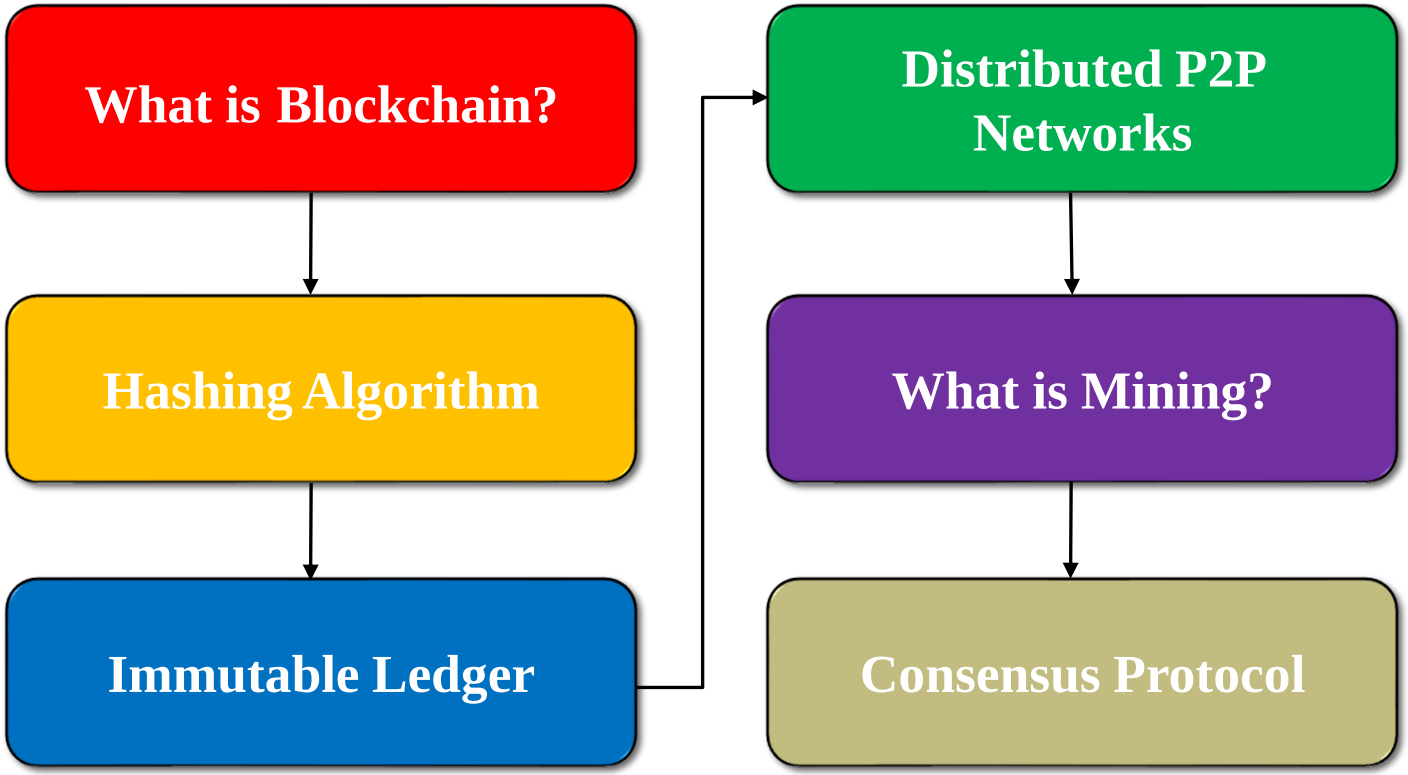
Blockchain

Dr. Bahar Ali
Assistant Professor (CS), National University Of Computer and Emerging Sciences, Peshawar.

Contents – Module A



Why should I study Blockchain?

Why should I study Blockchain?

Why should I study Blockchain?

“The Old question “Is it in the database?” will be replaced by “Is it on the Blockchain”

By William Mougayar
Toronto-based investor, researcher, and best-selling author of The Business Blockchain.

Why should I study Blockchain?

- Because Blockchain is a disruptive technology.

What is a disruptive technology?

- A technology, which changes the traditional approach.
- The new approach is enhanced than the existing approach.

Why should I study Blockchain?

Internet: Changes the communication Technology

- **Email**
  - Extremely fast when compared to traditional post.
  - Can be sent 24 hours a day, 365 days a year.
  - Can be sent and received from any computer, anywhere in the world
  - Cheap

Why should I study Blockchain?

Internet: Changes the communication Technology

- **Social Media**
  - Extremely fast when compared to traditional.
  - Everyone feels like they have a voice.
  - Being a wide reach low-cost medium.
  - Advertising makes reaching, targeting, and focusing on your target audience easier.

Why should I study Blockchain?

Internet:

Changes the communication system

Blockchain:

Changes the trust ecosystem

Providing enhanced security

Thus, data can be stored securely

Why should I study Blockchain?

Provenance: To verify the origin of something

- How it can be traced back through their entire journey, from farm to cup.
- Check how much was paid for it at every step of the chain.
- Can also see where their coffee ended up, and for what price

It can be possible via Blockchain

Why should I study Blockchain?

- How to check the credibility of an NGO?
  - Is NGO trustworthy and believable?
  - How do donors know their donation is reached to deserving people?

When was Blockchain first proposed?

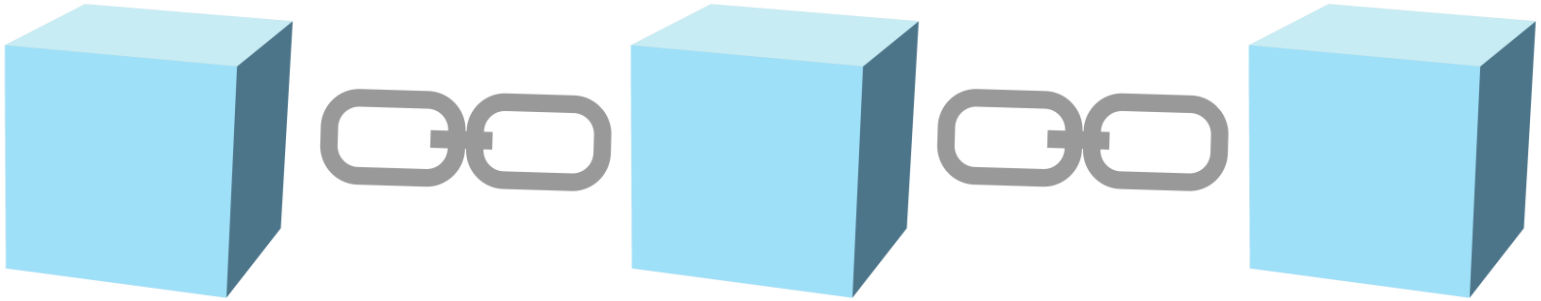
- First outlined in 1991 by **Stuart Haber** and **W. Scott Stornetta** [1]
  - To implement a system, where document timestamps could not be tampered with.
- Two decades later, with the launch of Bitcoin in January 2009, had its first real-world application by **Satoshi Nakamoto**

[1] https://link.springer.com/chapter/10.1007/3-540-38424-3_32

What is Blockchain?

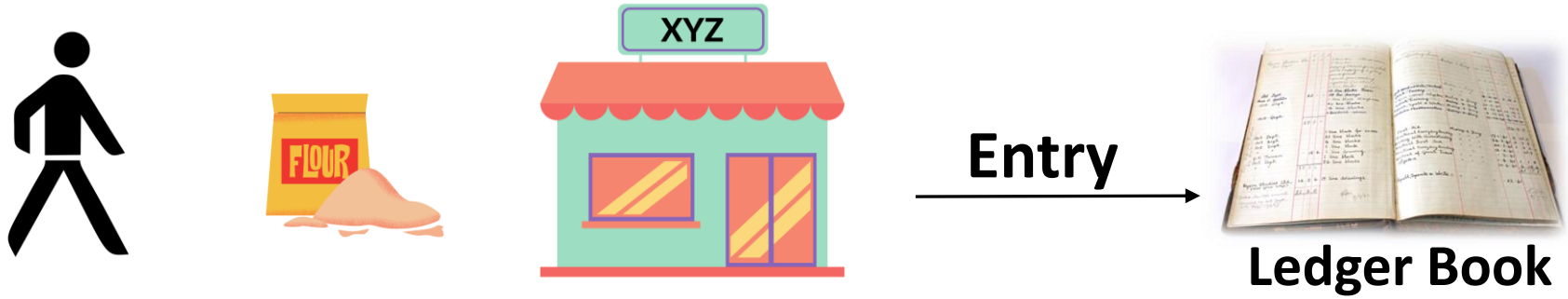
What is Blockchain?

Blockchain is a distributed immutable ledger which is completely transparent.



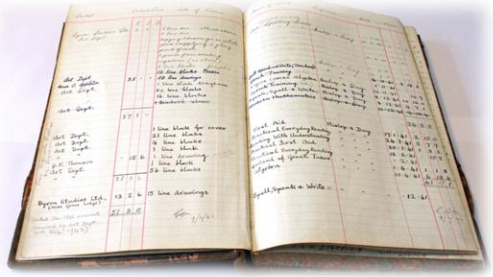
What is Blockchain?

- Consider you buy some flour from a shop on credit of rupees 1000
- The Shopkeeper enters credit amount 1000 in the ledger
- Later he changes the original record from 1000 to 1200 **(Record Tempered)**
- At the time payment you notice the amount had been altered
- How to prove the record has been altered ?

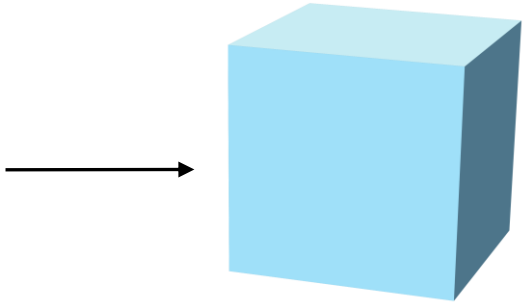


What is Blockchain?

- Blockchain works exactly like a **Ledger Book**
- Block in the Blockchain works as an entry in the ledger
- Block in the Blockchain is **immutable**.
- The data available to everyone at any time, so that all transactions are **transparent**



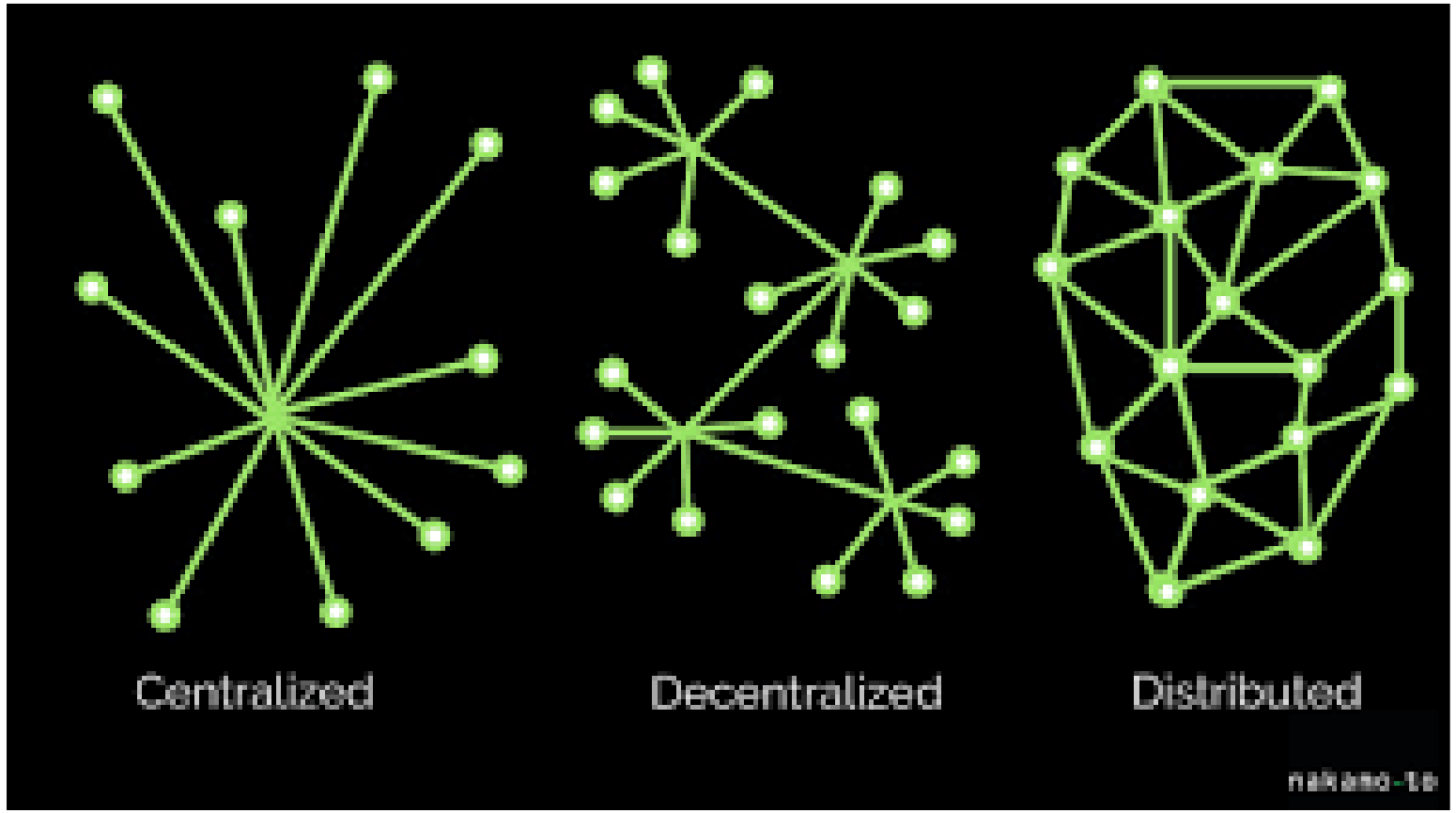
Ledger Book

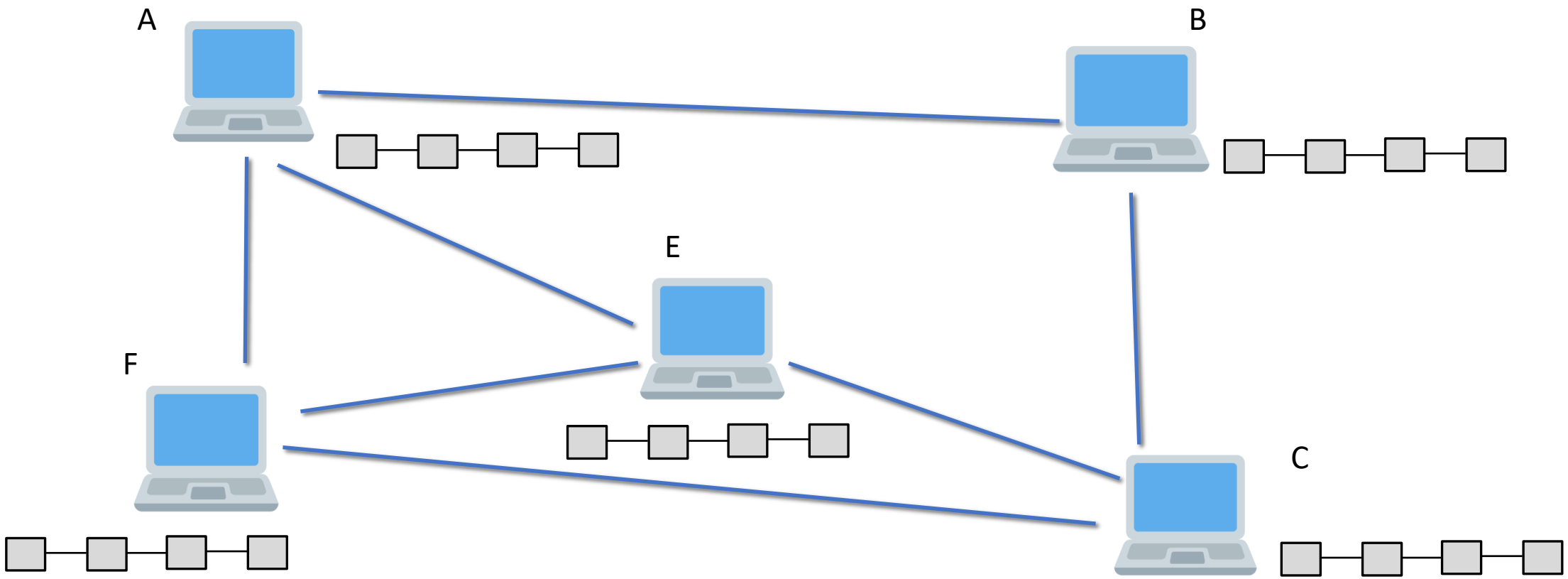


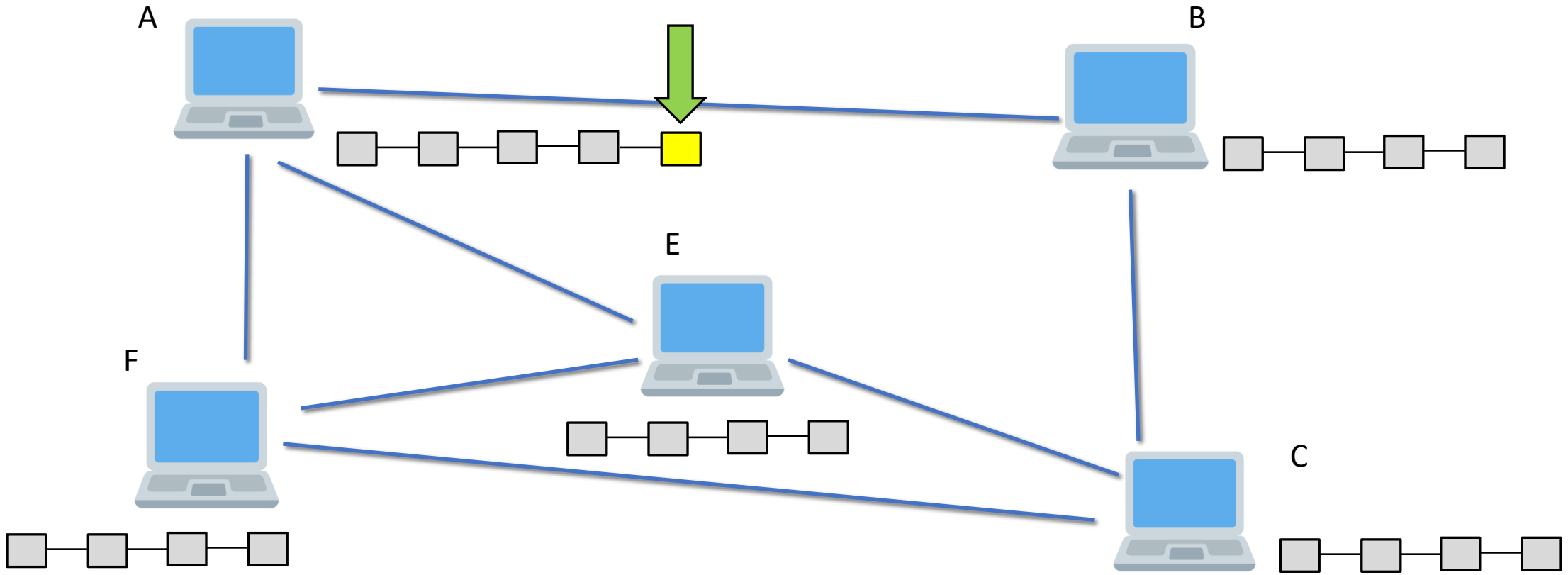
Block

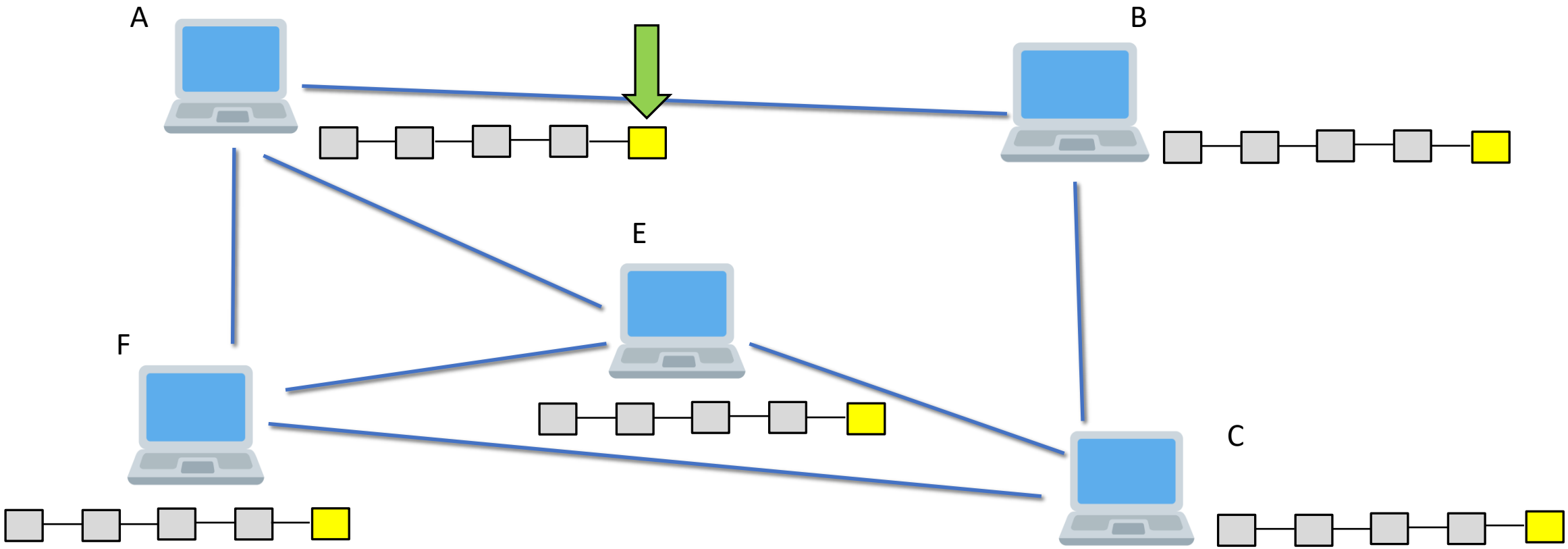
- **How Blockchain is Distributed?** Let's see

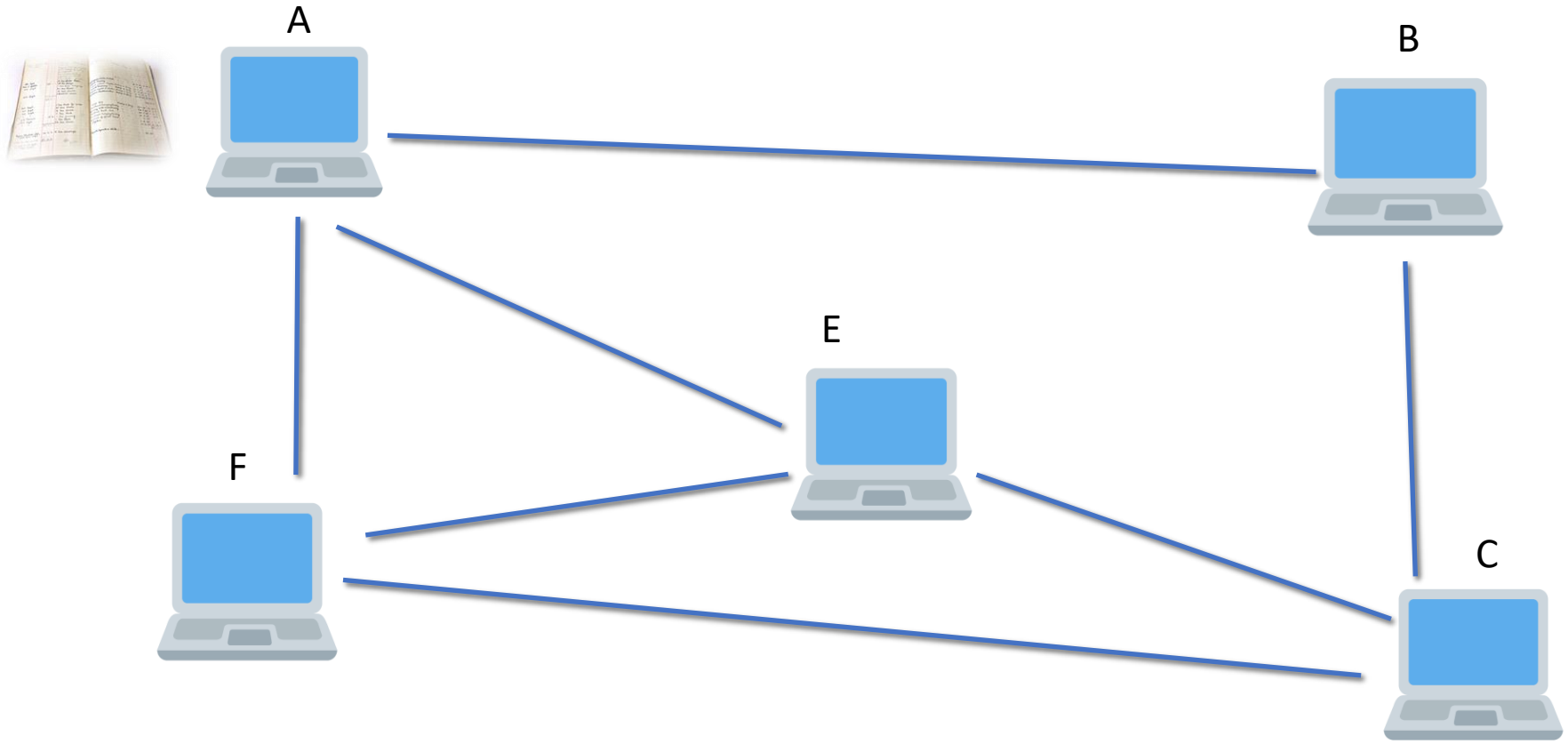
Centralized vs. Decentralized vs. Distributed

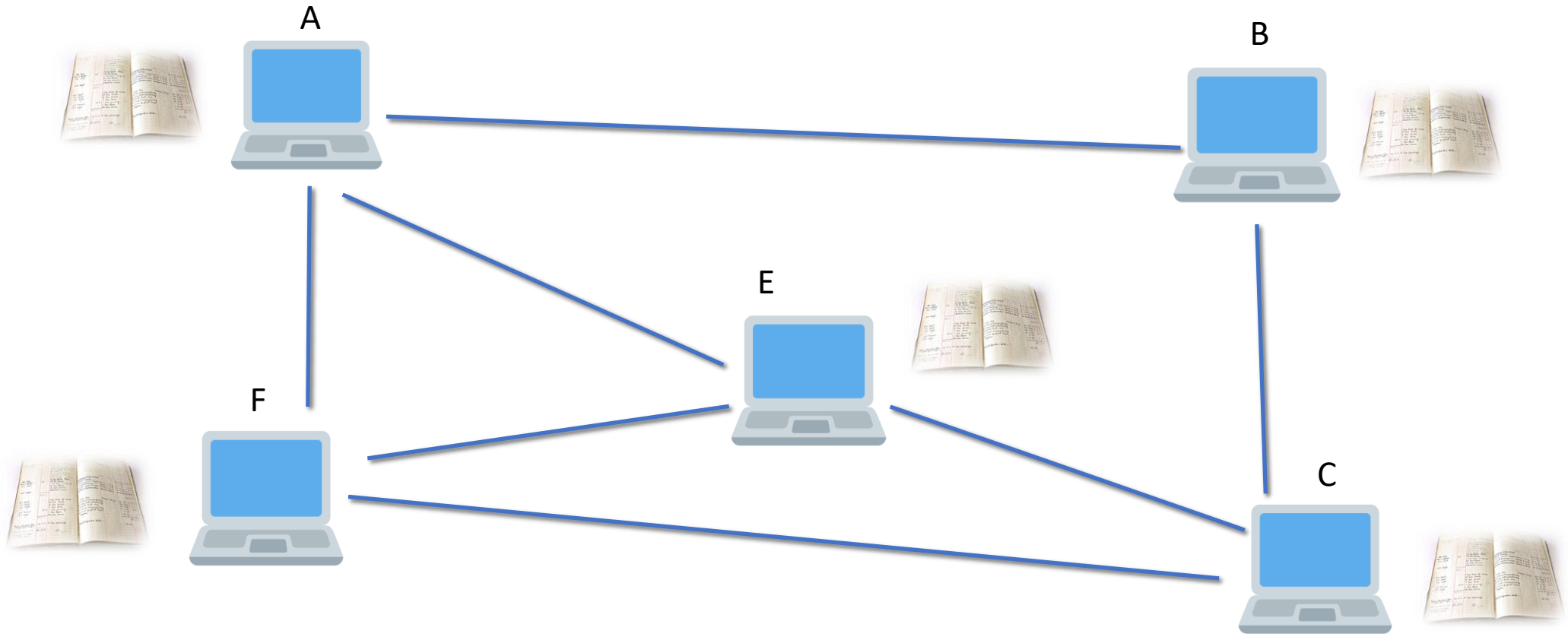



A
B
E
F
C

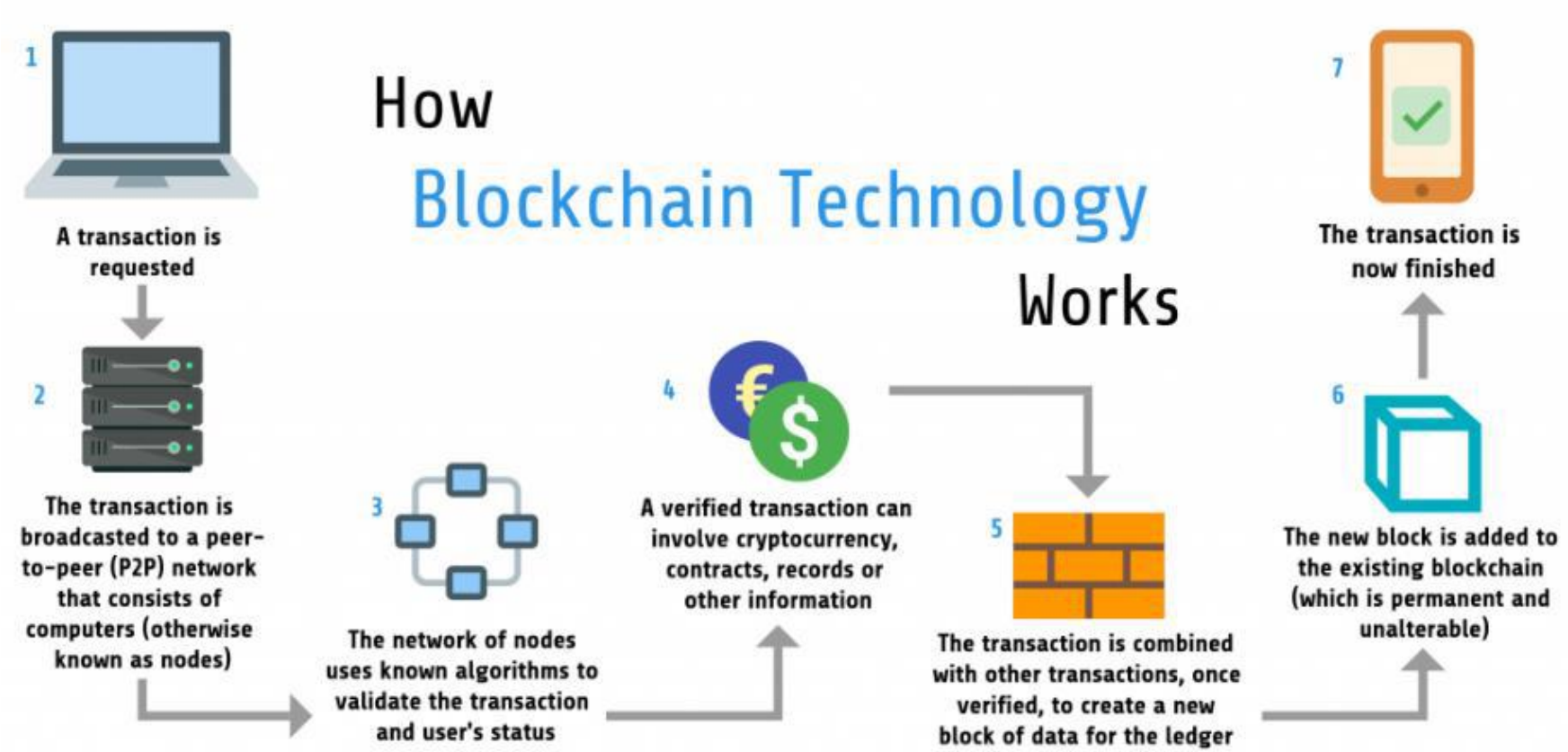

A
B
E
F
C


A
B
E
F
C


A
B
E
F
C


A
B
E
F
C

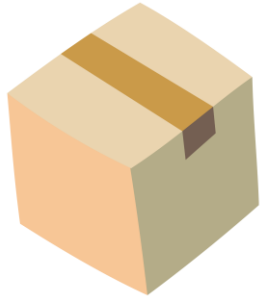
How Blockchain Works



Applications of Blockchain

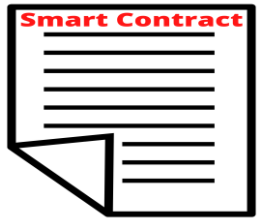
Applications of Blockchain

Product Tracking



Healthcare System

Smart Contracts



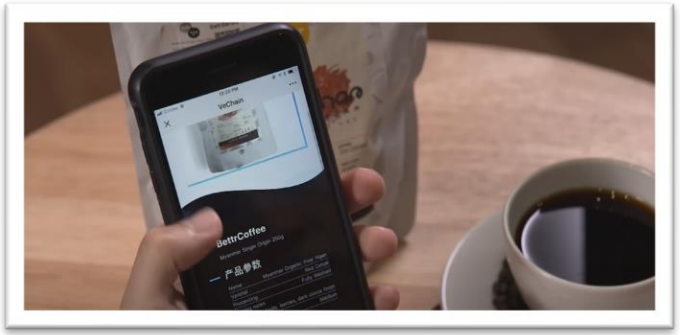
International Wire Transfer

Product Tracking

- In Denmark a supermarket implemented a blockchain
- You can read the bar code and check the origin of the product.

Coffee

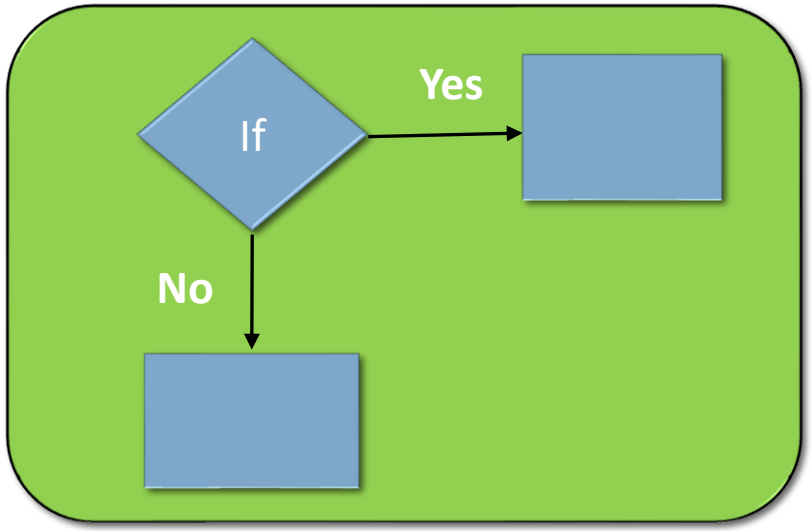
Scan Barcode

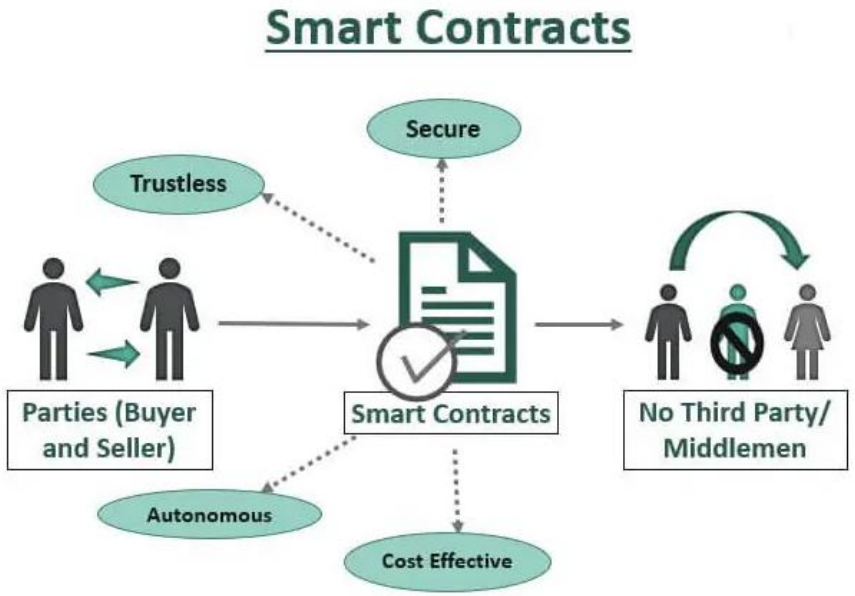


Check Information

Smart Contract

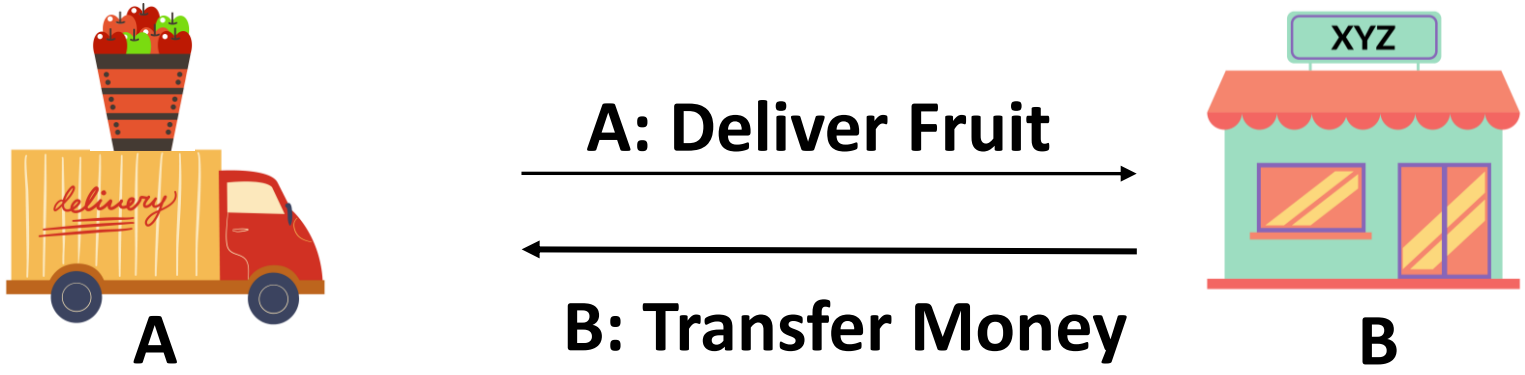
- A smart contract is a program that runs on a blockchain network





Smart Contract

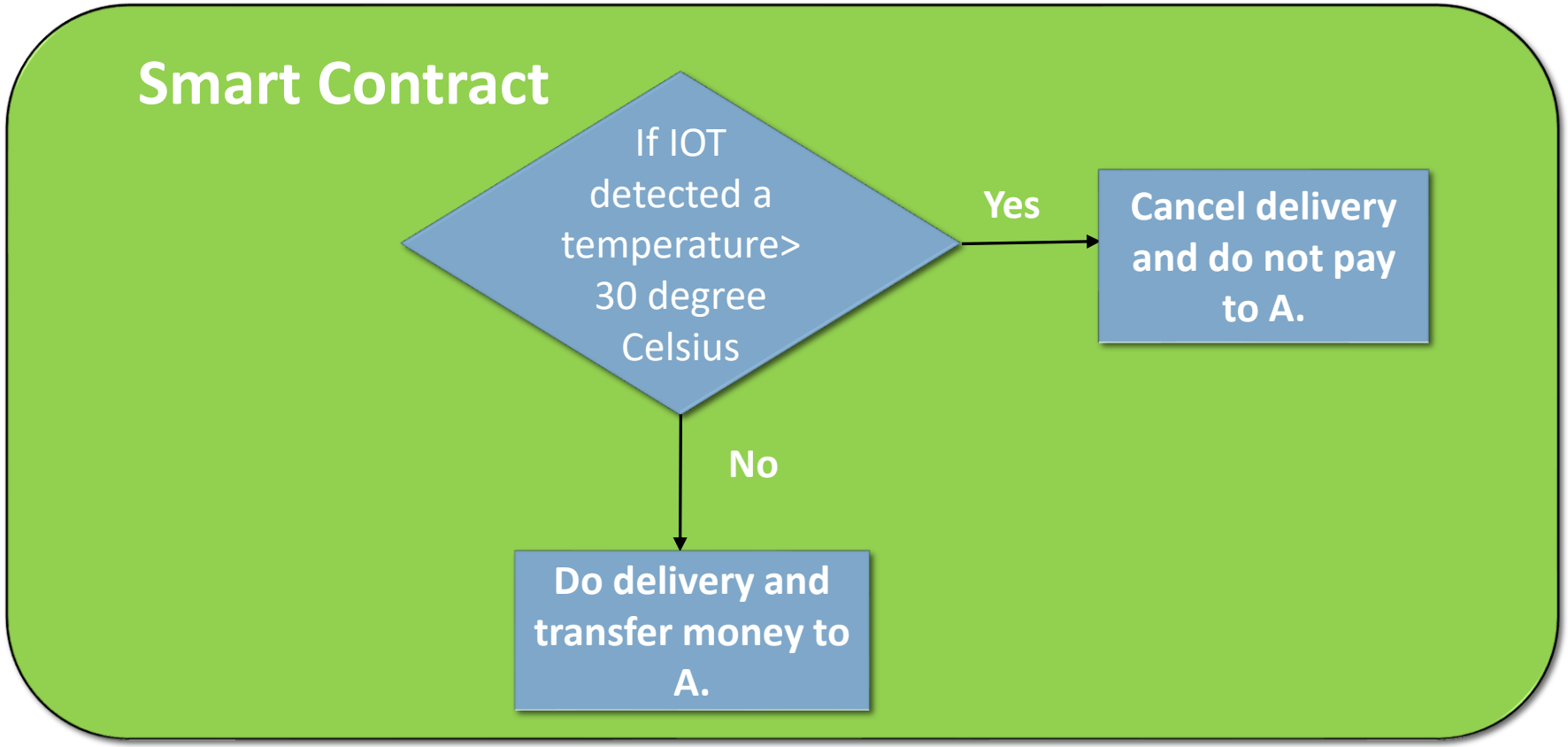
- Supplier A deliver food to Shop B
- A has to maintain a proper temperature to deliver fresh food
- B has to transfer the money on successful delivery of food
- How to ensure proper transaction, especially, if A and B do not trust each other
- Otherwise either A or B will be at a loss



Smart Contract

- So if the Smart contract is implemented then if A delivers things according to the contract
- The amount will be transferred from B's account and B will not be able stop it.
- The smart contract will be automatically implemented due to blockchain property.

Smart Contract



Note-Assuming optimum temperature <30 degree Celsius.

International Wire Transfer

- International wire transfer from one country to another
- Sender bank cannot transfer money directly to another bank
- But they send it through a corresponding bank
  - **Disadvantages:**
    - Slow processor
    - More fee as many banks are involved.
- Many banks in the USA have started working on Blockchain.

Sender Bank **Correspondent Bank** **Receiver Bank**

Healthcare System

- Patient has medical history on City A.
- Due to emergency patient goes to City B.
- So he should do all his test again.
- Time consuming and costly.

Healthcare System

Solution

- To maintain all records on Blockchain Network.