BLOCKCHAINS 101

PRESENTED BY

neuroware

NEUROWARE - MEET THE FOUNDERS

MSC MALAYSIA Status Company

Mark Smalley - CEO

Living in Malaysia for the past 20 years

Building Fintech Solutions for 15+ years

Spent 10 years building tech communities

Building blockchain apps for 5+ years

Ruben Tan - CTO

More than 10+ years of software engineering exp

Active community evangelist & technology speaker

Early developer in MyTeksi, OnApp, Bookya, etc

Studied distributed consensus as a hobby

NEUROWARE - FIRST OF MANY

MSC MALAYSIA
Status Company

- Only **Malaysian Company** to Graduate from **500 Startups** in Silicon Valley
- 1st Company in Asia Providing **Public Blockchain APIs** & Developer Toolkits
- 1st in The World to Develop **Non-Financial Blockchain Agnostic Protocols**
- Helped Organize World's 1st **Bank-Backed Blockchain Hackathon** (DBS)
- Over 15 Years of Collective Blockchain Development Experience

NEUROWARE - WHAT DO WE DO?

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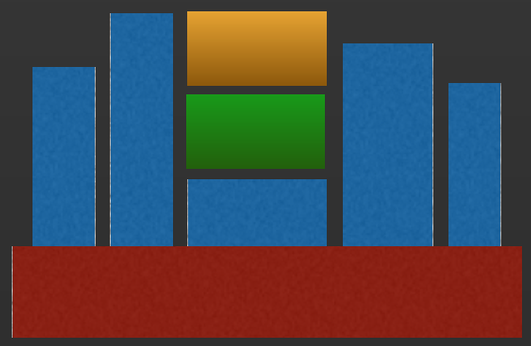
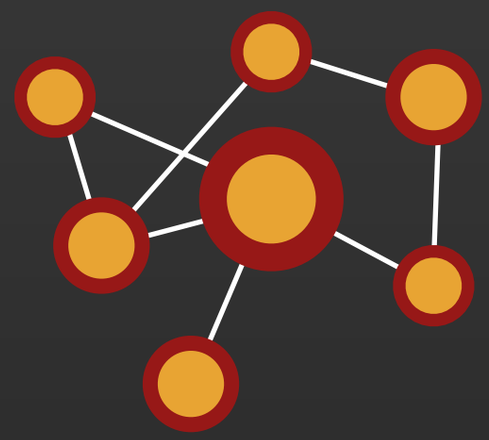


Blockchain
Infrastructure



Blockchain
Training

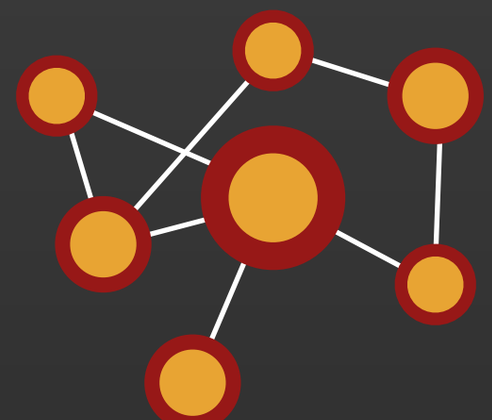
BLOCKCHAINS

Broad definitions

GENERAL TRAITS OF BLOCKCHAINS

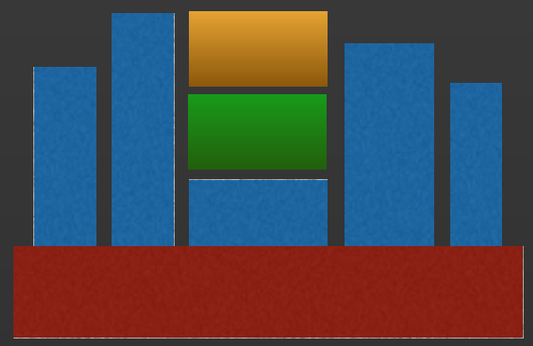
Blockchain stores data

- Ledgers, DNS records, etc
- Immutable once recorded
- Everybody has a copy



Blockchain is a network

- Fully distributed
- Peer to peer connection
- Has a consensus algorithm

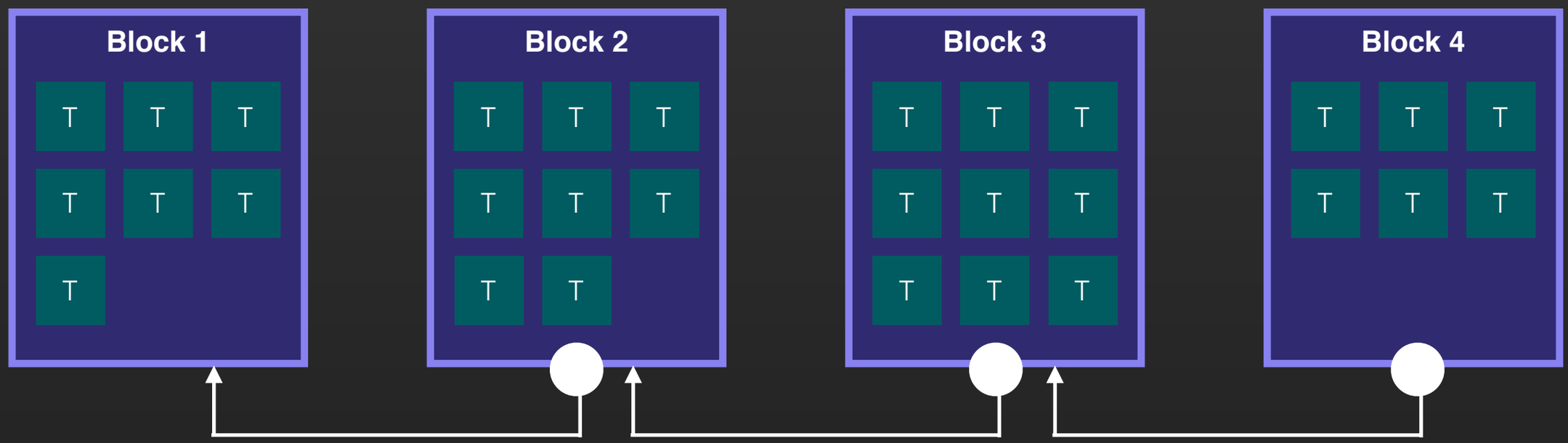


Blockchain is infrastructure

- Enables trust-less interaction
- Enables high automation
- Creates new business models

DIVING DEEPER

- A blockchain node stores all transactions that has ever happened in **blocks**
- Each block contains a series of **transactions** at a specific point of time
- Each block contains condensed information about the **previous** block
- This forms a **chain of blocks** which cannot be broken



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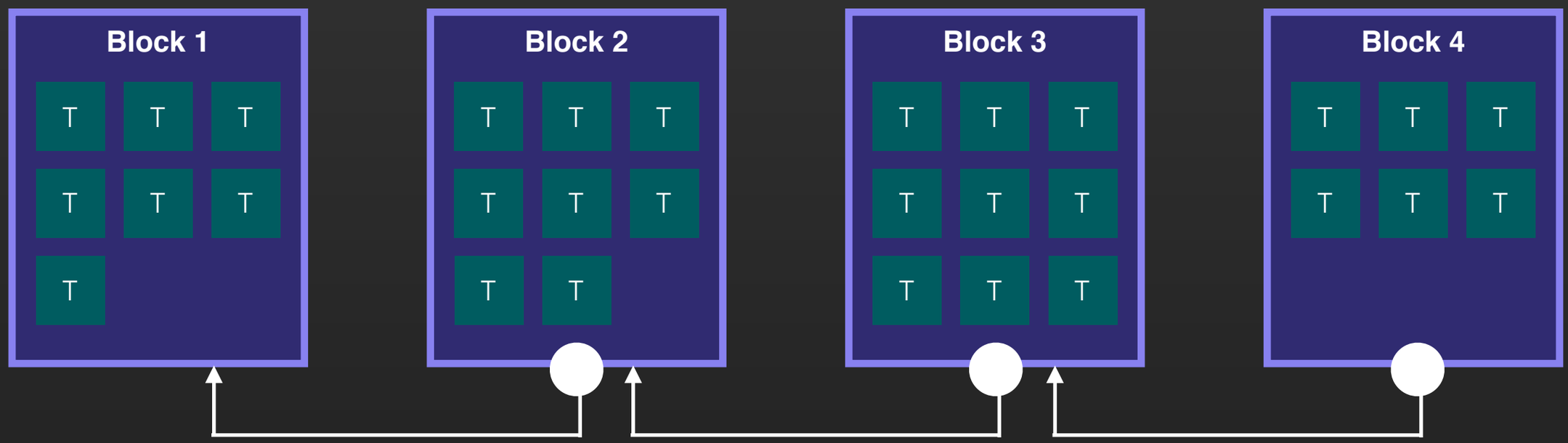

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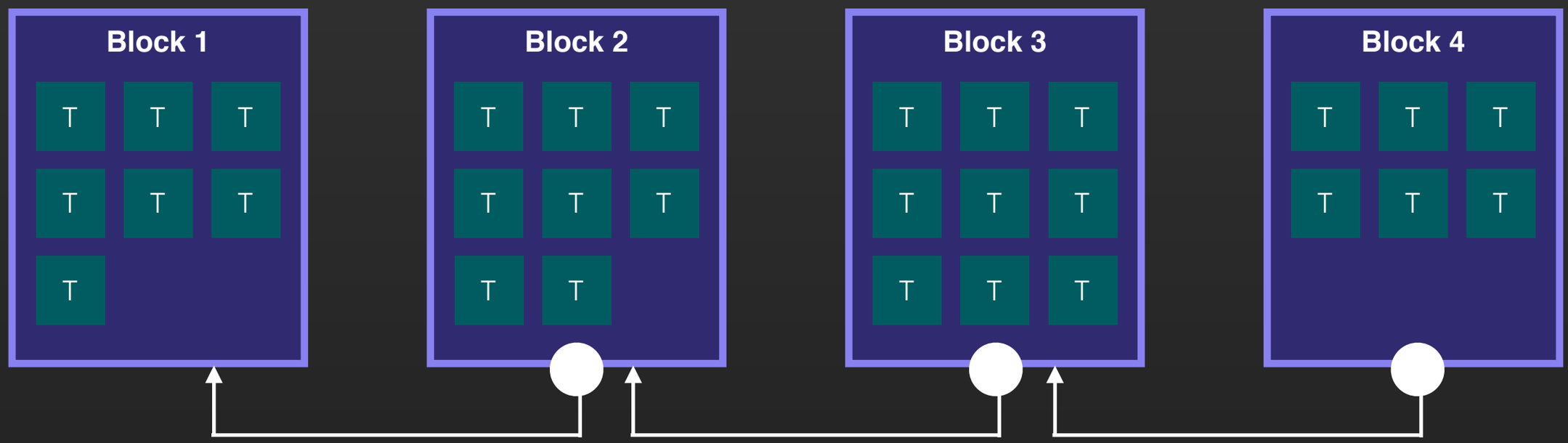

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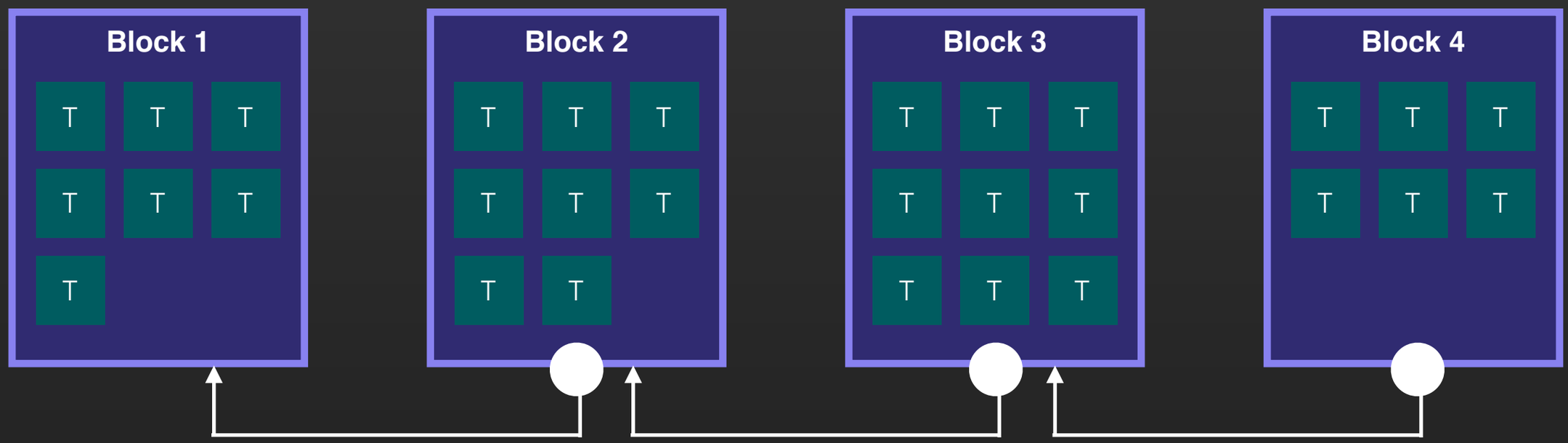
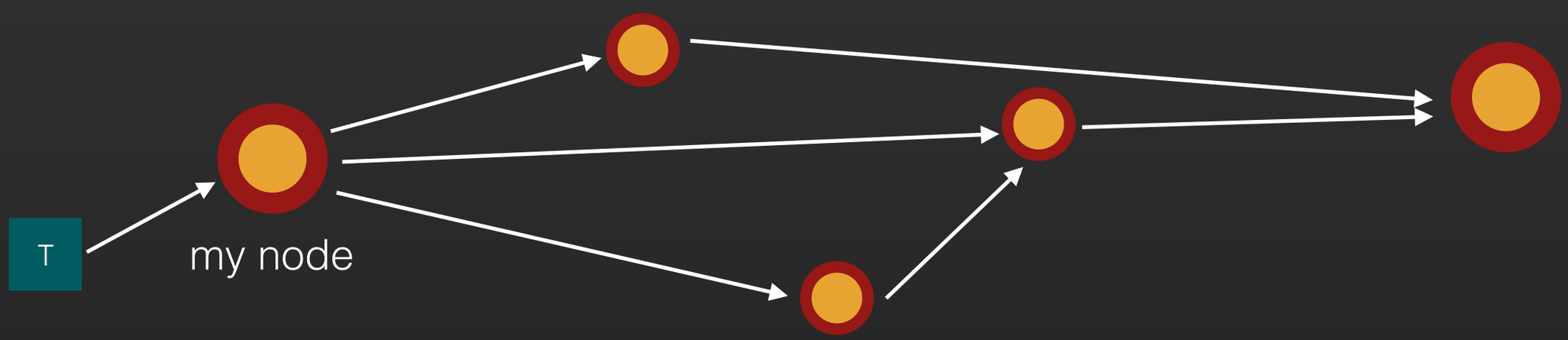


PEER TO PEER NETWORK

- Nodes connect together to form a peer-to-peer network
- Each node updates each other with new information as they receive it
- Updates to the ledger can be initiated from any node



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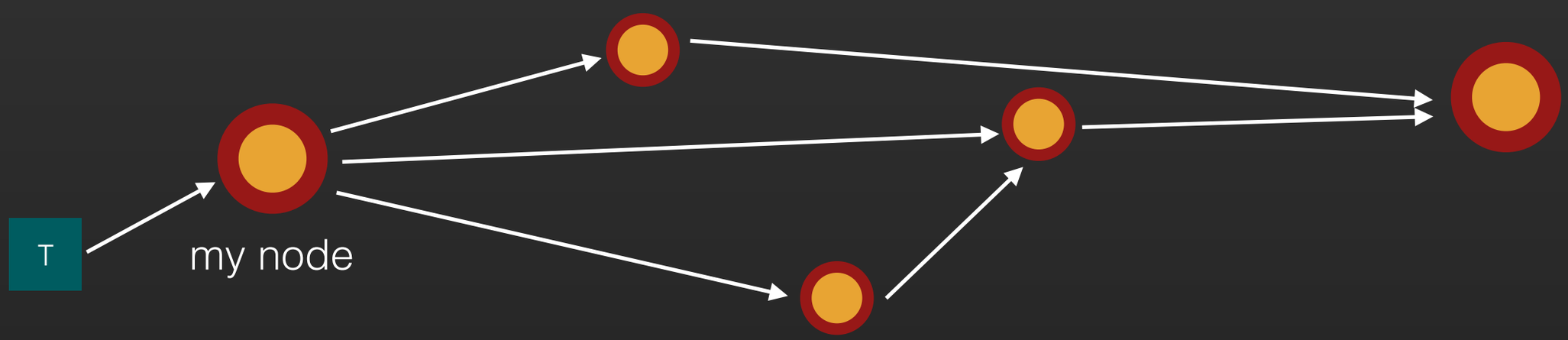

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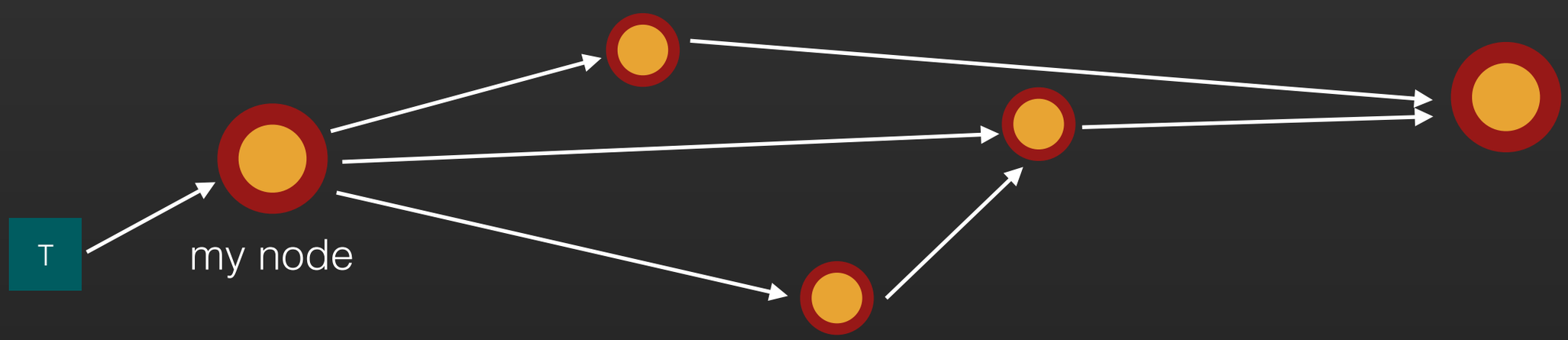


CONCEPTS ESTABLISHED SO FAR

1

Blockchains are made of a network of nodes connected to each other

2

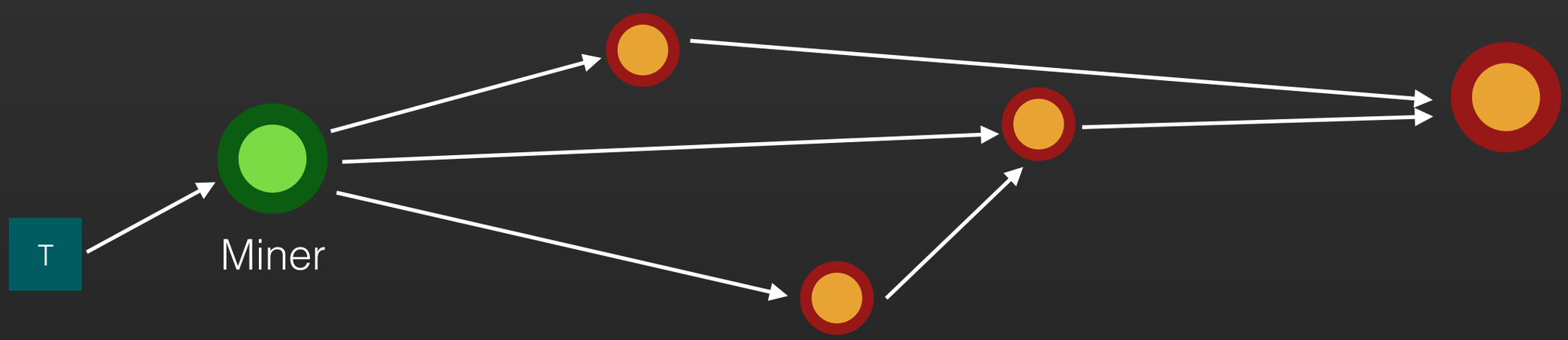
Inside each node is a chain of blocks containing data

PROBLEMS!

- Since all nodes have exactly the same data, and you can update this ledger from any node, how do we ensure that all nodes have the latest data?
- Known as a distributed consensus problem in computer science
- One of the hardest computing problems ever in the modern world
- Common problem in any large databases everywhere in the world
- How does blockchains solve this problem then?

BLOCKCHAIN MINERS/VERIFIERS

- Special nodes called **miners** do the hard work of updating nodes
- Miners pick out transactions, checks them, and packs them into **blocks**
- Miners then perform a difficult **mathematical calculation** using the block's data to proof that they are willing to spend electricity to commit the block to the global distributed ledger



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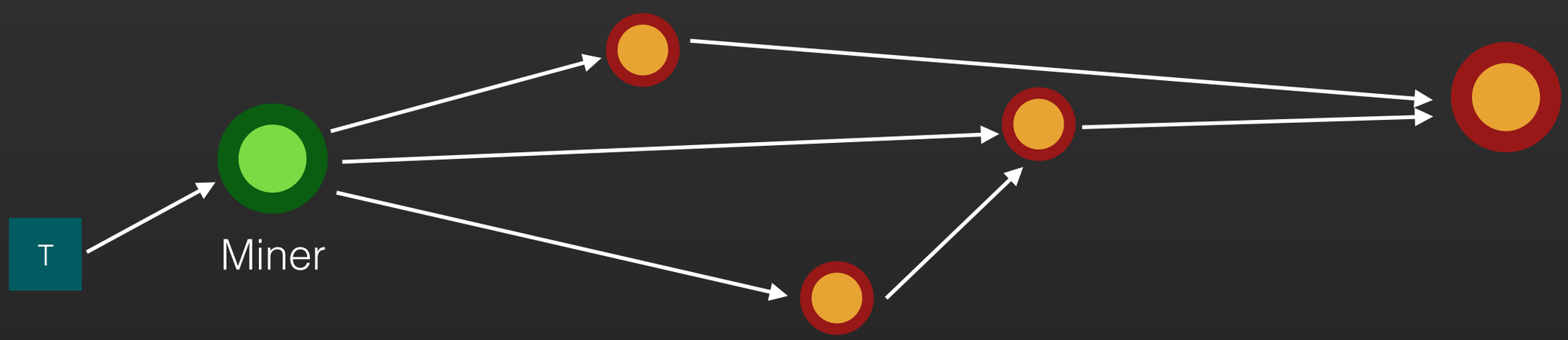

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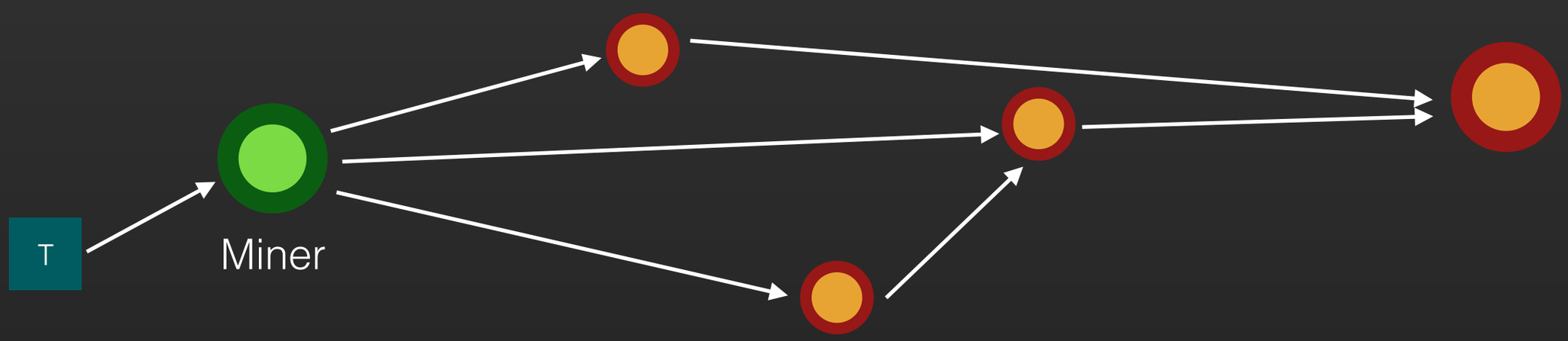
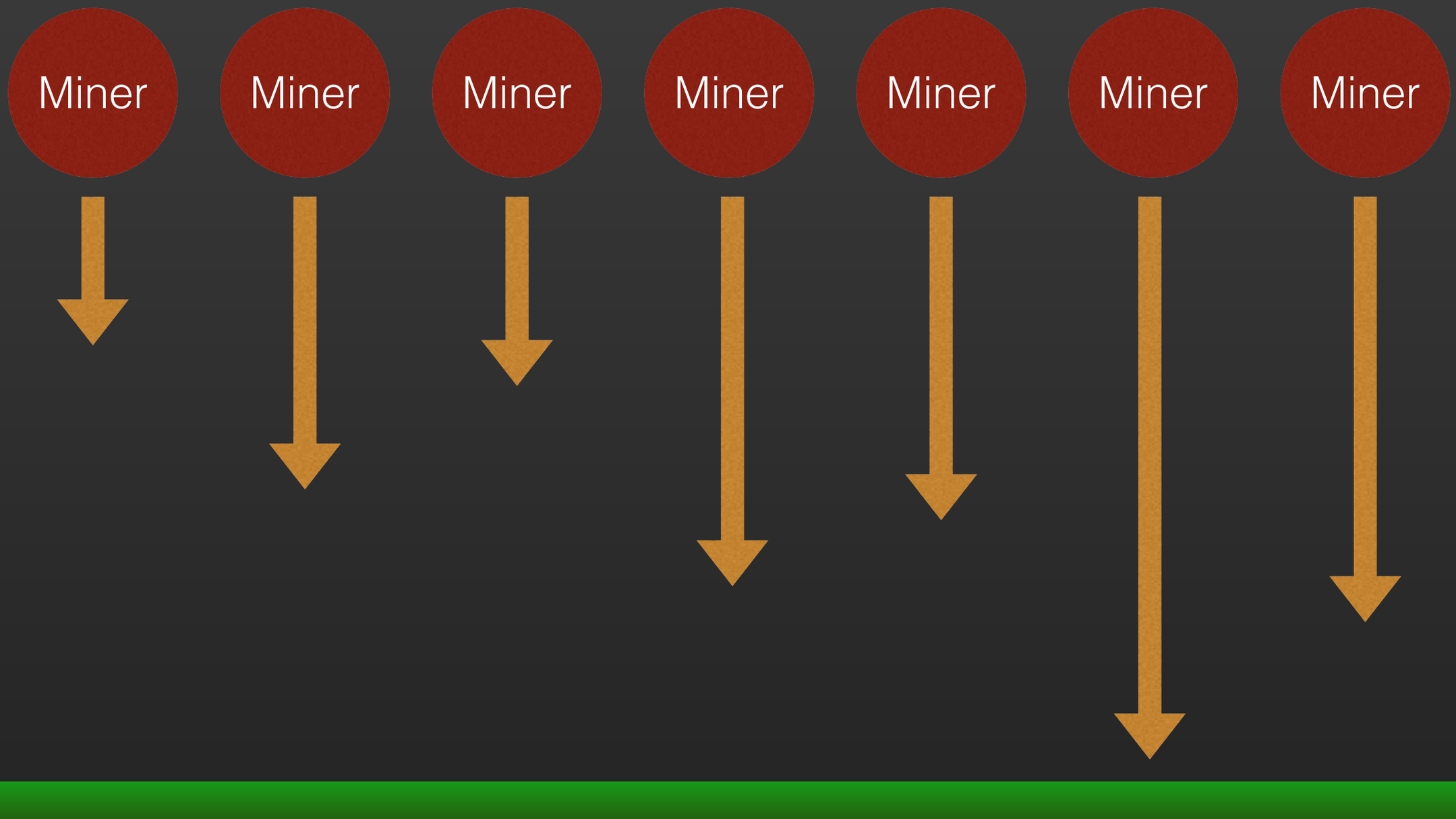


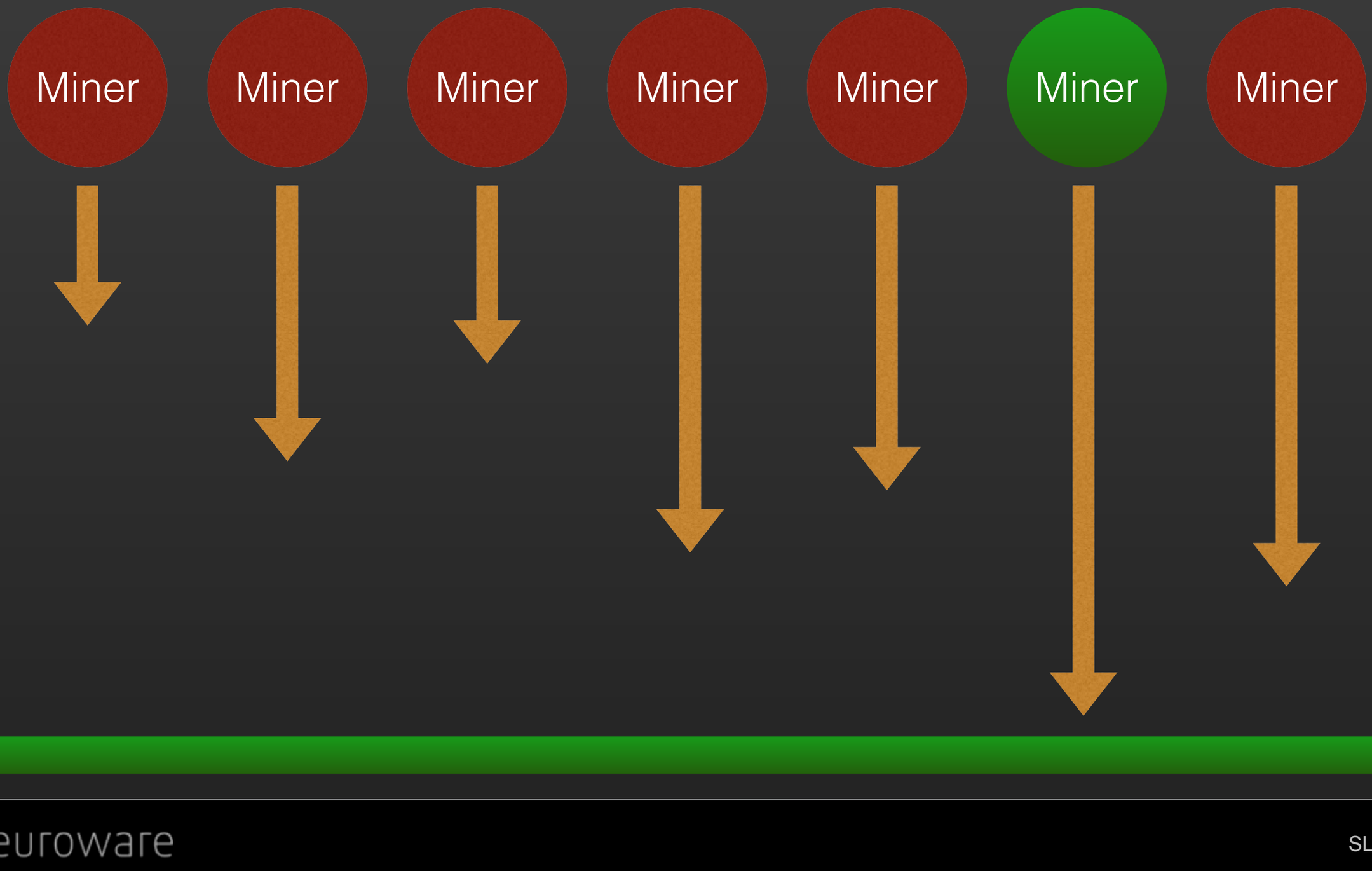
MINING PROCESS

Thousands of miners race to solve a math puzzle



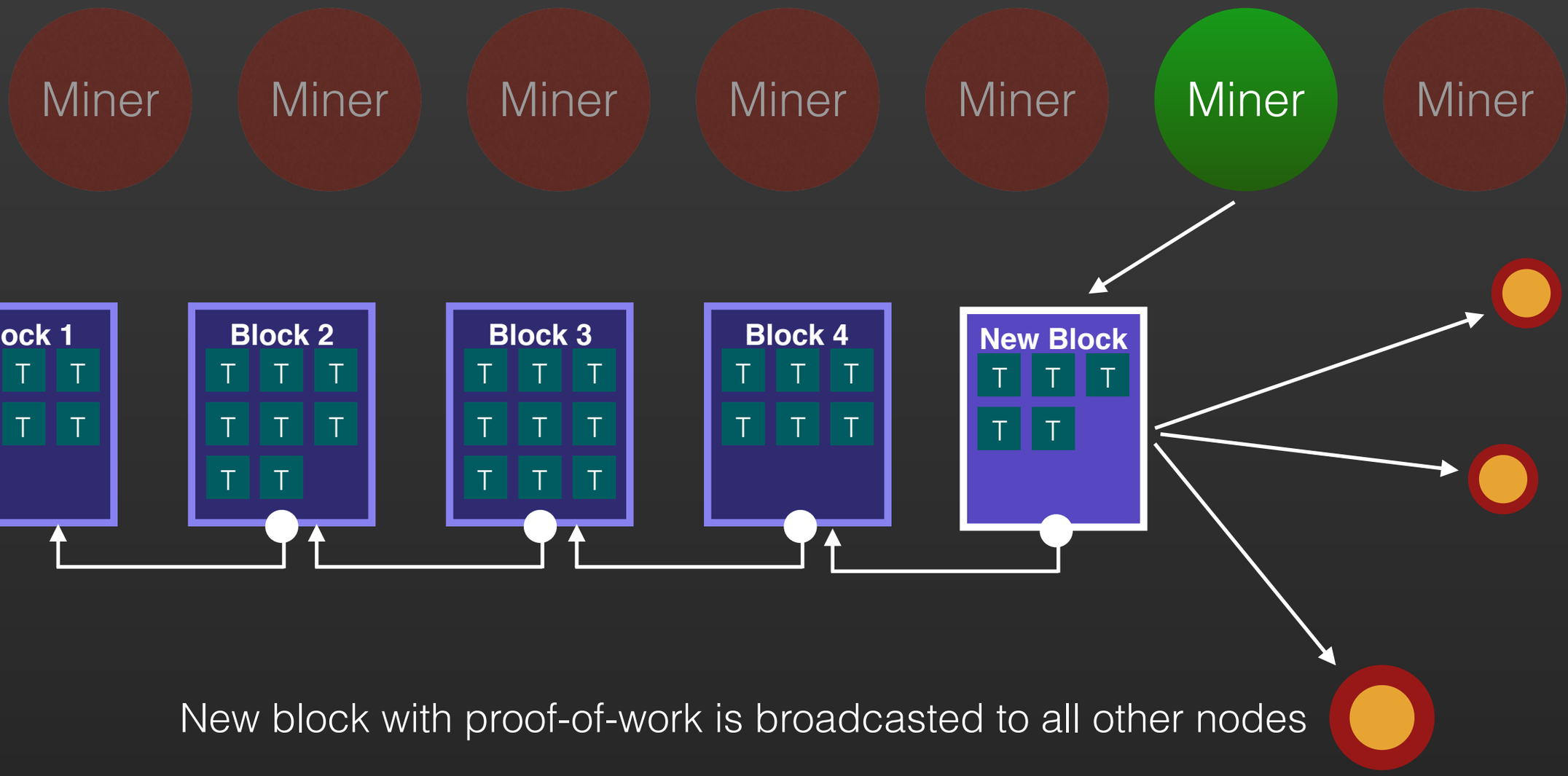
MINING PROCESS

First to solve gets the right to **add a new block**



MINING PROCESS

Miner is rewarded with **new coins** and **transaction fees**



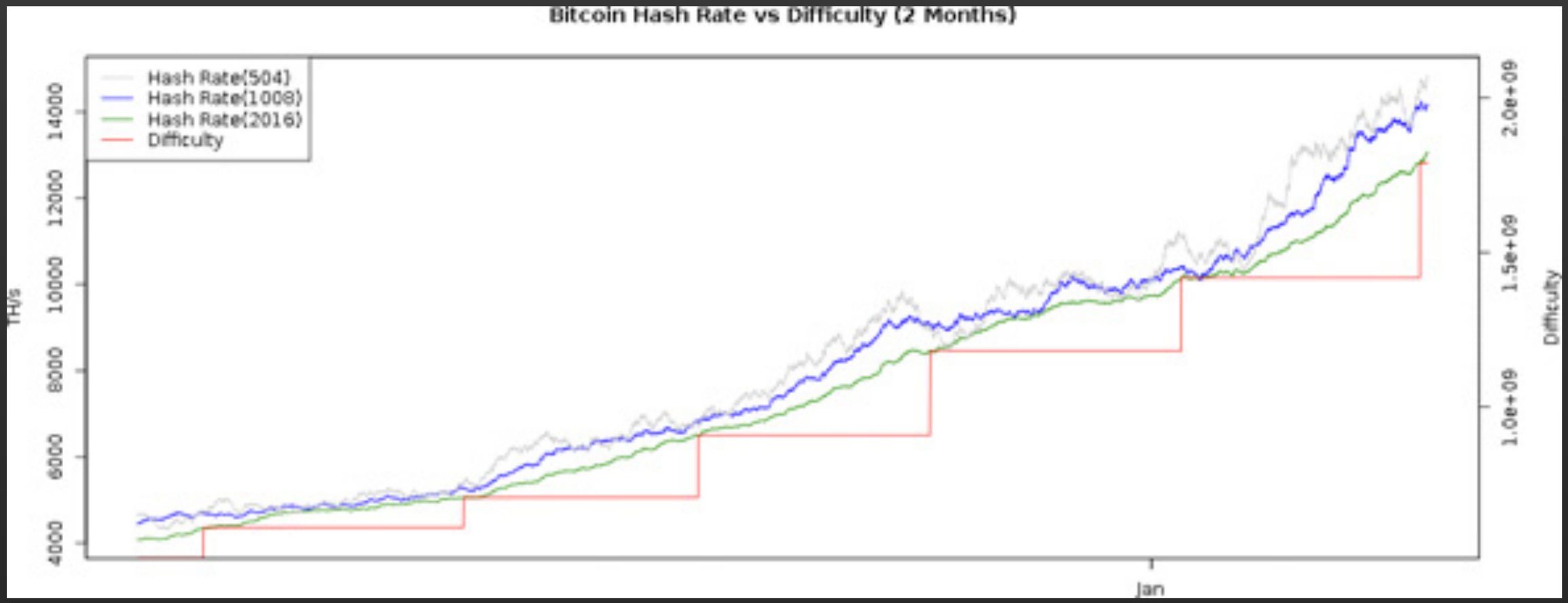
New block with proof-of-work is broadcasted to all other nodes

PROBLEMS!

- If miners are rewarded with new coins and anybody can be a miner, why wouldn't all nodes be mining nodes then?
- If everybody tries to mine their blocks at the same time, how do we perform traffic control?

AUTO-ADJUSTING DIFFICULTY

Auto-adjusting difficulty acts as **traffic control**



EARLY MINING RIGS

MODERN MINING RIGS

BACK TO REAL WORLD

The monumental impact of blockchains

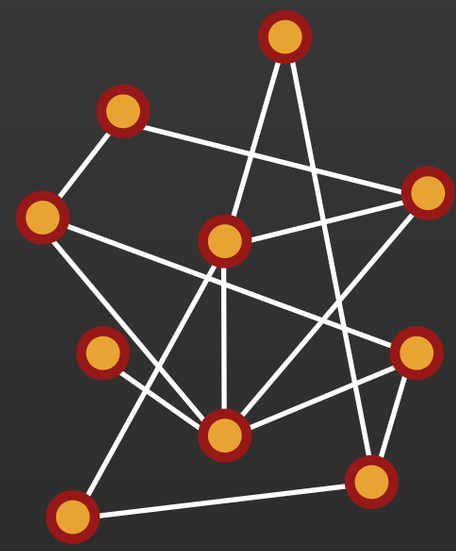
BENEFITS OF BLOCKCHAINS

- **Save cost** - move from expensive client-server oriented structure (and cost of running/renting a complete data centre) to utilising commodity hardware

- **Enable innovation** - blockchains can be used to create ecosystems with open participation, which in turn will create new business models/opportunities

- **Strong fundamentals** - most blockchains have strong cryptography fundamentals, better base to work on than to rely on custom implementations

- **Empowers trust** - blockchains are neutral, and can be used as a platform to conduct transactions without the need of an intervening third-party



SAVING COST THROUGH DECENTRALISING

Save cost - move from expensive client-server oriented structure (and cost of running/renting a complete data centre) to utilising commodity hardware

- Data centre rental/building cost
- Hardware cost
- Electricity cost
- Maintenance personnel salary
- Security hardware cost
- Security personnel cost

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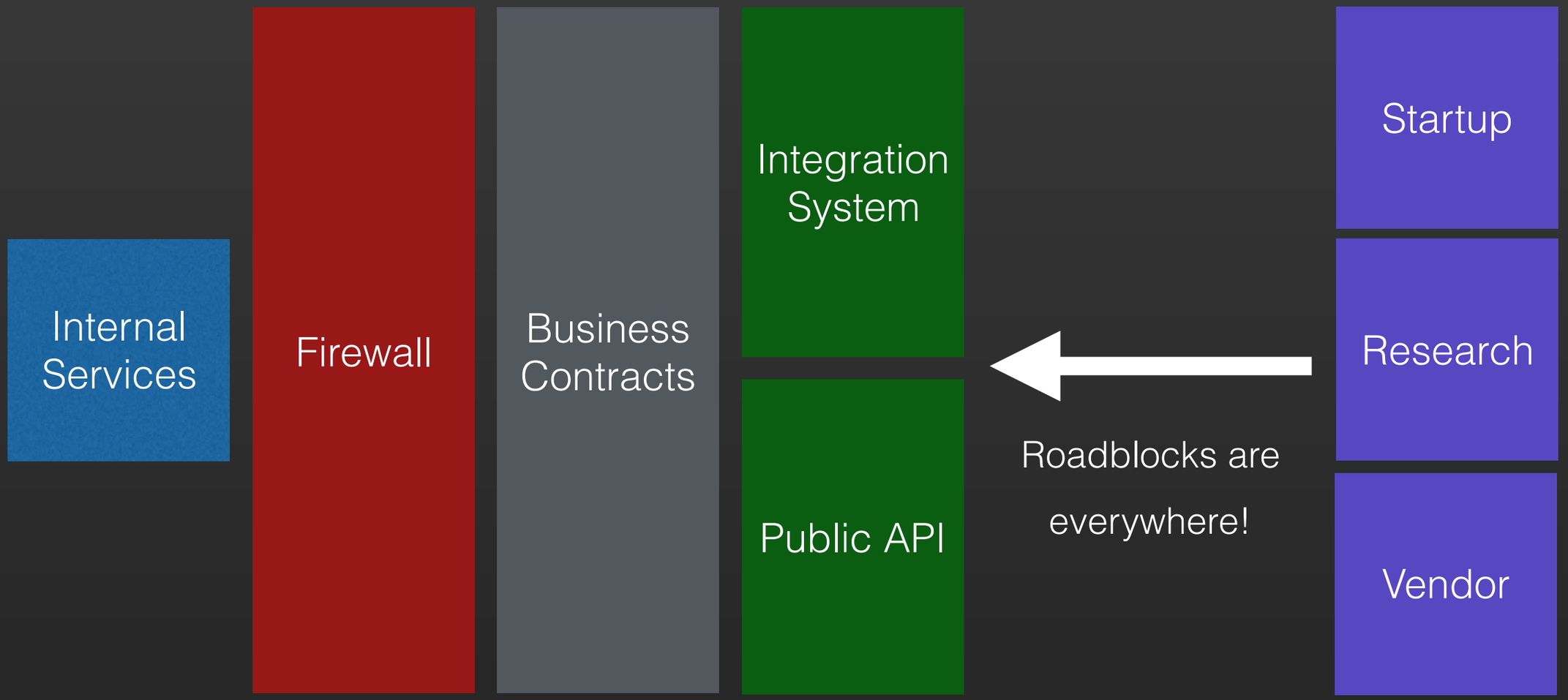
ENABLING INNOVATION THROUGH ECOSYSTEMS

Enable innovation - blockchains can be used to create ecosystems with open participation, which in turn will create new business models/ opportunities



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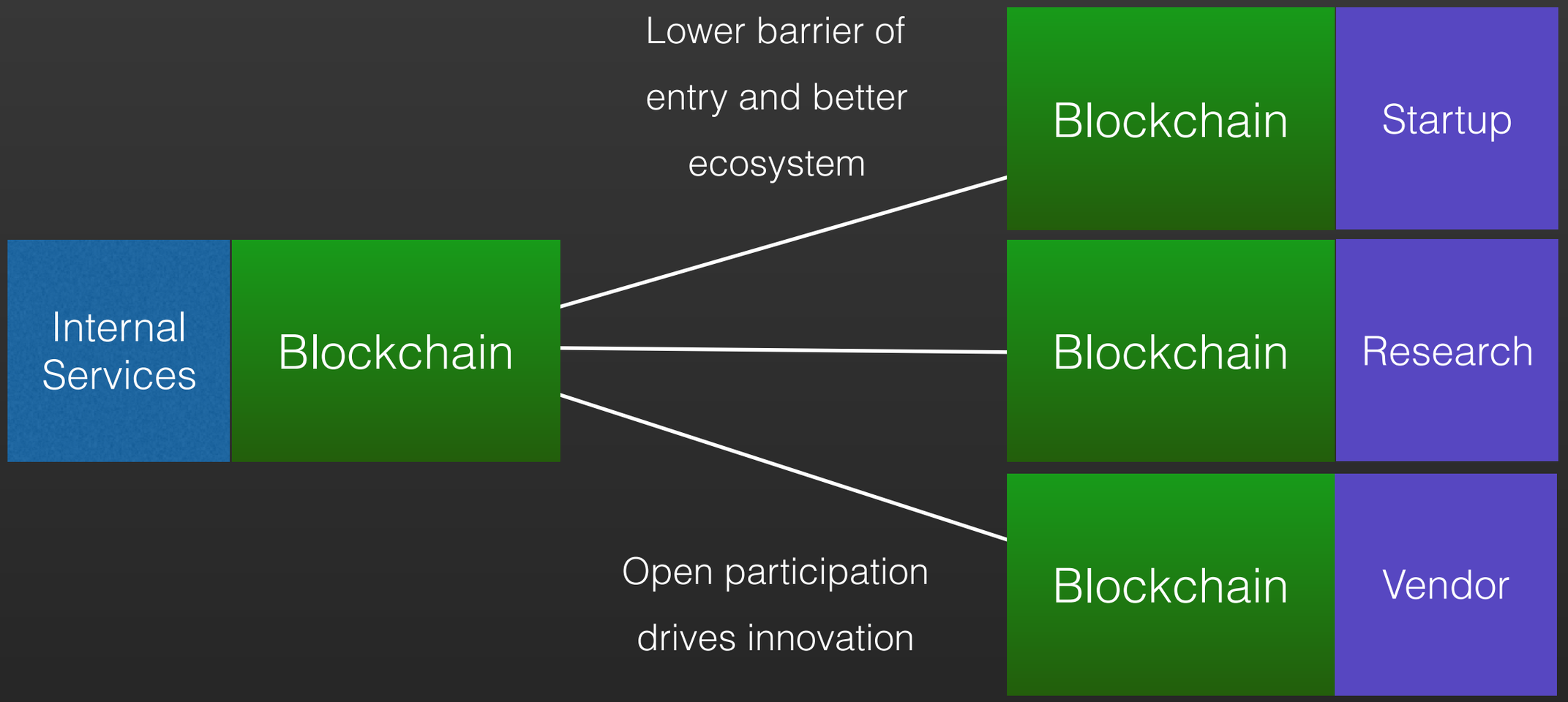

RELY ON BLOCKCHAIN'S STRONG FUNDAMENTALS

Strong fundamentals - most blockchains have strong cryptography fundamentals, better base to work on than to rely on custom implementations

SWIFT network lost 81 million USD to a cyber heist in 2016

LinkedIn was breached, more than 117 million accounts compromised

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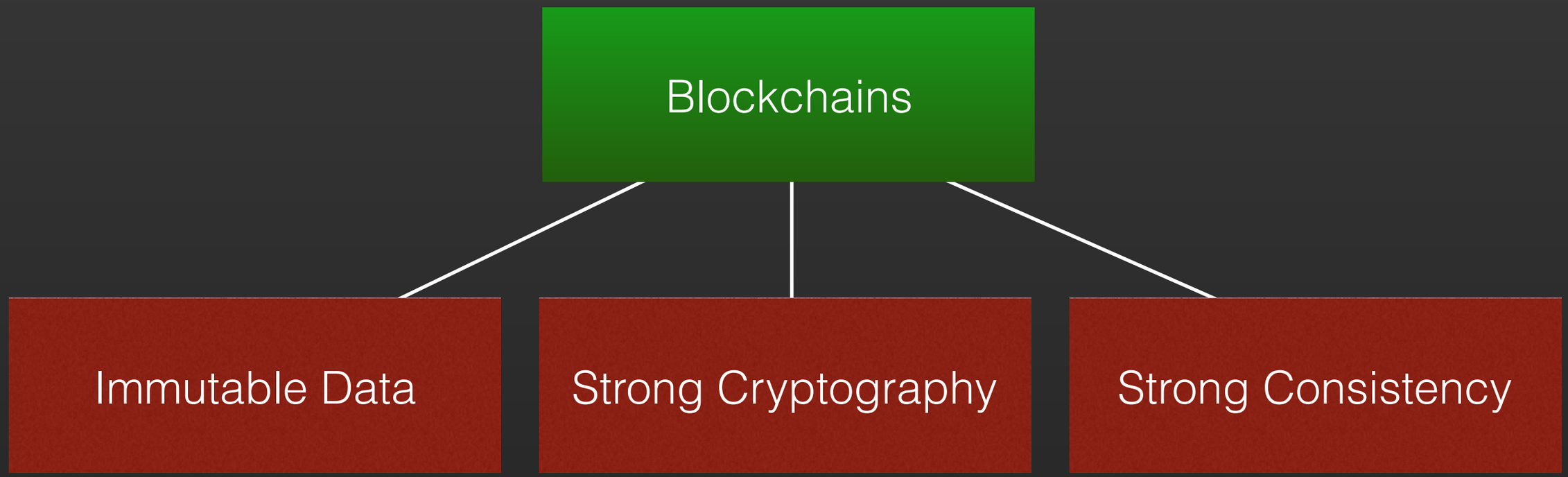

STREAMLINE PROCESSES THROUGH NEUTRALITY

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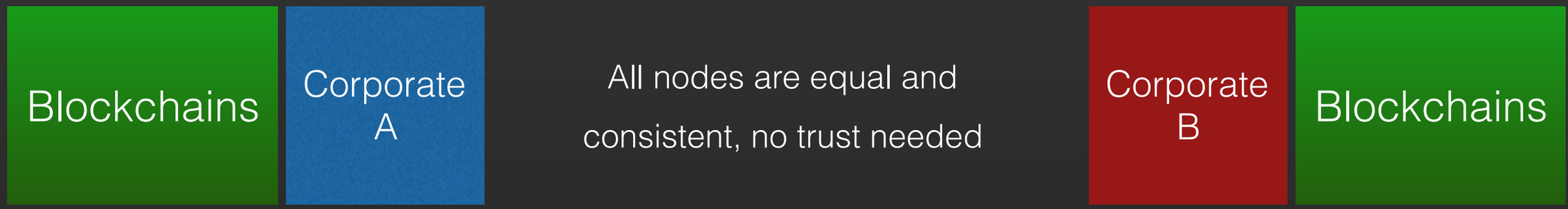

TAKING THE FINANCE WORLD BY STORM

As of January 2016, more than 60 banks and leading financial institutions have made statements confirming that they are actively working on blockchain projects.

BIG NAMES IN THE INDUSTRY

Custom blockchain for settlements

Blockchain based trade finance platform

Blockchain based loyalty platform

Blockchain based remittance platform

multiple blockchains for cross-boarder payments and loyalty

Exploring KYC and AML via the blockchains

Patented a blockchain based wire transfer system

SENEGAL AND TUNISIA

Placed national currency on the blockchain, or converted national currency into digital form on the blockchain

BLOCKCHAINS - Q&A?

A gateway into distributed technologies