TeleTrusT
Pioneers in IT security.

TeleTrusT-Informationstag "Blockchain"

Berlin 27.06.2018

Neue Basis-Technologien und Konsensalgorithmen

Philipp Lang, Blockchain Team esatus AG

Agenda

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1. Proof of X
2. Directed Acyclic Graph (DAG)
3. BFT-Algorithmen
4. Forschung

Proof of Work (PoW)

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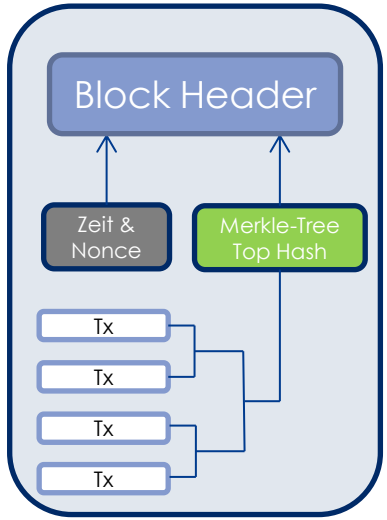
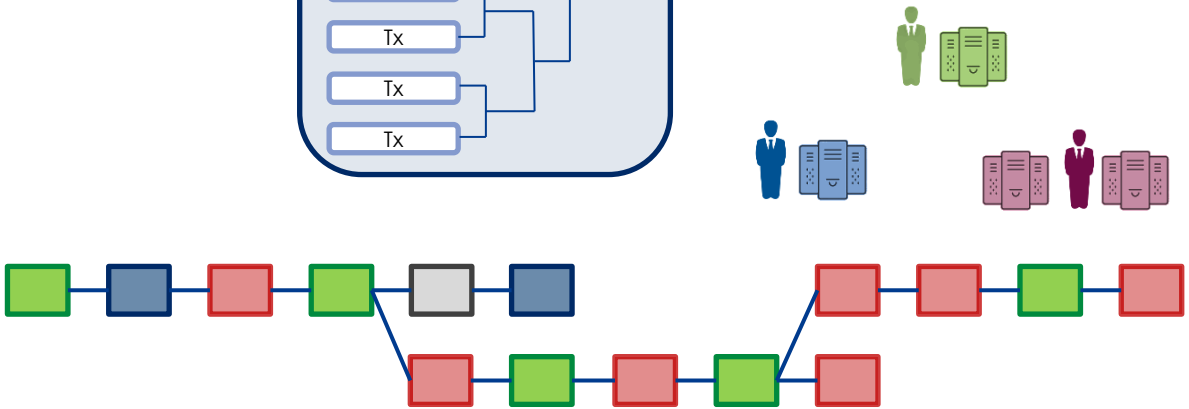
- Anwendungen
  - BTC/BCH
  - LTC
  - ETH/ETC
- Stärken
  - Vertrauenslose Umgebungen
  - Etabliertes Verfahren
  - Funktioniert (aktuell)
- Schwächen
  - Hohe Kosten
  - Skalierung
  - Majority Attacken





Proof of Stake (PoS)

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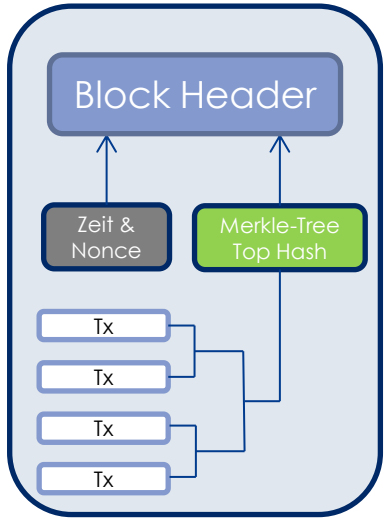
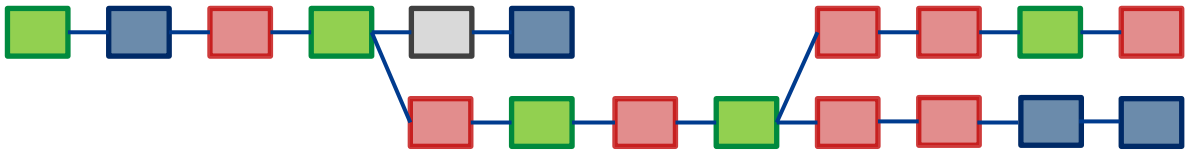
- Anwendungen
  - ADA
  - STRAT
  - Dash
  - Neo
- Stärken
  - Energie effizienter
  - Vertrauenslose Umgebungen
  - Bereits in Anwendung
- Schwächen
  - Majority Attacken
  - Nothing at Stake





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2. Directed Acyclic Graph (DAG)

Directed Acyclic Graph (DAG)

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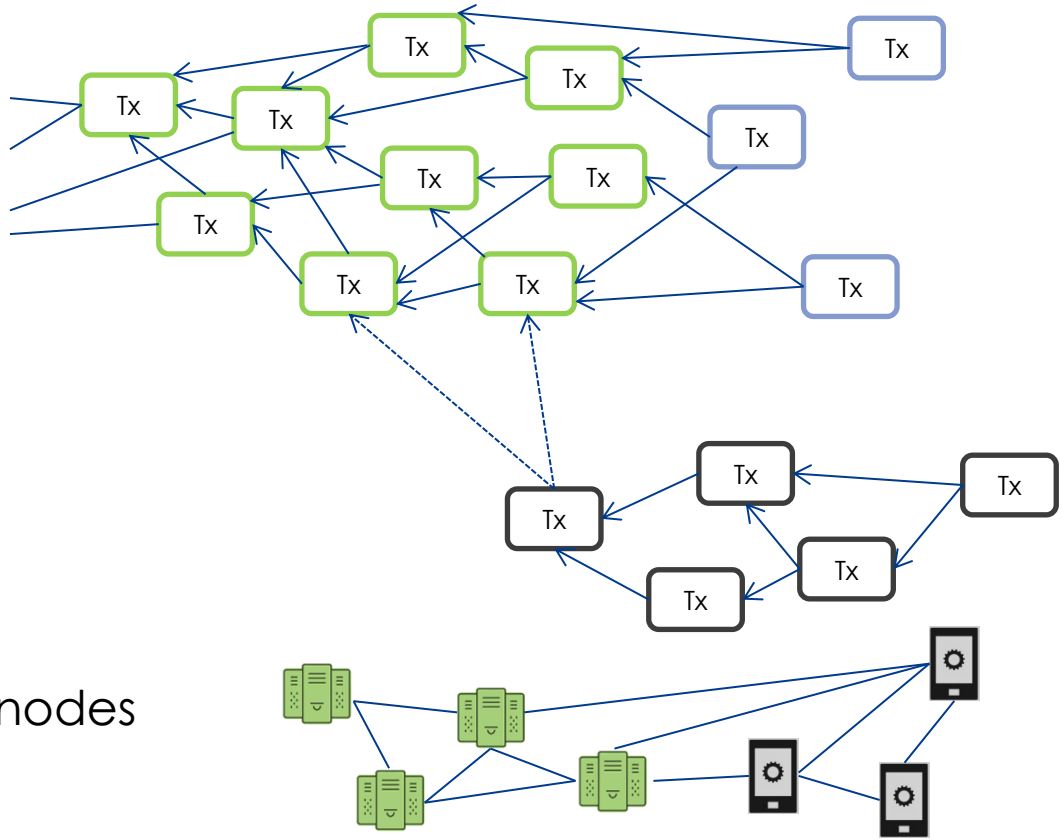
- Anwendungen
  - Byteball
  - IOTA
- Stärken
  - Hohe Skalierbarkeit
  - Offline Modus (IOT)
  - Keine Blöcke / Gebühren
- Schwächen
  - Mindestanzahl Transaktionen
  - Große Abhängigkeit von Fullnodes



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3. BFT-Algorithmen

Practical Byzantine Fault Tolerance (PBFT)

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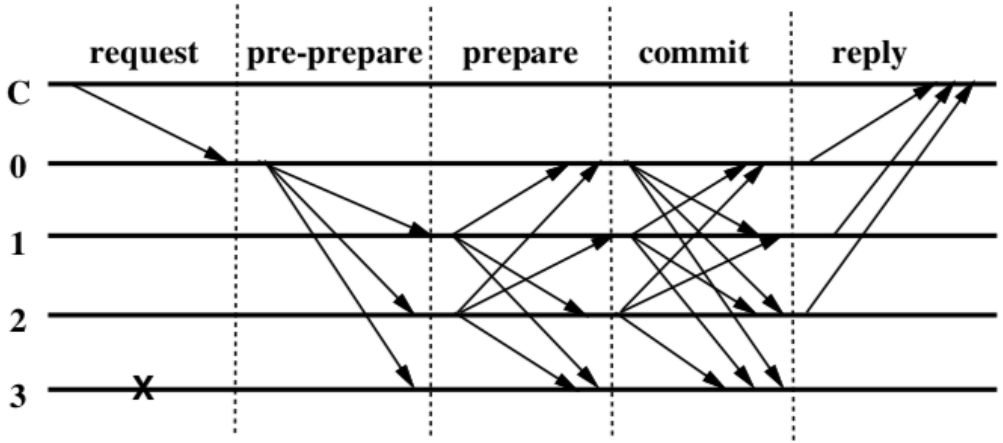
- Anwendungen
  - Hyperledger Fabric
- Stärken
  - Ursprung Sensortechnik
  - Hohe Skalierbarkeit
  - Effizienz
- Schwächen
  - Majority Attacke bei 1/3
  - Konsortium Verfahren



PBFT Schema [1]

1: http://pmg.csail.mit.edu/papers/osdi99.pdf

Redundant Byzantine Fault Tolerance (RBFT)

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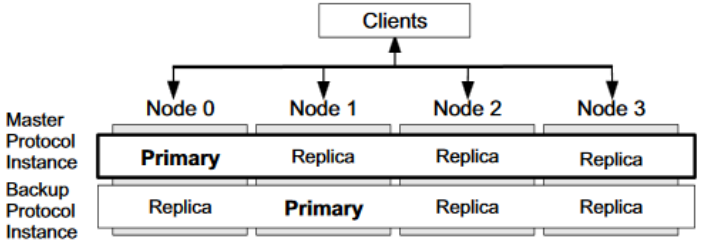
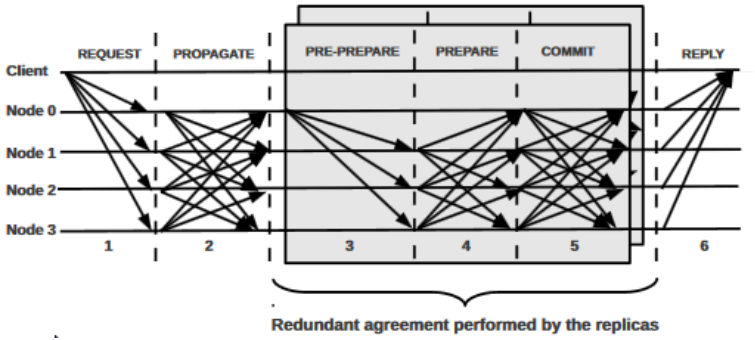
- Anwendungen
  - Hyperledger-Indy (sovrin)
- Stärken
  - Hohe Skalierbarkeit
  - Effizienz
- Schwächen
  - Majority Attack bei 1/3
  - Konsortium Verfahren



RBFT Protocoll Steps [1]



RBFT Protocoll Steps [1]

1: https://pakupaku.me/plaublin/rbft/5000a297.pdf

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4. Forschung

PoW on a Blockchain

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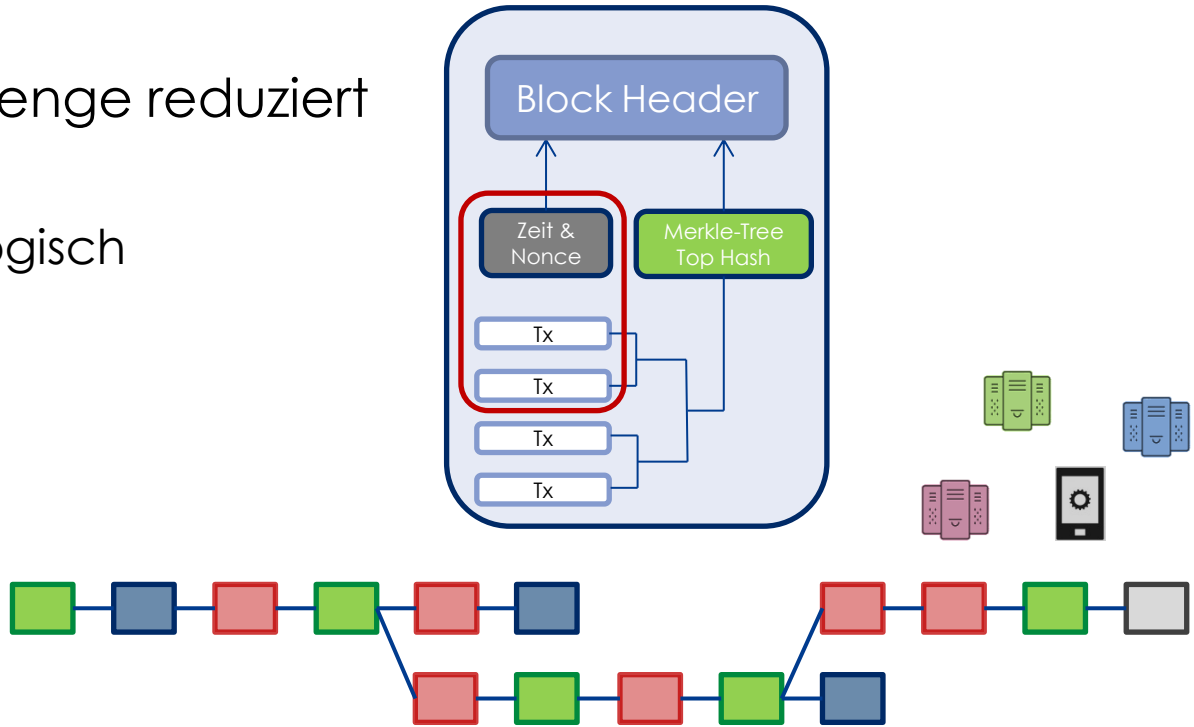
- IBM Patent 26. April
- Nonce wird auf Teilmenge reduziert
- Stärken
  - Ökonomisch / Ökologisch
  - IOT fähig
- Schwächen
  - Unerforscht
  - Kalibrierung unklar
  - Nur IOT Devices?



Proof of Ellapsed Time

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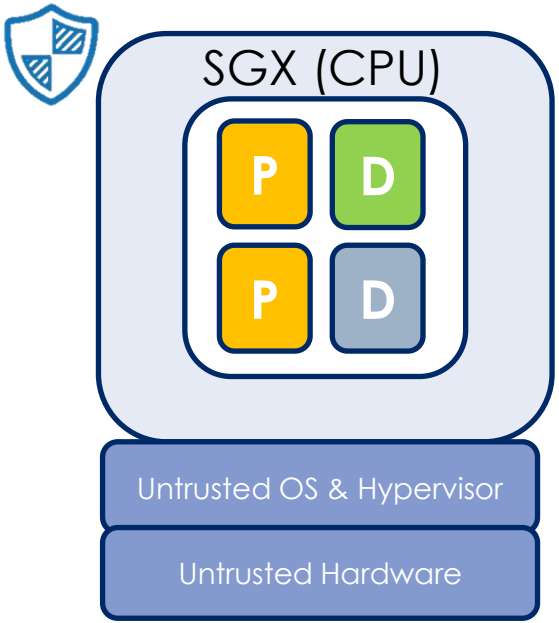
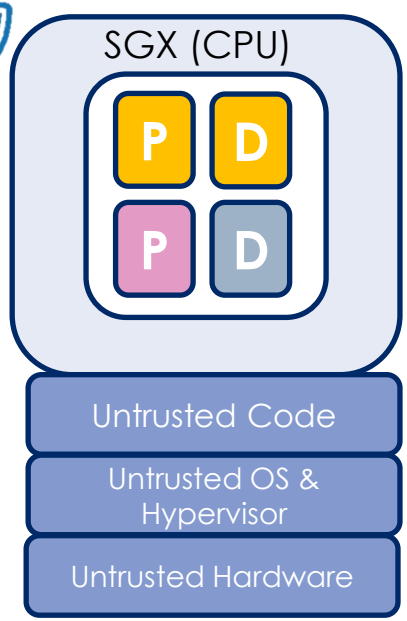
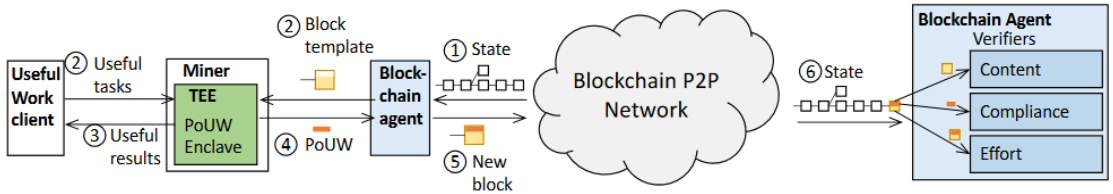
- Intel Patent
- „Simuliert“ PoW (schläft)
- Vorteile
  - Ökonomisch / Ökologisch
  - IOT Fähig
- Schwächen
  - Stale Chips Problem
  - Broken Chips Problem
  - Teilweise dezentralisiert



Proof of Useful Work (PoUW)

- Intels Security Guard Extension (SGX)
- Vorteile
  - Ökonomisch / Ökologisch
  - IOT Fähig
- Schwächen
  - Teilweise dezentralisiert





Architektur REM [1]

1: https://www.usenix.org/system/files/conference/usenixsecurity17/sec17-zhang.pdf

Übersicht

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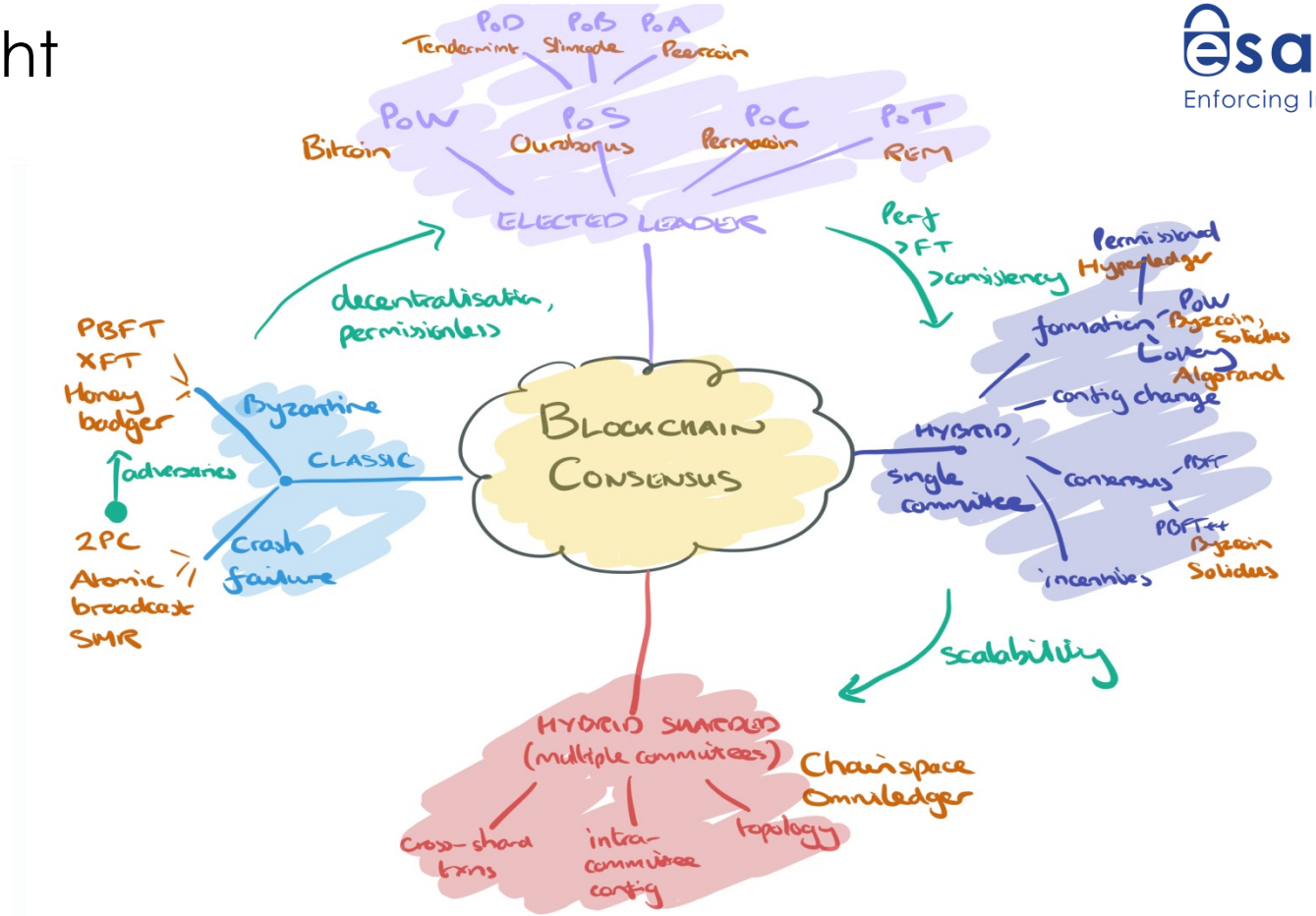

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Quellen

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- https://medium.com/kokster/understanding-hyperledger-sawtooth-proof-of-elapsed-time-e0c303577ec1
- http://iotatoken.com/IOTA Whitepaper.pdf

Questions & Answers

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Ansprechpartner

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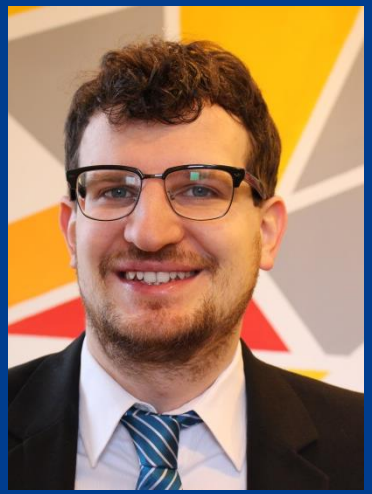

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Vielen Dank für Ihre Aufmerksamkeit!