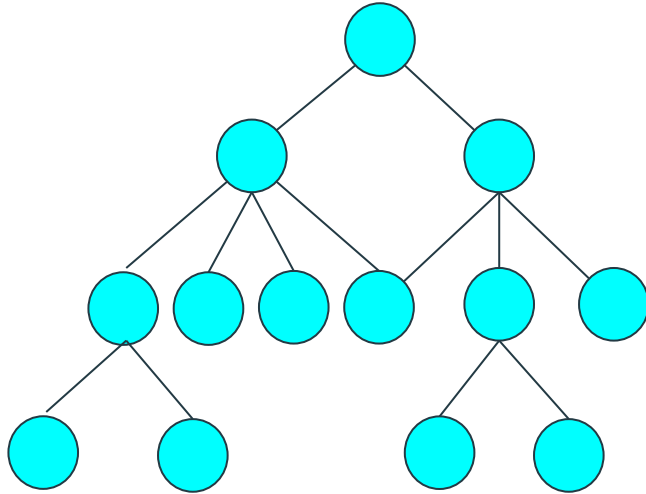# Introduction to Blockchain Technology
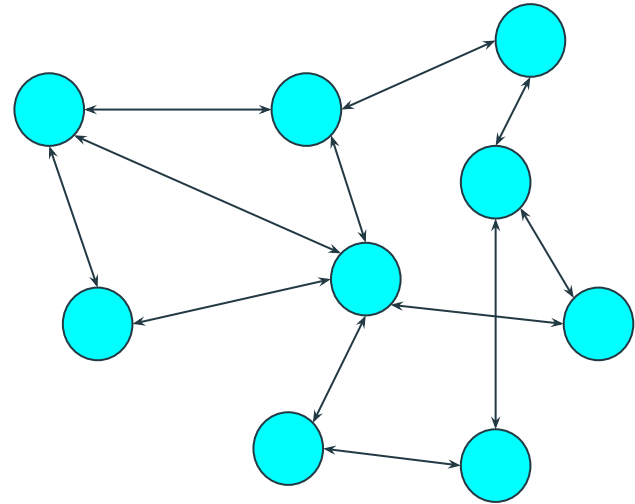
Konstantinos Karasavvas
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Research Fellow (Blockchain) in Aristotle University

Governance Model

Hierarchical

Decentralized

What is Blockchain? (1/2)

- Blockchain is a technology
  - Decentralized Ledger Technology (DLT)
  - Introduced in 2008/9 by Bitcoin cryptocurrency

- Bitcoin: a novel combination of technologies
  - Distributed computing
    - a peer-to-peer network/protocol
    - a novel consensus mechanism
  - Cryptography
    - a decentralized trustless platform using elliptic-curve cryptography (PKI)
  - Game Theory
    - incentives-based
    - a proof-of-work algorithm

What is Blockchain? (2/2)

- Imagine a shared database which global state can be updated only if the majority agrees according to predetermined rules
  - Asset registry that records who owns what
  - Append-only log of events that update the shared state
- A computer program (code with its methods/state) is also state
  - Smart contracts
    - No one controls the code
- Foundation of a new decentralized infrastructure
- Main categories
  - Public (Bitcoin, Ethereum, etc.)
  - Private

Main characteristics (Public - Private)

- Decentralized
  - State changes only after majority consensus
- Immutable
  - Append-only; no deletion or modifications allowed (w/o majority consensus)
- Transparent
  - Operations/data are available for all to see and verify
- Open
  - No barriers of entry; anyone can participate
- Secure
  - Strong cryptography ensures integrity of data stored

- Decentralized
  - State changes only after consensus determined by internal policy
- Immutable
  - Append-only; no deletion or modifications allowed (w/o consensus accord. to policy)
- Transparent
  - Operations/data are available for predetermined member relationships
- Closed
  - Private membership
  - New members can be added by vote
- Secure
  - Strong cryptography ensures integrity of data stored

Blockchains: Applications

- **Remittances**
- **Payments**
- **Bank services for the unbanked**
- **Store of Value**
- **Digital Tokens**
- Decentralized Applications
- Micropayments
- Proof of Existence
- Smart Contracts
- Decentralized Autonomous Organizations
- Internet of Things / Machine to Machine
- Voting / Identity

Remittances

- €600 billion market
  - Western Union (15%)
  - MoneyGram
- High fees
  - depends on location
  - up to 15%
  - more for same day delivery
- Up to same day delivery
- Anywhere there is an agent
- Working hours
  - plus extended hours

- Cryptocurrencies slowly gains momentum
- Costs **cents** irrespective of amount
- Takes minutes
  - in practice it is much faster
- Anywhere there is a connected machine
  - Internet (no need for permanent access)
- Anytime
  - 24/7
- No intermediaries, but…
  - bitspark.io
  - rebit.ph
  - bitpesa.co

Making/Receiving Payments

- Online
- Credit cards
  - 2%-6% + small flat rate
- Debit cards
  - 2%-3% + small flat rate
- Paypal
  - 2.9% + $0.30
- Cryptocurrencies
  - none
  - only the sender pays

- Merchants can offer discounts for cryptocurrencies
- Payment Processing
  - Coinbase, BitPay
- Point of Sale
  - Bitcoin PoS (android app)

- Some major companies
  - Overstock
  - Microsoft
  - Dell
  - Expedia
  - Time Inc.
  - DISH Network
  - Newegg
  - Zynga
  - UK's Theatre Tickets Direct
  - AirBaltic
  - CheepAir
  - …

- Do they keep their bitcoins?
- Can Bitcoin handle demand if widely adopted?

Be your own bank

- Bank services for the unbanked/underbanked
  - payments
  - remittances
  - micro-payments
  - donations
    - UN World Food Programme
  - … using Mobiles

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  - capital controls
  - censorship

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- Store of value (vs hyper-inflation)
  - gold
  - reserve currencies
  - bitcoin
    - deflationary
    - Latin/South America, China, Russia.

Digital Tokens

- represent/transfer real world value/asset
  - theater tickets
  - consultancy hours
  - authentication mechanism
  - stock markets' shares
  - new currency
  - car ownership/key, house deeds, …

- open blockchain technology
  - immutability
  - transparency

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- Swedish National Land Survey (on trial)
  - immutability / transparency
  - automation of selling process
  - less paperwork (months -> days/hours)
  - more secure
- Nasdaq Composite Index
  - pre-IPO trading
  - equity shares on Bitcoin's blockchain
- LetsTalkBitcoin.com (publishing platform)
  - LTBC token
  - Proof of Participation
  - token-based access
- Steem (social networking with rewards)
- StorJ (decentralized cloud storage)
- FoldingCoin (help scientists cure diseases)
- BitCrystals - Spells of Genesis game
- …

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Blockchain Technology Evolution

- 2009: **Bitcoin** was born
- 2010: First *real-value* transaction
- 2011: Silk Road accepts Bitcoin
- 2012
  - Television series 'The Good Wife'
  - **Litecoin**
- 2013
  - US Financial Crimes Enforcement Network (FINCEN) "guidance report"
  - China bans Bitcoin
- 2014
  - Major online retailers (Overstock) start accepting Bitcoin
  - **Ethereum** (aka Blockchain 2.0)
  - US government auctions 29k Bitcoins
  - UK government classified Bitcoin as asset (no VAT)

- 2015
  - **Hyperledger project** (Linux Foundation)
  - NY Exchange invests in Coinbase
  - ~160.000 merchants accept Bitcoin
- 2016
  - Japan recognises Bitcoin as currency
  - ~770 ATMs
  - Billions are invested by VCs and ICOs
- 2017
  - Surpusses $800 billion in capitalization
  - Blockchain 3.0

- Thousands of blockchain and cryptocurrencies projects

- Hype or disruptive technology?

Get involved

- Blockchain technology, infancy
  - Internet's 90s
- Rapidly evolving
  - Technological aspects
  - Sociological, Economical, Political, Business aspects
- There are 14 jobs for every blockchain developer

- Bitcoin and Blockchain Technology meetup in Thessaloniki
  - https://www.meetup.com/BlockchainGreece-1/
  - Forums, Reddit, Slack, …

Questions ?

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