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Blockchain Definition, Implications, and Potentials:

A Hands-on approach

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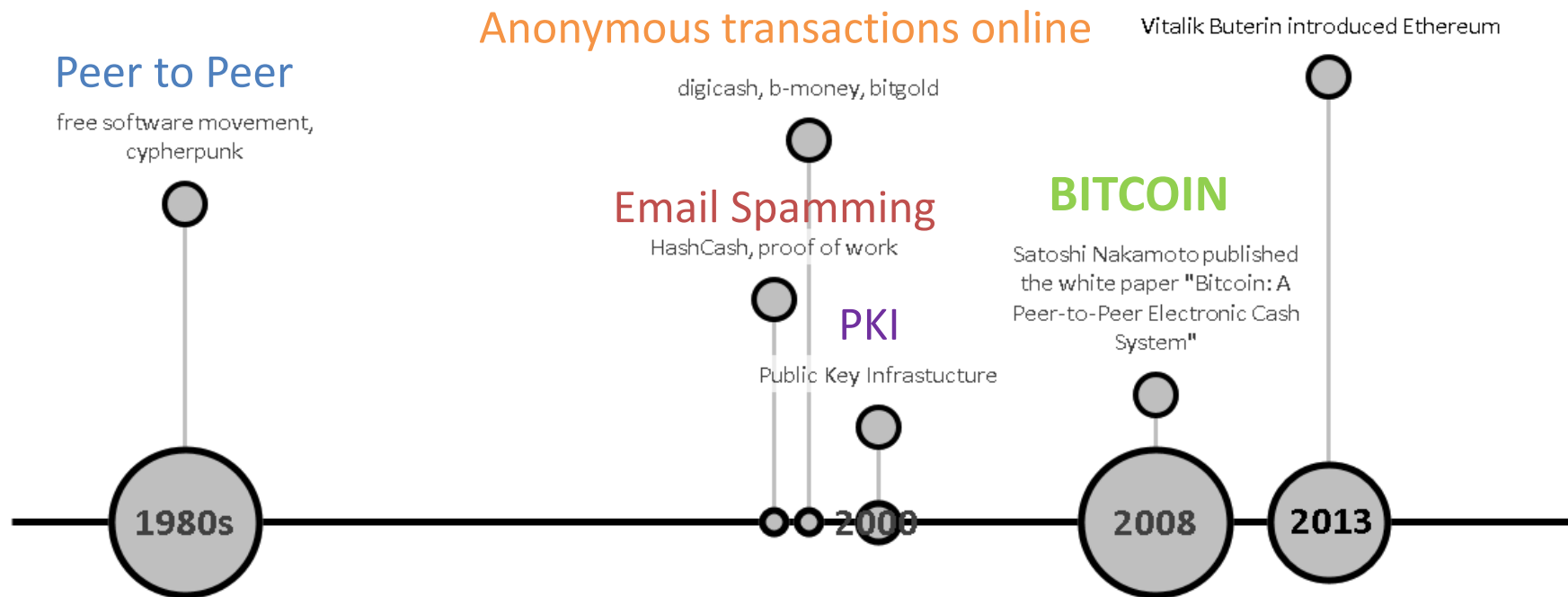
Acknowledgement

- The content of this presentation is extracted or modified from of a number of existing work that is either available online or is the result of Peers' discussions. Reference are included when possible.

- Background

- What does a blockchain solve?

- When to use it?

- How does it work?

`
  - Demo

- How the industry defines it?

- Show cases :
  – The University of Scranton cryptocurrency experiment for Students Engagement.
  – Food Supply Chain

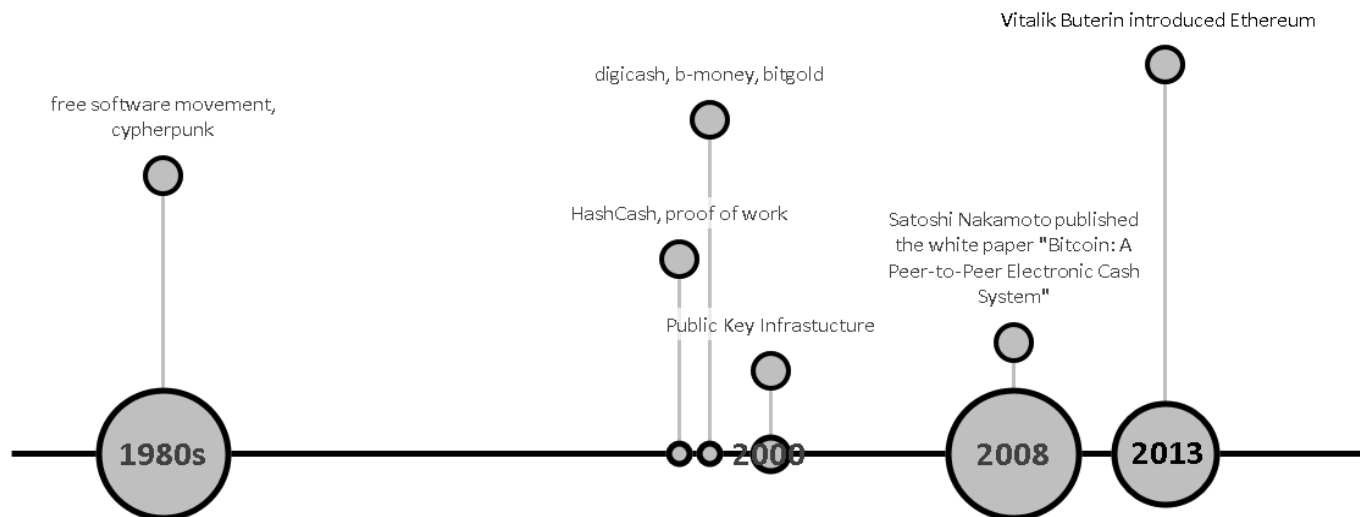- Existing Challenges

- Wrap-up

KANIA

Smart Contracts, ICOs

Anonymous transactions online

Vitalik Buterin introduced Ethereum

Peer to Peer

digicash, b-money, bitgold

free software movement,
cypherpunk

BITCOIN

Email Spamming

HashCash, proof of work

Satoshi Nakamoto published
the white paper "Bitcoin: A
Peer-to-Peer Electronic Cash
System"

PKI

Public Key Infrastucture

1980s   2000   2008   2013

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- *Bitcoin is an application of Blockchain.*
- *It is the result of a number of technologies*
  - *Peer to Peer*
  - *Public Key Infrastructure*
  - *Consensus mechanism*

Vitalik Buterin introduced Ethereum

digicash, b-money, bitgold

free software movement, cypherpunk

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Public Key Infrastucture
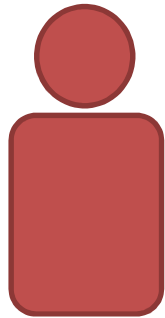
1980s   2008   2008   2013

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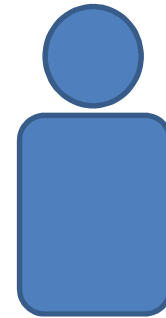 - Food Supply Chain
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KANIA
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Trust

Alice

Bob

Alice → **Bob**

$500

Traditional Way of Transferring money

Alice → **Bob**
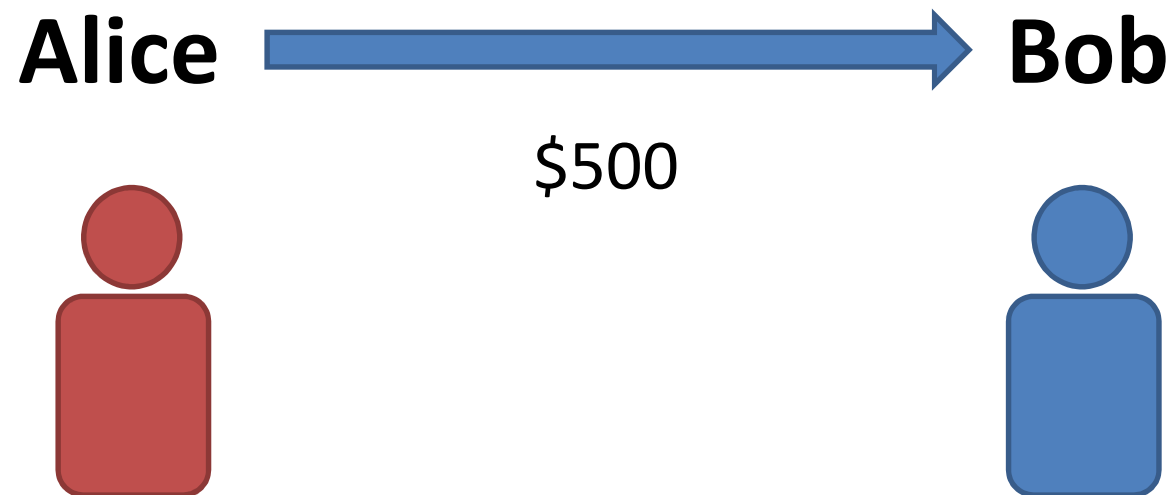
$500

3rd Trusted party

Alice ➡️ ✅ ➡️ Bob

$500

3rd Trusted party

Alice

Bob

$500

Traditional Way of Transferring money

3rd Trusted party

✓

Alice → **Bob**

$500 $490

Traditional Way of Transferring money

3rd Trusted party

Alice

$500

A few days

$490

Bob
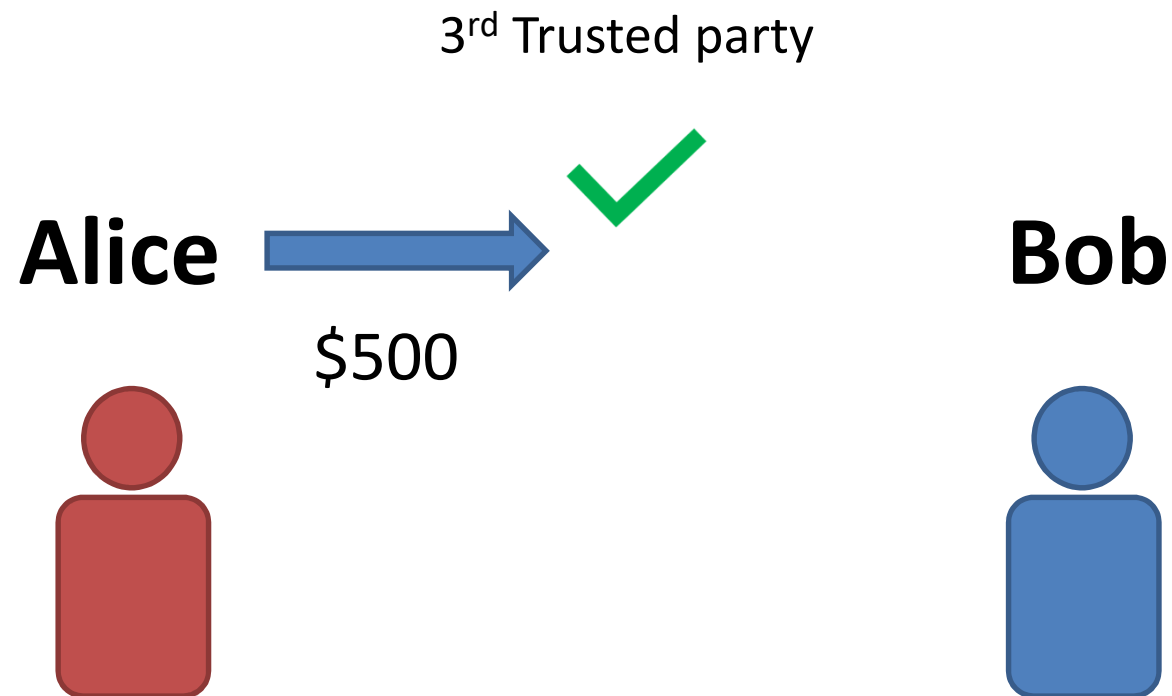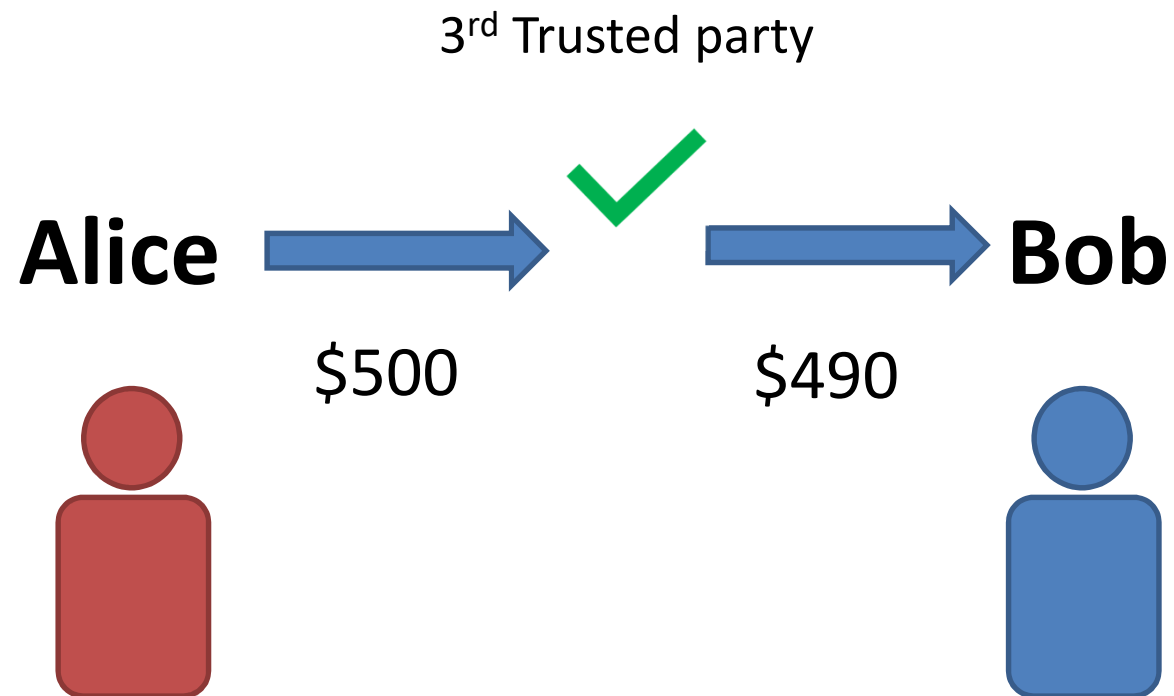
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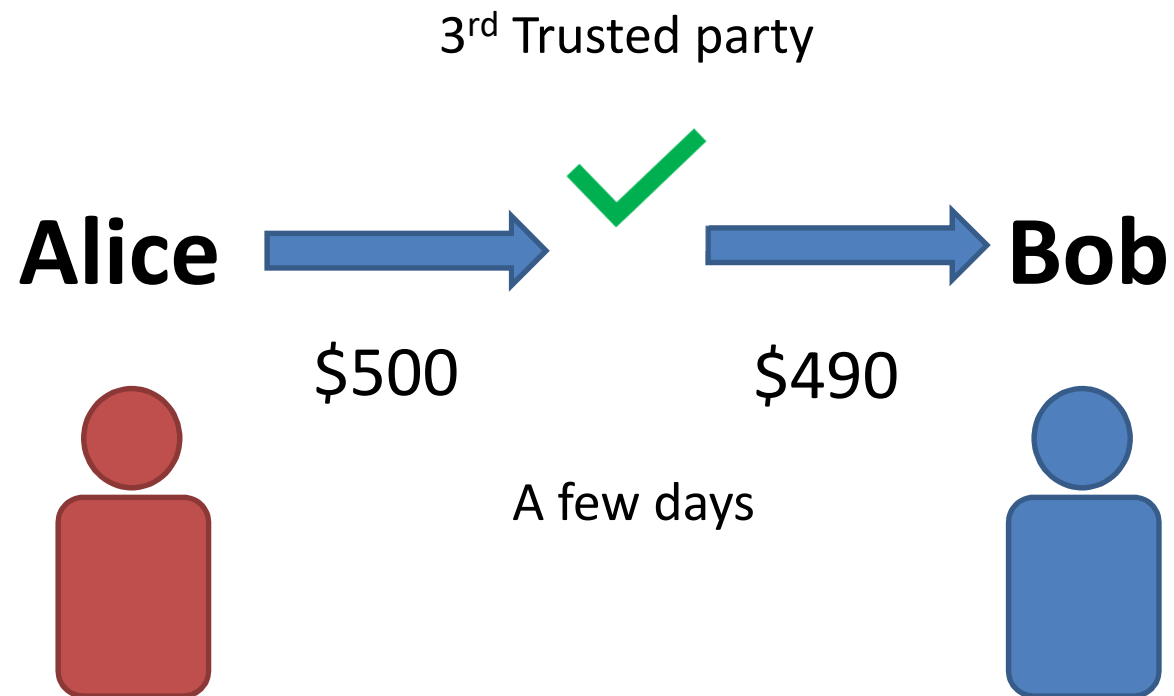
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- Blockchain Aims to:
  - Eliminate intermediaries.
  - Do it faster.
  - More Secure.
  - Traceable history.
  - Permanent records.

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Alice

Alice=$500

Bob

Dave

Carol

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Alice →($500)→ **Bob**

Alice=$500

Alice->Bob, $500

Bob-> Carol, $400

Bob →($400)→ **Carol**

Dave

Carol

Alice — $500 → **Bob**

Alice=$500

Alice->Bob, $500

Bob-> Carol, $400

Carol->Dave, $300

Bob — $400 → **Carol**

Dave ← $300 — Carol

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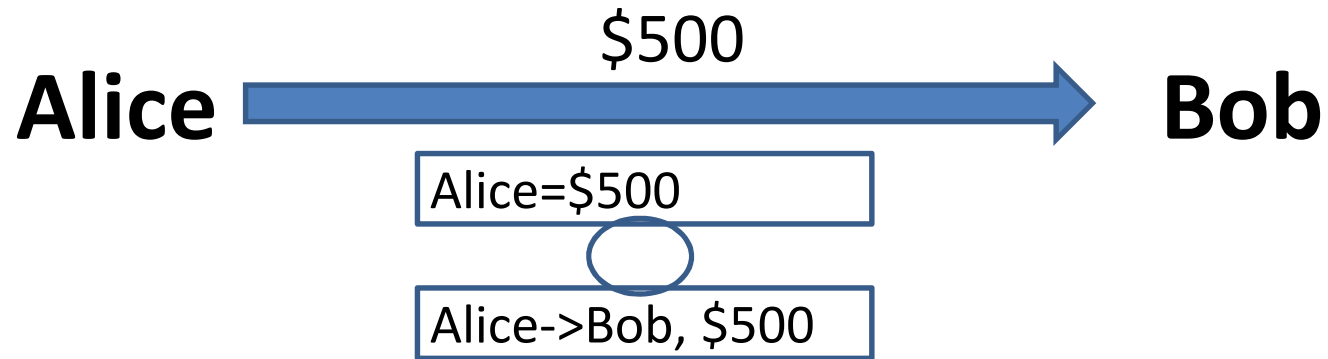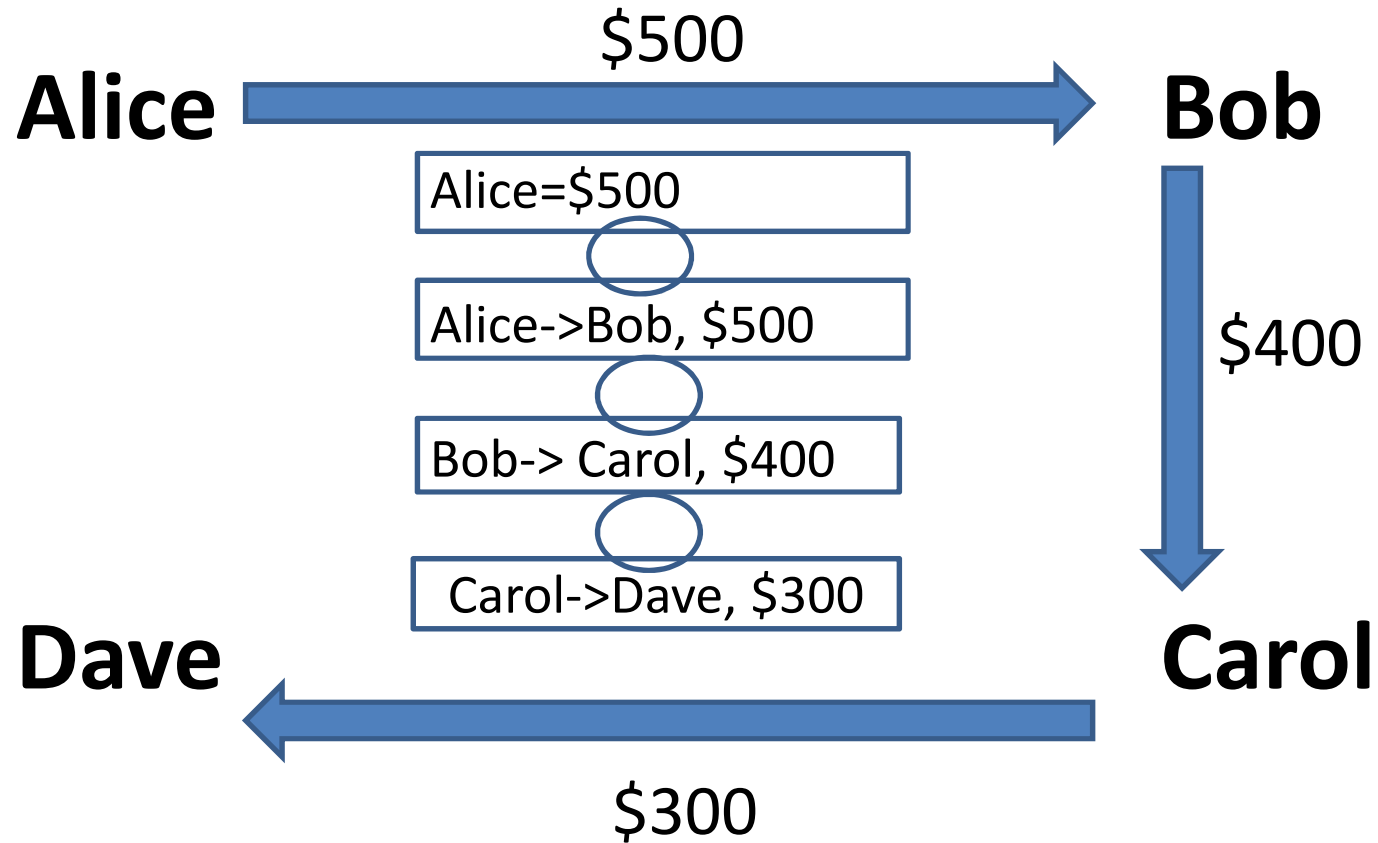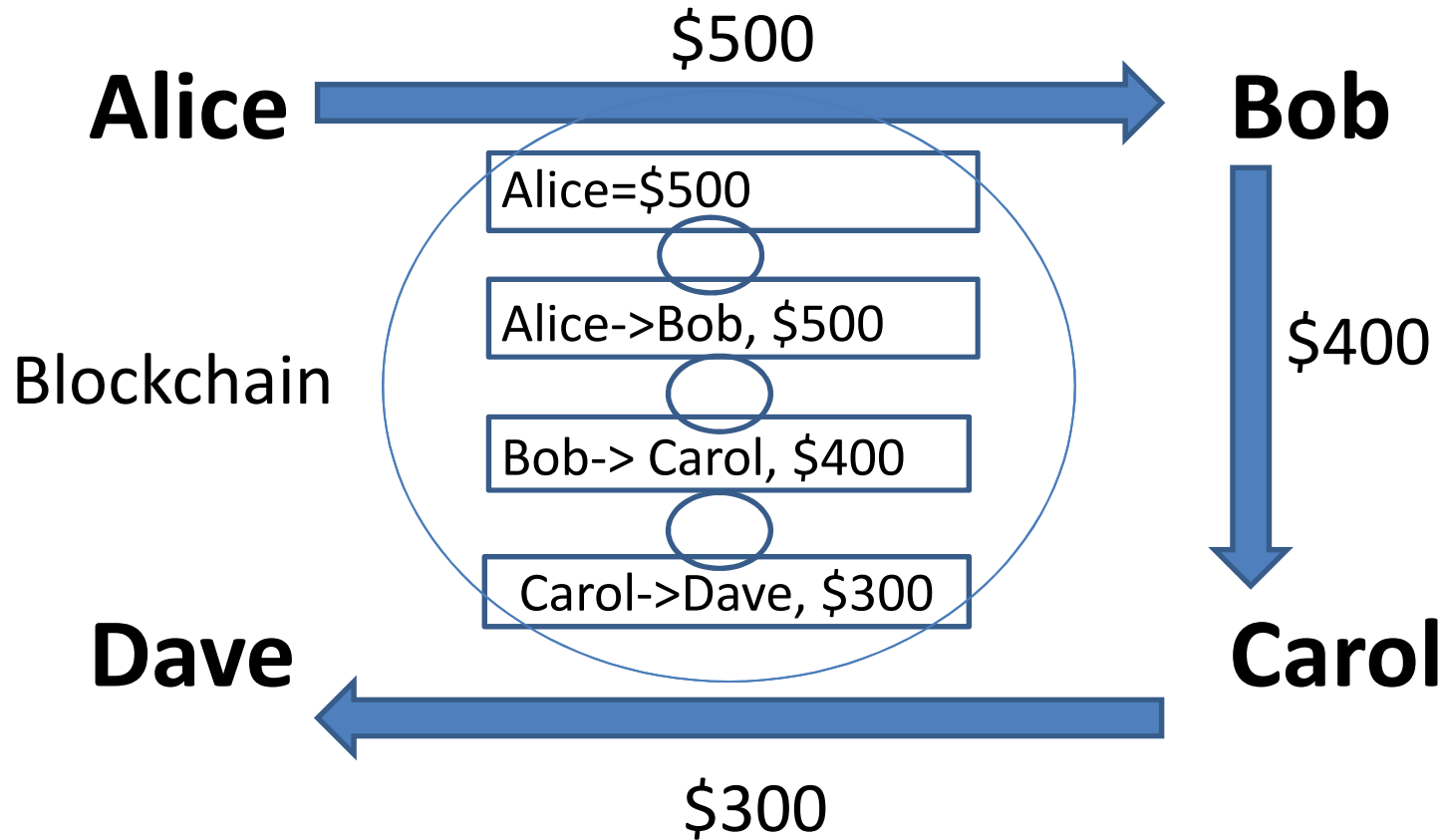
Public Ledger: No double spending (Traceable)

$500

Alice → **Bob**

$500

Blockchain

Alice=$500

Alice->Bob, $500

Bob-> Carol, $400

Carol->Dave, $300

$400

Dave ← **Carol**

$300

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Distributed Public Ledger

Alice

$500 → Bob

$400

Dave

$300

Carol

Blockchain

Alice=$500

Alice->Bob, $500

Bob-> Carol, $400

Carol->Dave, $300
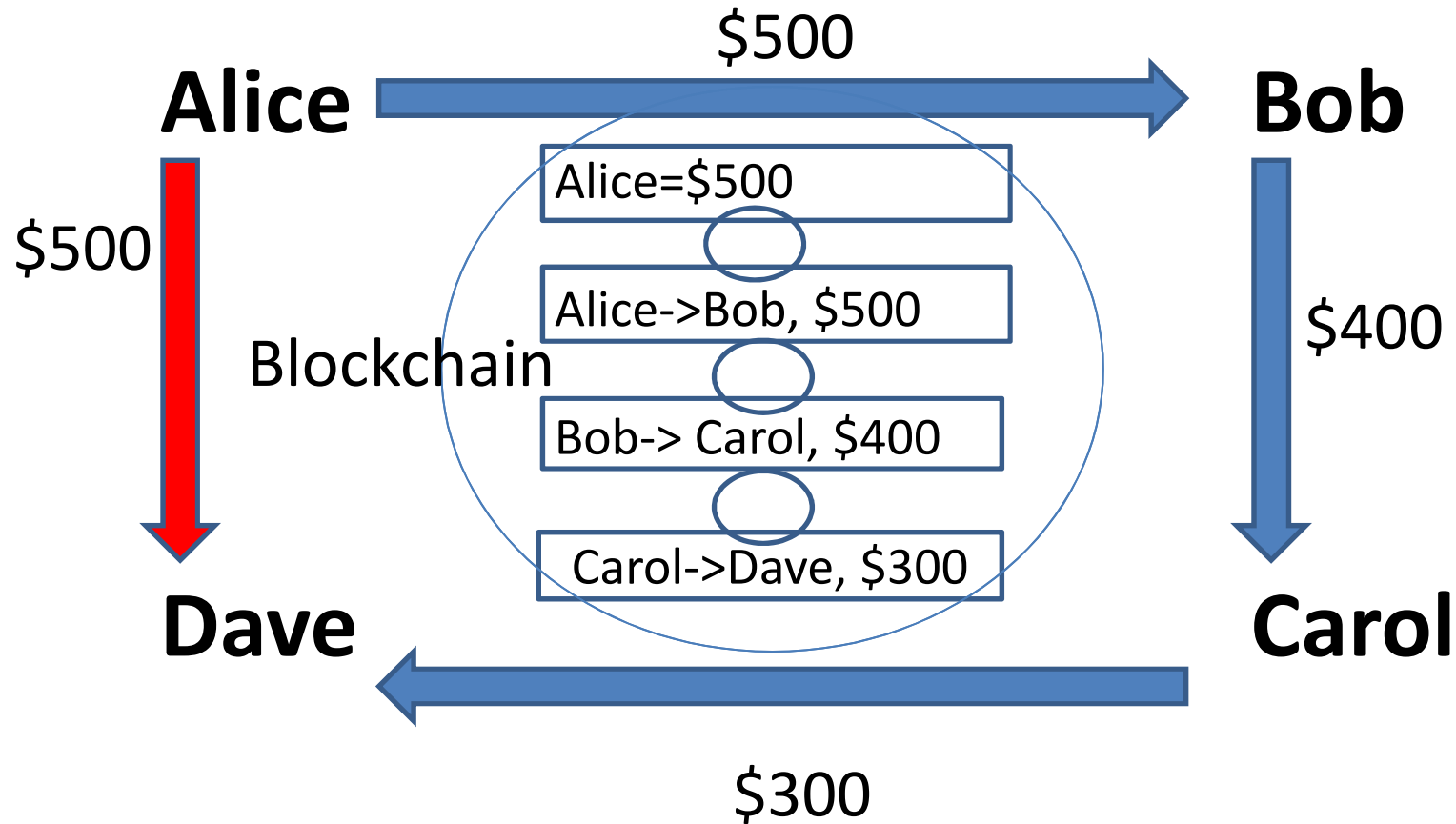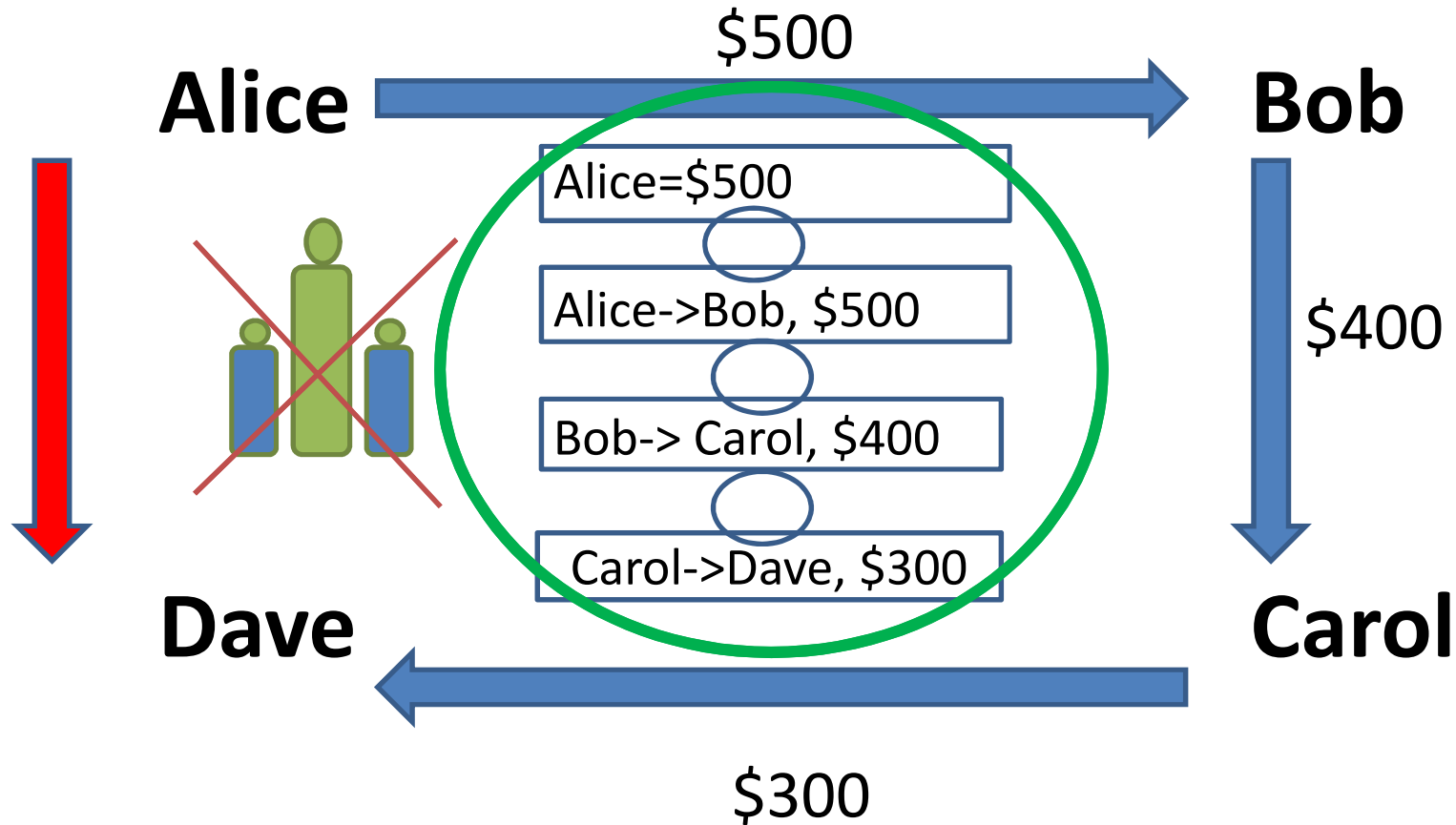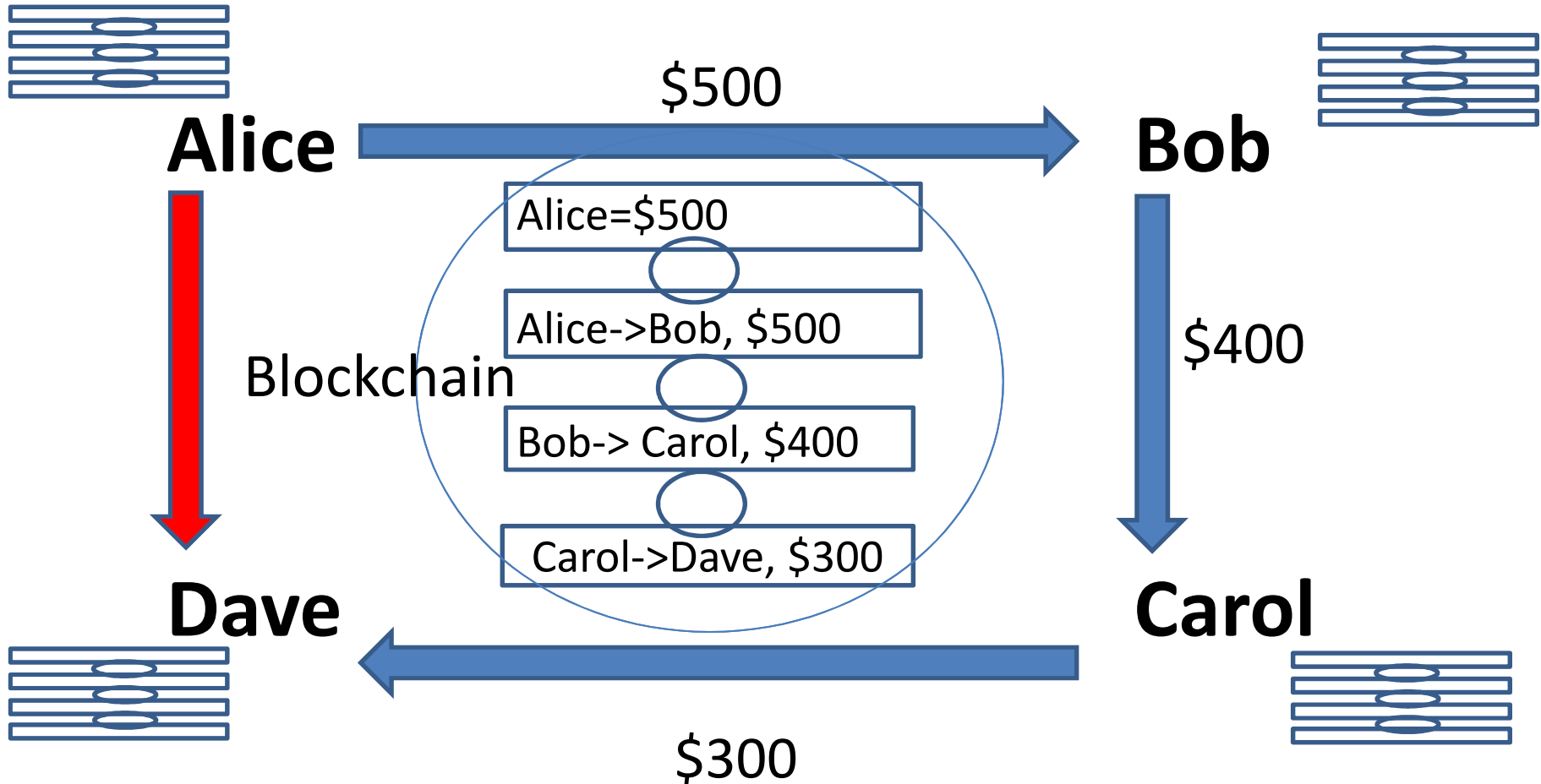
Why host a copy of the ledger?
How to update the ledger?

Distributed Public Ledger: Miners

Alice

$500

Bob

Unconfirmed Transaction

100$

400$

Dave

Carol

300$

Distributed Public Ledger: Miners

Alice

Miner

Bob

$500

400$

Unconfirmed Transaction

100$

Dave

Carol

300$
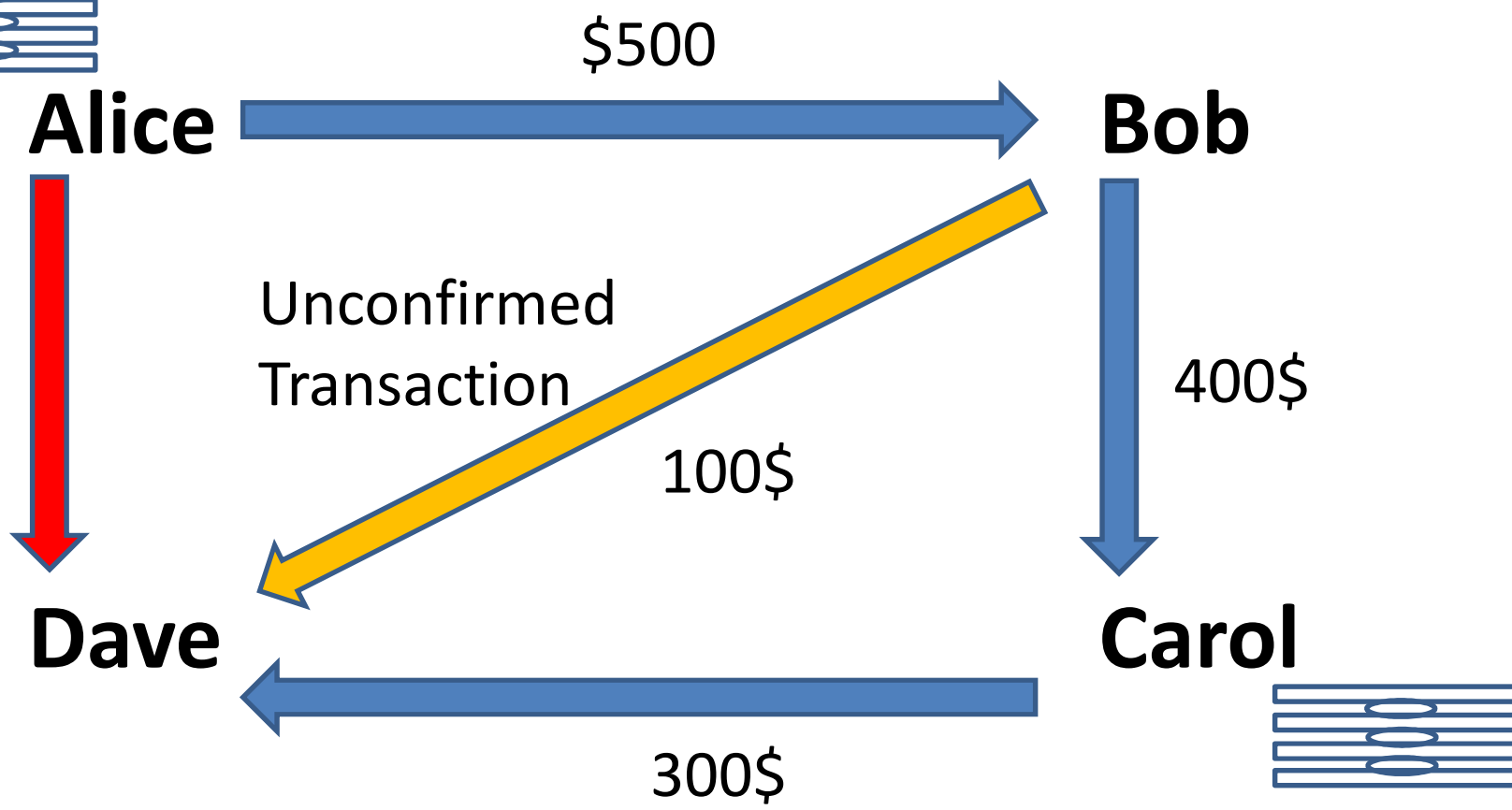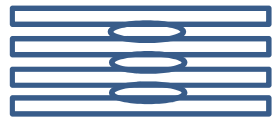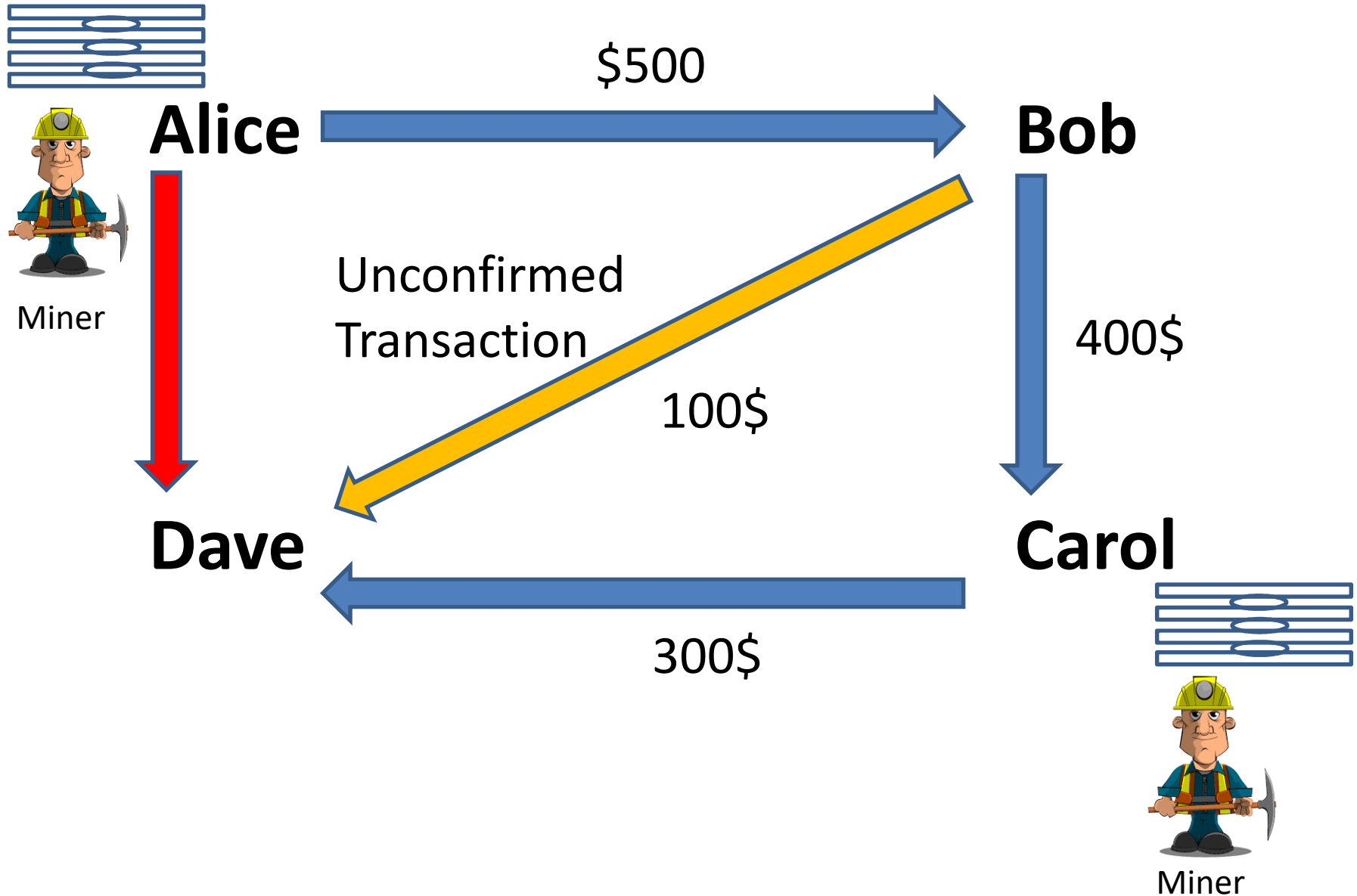
Miner

- Miners are special nodes on the network that validate transactions and add it to the block.

- Compete for confirming the transaction.

- The first to confirm it and add it to the block gets the reward

  – Where are they? https://bitnodes.earn.com/

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- Validate by checking the blockchain if Bob has enough money to send to Dave.

- Try to guess a number for adding the new transaction to the blockchain.

- Once a miner guess right, s/he wins and broadcast the answer to the network.

- Other miners will stop try to validate it and try to validate a new block.

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- Blockchain is based on Distributed Public Ledgers.
- Miners compete with each other for validate transactions and add them to the blocks.
- Miners that win the competition get a reward.

Vitalik Buterin introduced Ethereum

digicash, b-money, bitgold

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Public Key Infrastucture

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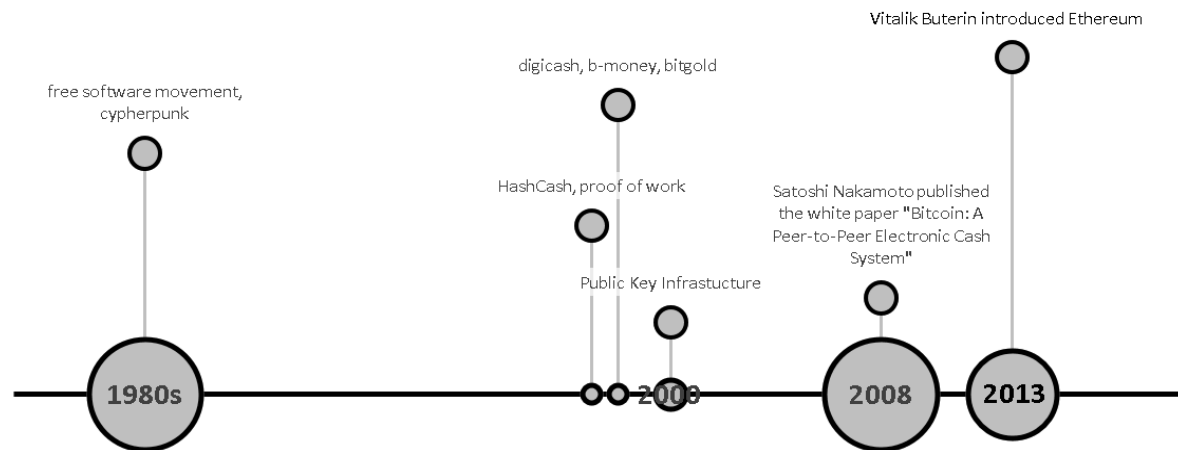
- Current paper-based systems drive $18 trillion in transactions per year.
- Executing smart contracts
  - Ground rules – Terms & conditions recorded in code
  - Distributed network executes contract & monitors compliance
  - Outcomes are automatically validated without third party
- This enables peer-to-peer trading of everything from renewable energy to automated hotel room bookings.

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A new era form Information Exchange to Value Exchange.

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- *After analyzing more than 4300 blockchain based companies that launched in the past 2 years, the market defines the blockchain as follows:*

*Blockchain is a **decentralized Peer to Peer** technology that uses **Proof of Work**, among other models to reach consensus and enable new **economic** business models in different industries including **Advertising, Banking and Energy** to name a few. (Gomaa, Li 2019)*

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  – **Demo**

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Demo

- Ingredients : Hash / Block / Blockchain
- Have an identity: https://metamask.io/
- Get some money!
- Start interacting: Create a cryptocurrency
- http://tokenfactory.surge.sh/
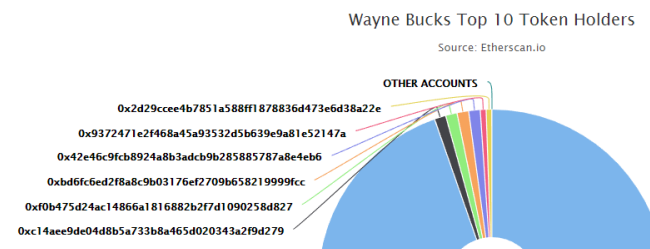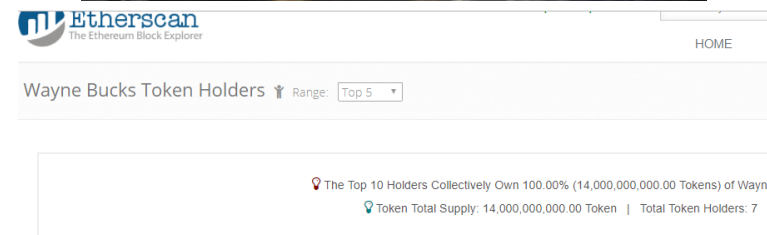- Verify transactions on the blockchain https://ropsten.etherscan.io/

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Show Case: U of Scranton - Entrepreneurship Program experiment

– Ranked 31st in the nation(2019)

– Learning by doing

– Usage of the Wayne House

  • Space rental currency

– Coins used for engagement tracking:

  • Attending events.

  • Helping other companies.

  • Promoting activities.

  • Bartering services.

Vine St

Etherscan
The Ethereum Block Explorer

HOME

Wayne Bucks Token Holders Range: Top 5

The Top 10 Holders Collectively Own 100.00% (14,000,000,000.00 Tokens) of Wayne
Token Total Supply: 14,000,000,000.00 Token | Total Token Holders: 7

Wayne Bucks Top 10 Token Holders
Source: Etherscan.io

OTHER ACCOUNTS

0x2d29ccee4b7851a588ff1878836d473e6d38a22e
0x9372471e2f468a45a93532d5b639e9a81e52147a
0x42e46c9fcb8924a8b3adcb9b285885787a8e4eb6
0xbd6fc6ed2f8a8c9b03176ef2709b658219999fcc
0xf0b475d24ac14866a1816882b2f7d1090258d827
0xc14aee9de04d8b5a733b8a465d020343a2f9d279

IBM Food Trust: Overview

1 out of 10 people get sick each year, and **420,000** die from foodborne illness

80% of CPGs say their business is partially or entirely paper-based, resulting in inefficiencies and unnecessary costs

1 / 3 of global fresh fruits and vegetables are thrown away because their quality has dropped to unacceptable

Only 1 in 4 consumers trust today's food system. **94%** say they'd be more loyal to brands that offers transparency

IBM Food Trust

Modules — Trace | Certification | Freshness* | Consumer*

Blockchain Technology

Food Supply Chain Ecosystem

IBM Food Trust solution provides secure access to end-to-end food supply chain information via specialized modules

Dole | McCormick | McLANE | Driscoll's | Unilever | gsf | Walmart | Nestlé | Kroger

Early Adopters

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- **Lack of trained professionals.**
- New technology adoption takes time.
  - Successful use cases, realized benefits, wide adoption
- Scalability. Visa is 10,000 transactions/second vs 8 transactions per second in bitcoin
- Regulatory issues related to auditing, taxation, transparency, liability and usage.
- Energy usage: Mining Bitcoin uses more electricity that Slovenia per year.

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- Blockchain has a potential
  - Simple, Secure way to establish trust for moving, money, products and information worldwide
  - Promotes new business models as intermediaries are removed
- Still have its challenges
- Moving fast

Q&A

Blockchain Definition, Implications, and Potentials:
A Hands-on approach

Ahmed Gomaa

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https://www.scranton.edu/faculty/gomaa/