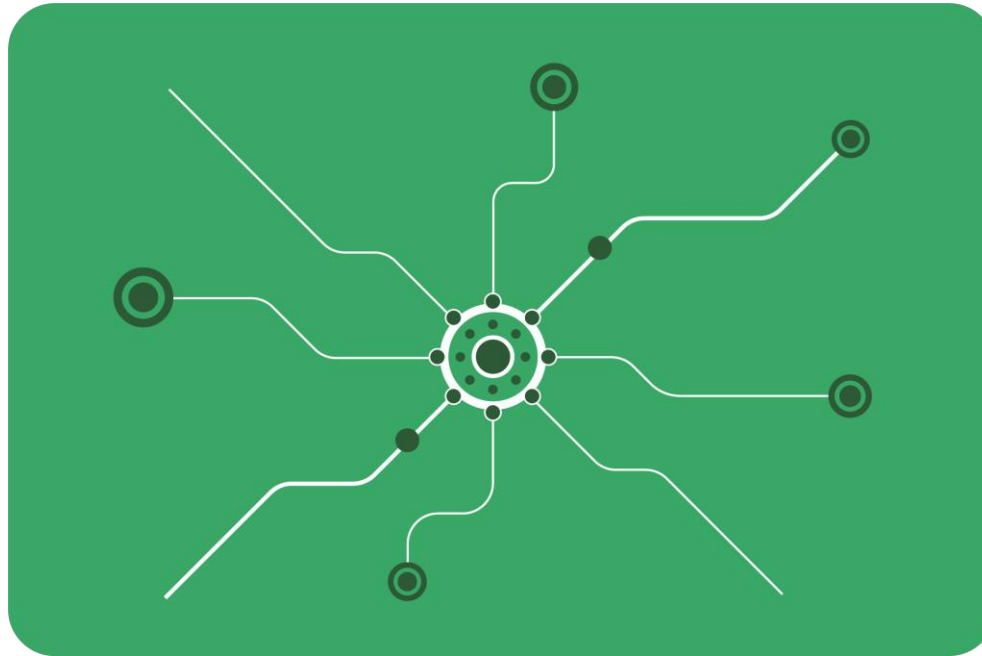
# Trustless light nodes



- Most IoT edge devices are resource-constrained cannot run full nodes, but this does not mean they should become blind puppets of the full nodes they rely on.
- Taraxa has created a practical solution that enables light nodes to poll a random subset of the network to ascertain the veracity of what it's been told.



# Adaptive protocol



- Network conditions are constantly changing, and the rules governing protocol behaviors should likewise adapt - automatically - not via online forums.
- Key protocol rules in Taraxa such as block generation rate, block size, and committee size are calculated and decided dynamically on the fly, minimizing the need for a hard forks (and flame wars).

# Thank you!



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