openHPI Course: Blockchain – Revealing the Myth

Blockchain Alternatives

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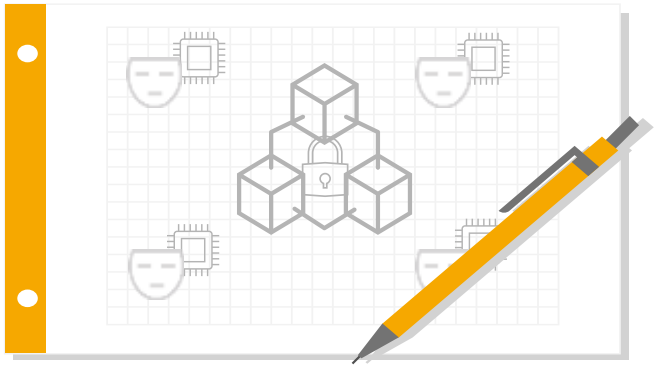
First Generation Blockchain Definition

You probably remember our blockchain definition. Let's take it up and see if it still works in the context of Blockchain 2.0

Blockchain technology provides a

- *permissionless peer-to-peer network*
- *using proof-of-work to record a public history of contents*
- *that quickly becomes computationally impractical for an attacker to change if honest nodes control a majority of CPU power.*
- *This is done without any trusted third party and does not require trust between peers*

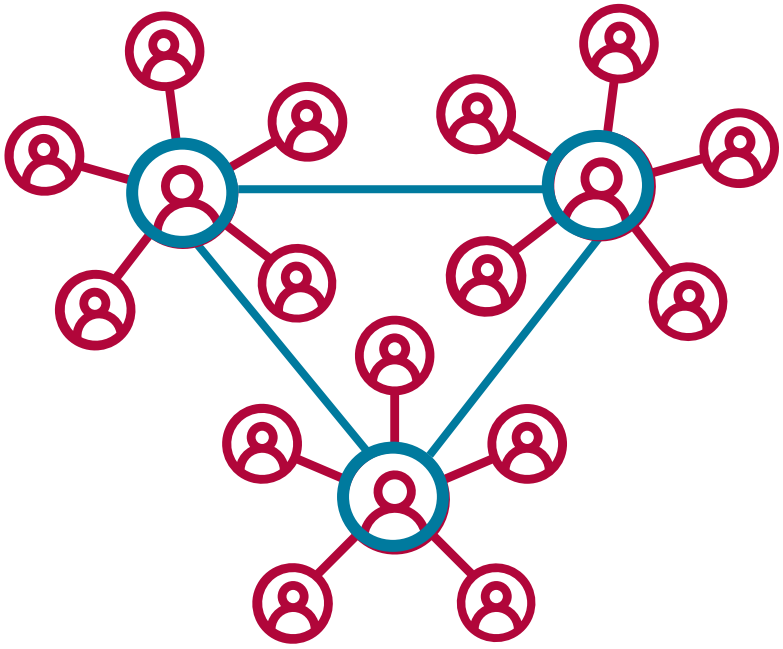
See also Satoshi Nakamoto, Bitcoin: A peer-to-peer electronic cash system, 2008



From Public Blockchains to More "Efficient" Systems

First generation blockchains such as Bitcoin were always **permissionless public blockchain**

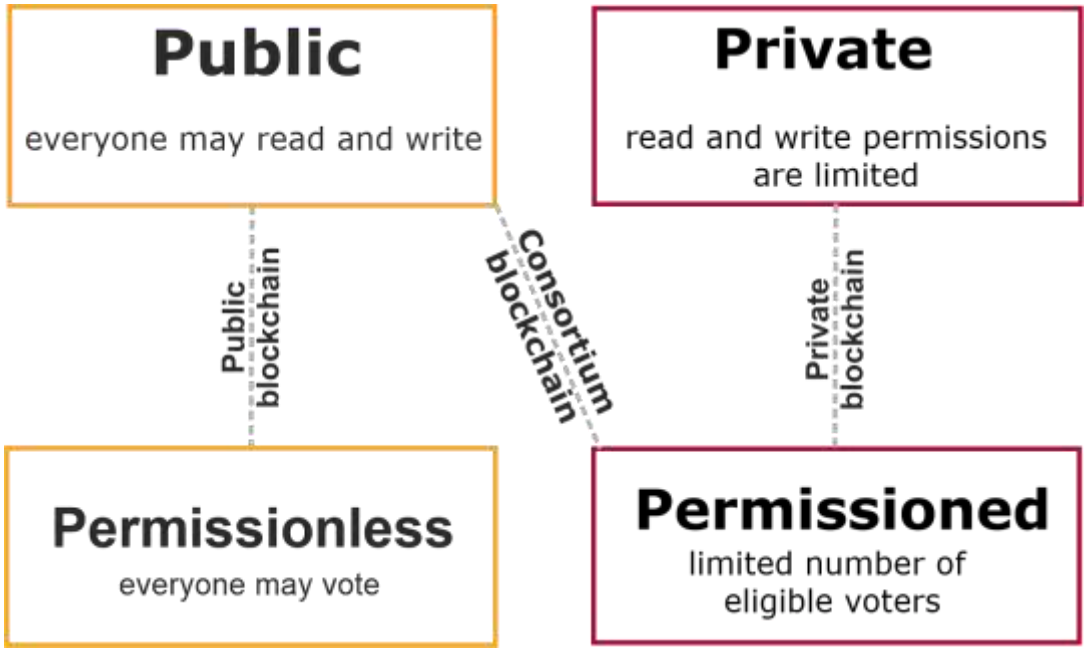
- Intention of restricting the terms of use is a way to make the system more efficient
- Decentralization of the system is in this way secondary



Private and Public Blockchains

It is about a combination of the **following restrictions**:

- **Read permission** – who can see the blockchain contents
- **Write permission** – who can create transactions
- **Consensus permission** – who can vote for the longest chain (attach blocks to the chain)



Private Blockchains

These restrictions mean that **users have to authenticate and authorize themselves** to use the system

- There is **no need in transparency** of content for all, e.g. transactions
- Voting on the next block can be done with **more efficient strategies than Proof-of-Work**
- This is because **miners or validators are known and limited**
- Risk: These preselected miners and validators can be **more easily manipulated by attackers**

Efficiency of Proof-of-Work

Why would we even consider to replace Proof-of-Work?

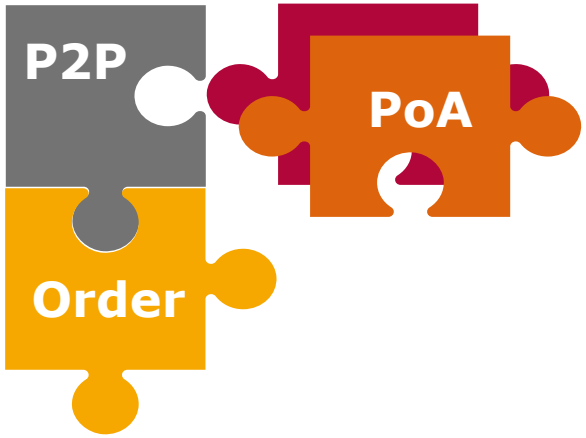
- Among the most widespread headlines is the energy consumption of the Bitcoin System
- **Annualized energy** consumption equivalent to **Chile**
- Carbon footprint of a **single transaction** equivalent to **725,148 VISA transactions**
- Price of Bitcoin influences energy spent on mining

https://digiconomist.net/bitcoin-energy-consumption/

Proof-of-Authority

An alternative to PoW for permissioned blockchains is called **Proof-of-Authority** (**PoA**) and is no longer based on the effort expended in solving a computational (electricity intensive) task

- A **limited group** of users can participate in the **consensus algorithm** for the creation of the next block
- Relies on the **trust in that group of nodes**
- Also called "**consortium blockchain**"
- The smaller group can simply do a **majority vote** as they are authenticated and authorized

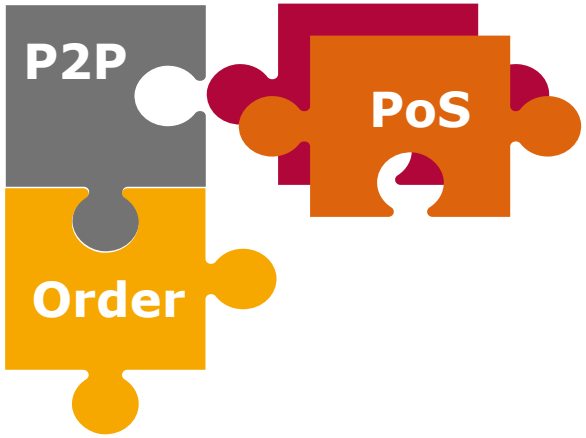


Risk Manipulation by the selected nodes

Proof-of-Stake

An alternative to PoW for public/unpermissioned blockchains is called **Proof-of-Stake** (**PoS**) relies on the "staking" of a **proportion of digital coins in a cryptocurrency**

- Users use their stakes to vote – who have the **n percent** of the digital coins, may create **n percent** of the blocks
- Miners are replaced by **validators**, which use the PoS algorithm and have the possibility to create a block



Is it Still Blockchain-based?

Many new **independent** blockchain networks with **adapted parameters** or **new functionalities** are created using Bitcoin or Ethereum source code

- Numerous technical concepts and projects, which **already existed before blockchain technology**, using the hype surrounding blockchain experience higher sales when **marketed under the blockchain** name
- The question arises as to which changes and adaptations would we say that **it is no longer blockchain-based**