

Blockchain and its Advancement in the Agriculture Industry



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What Is Blockchain?

- Blockchain is a technology used to collect and share data in a digital format.
- Blockchain is a distributed electronic ledger.
- Blockchain technically is:
 - A decentralized network of machines.
 - Peer To Peer.
 - Transparent to Members.
 - Irreversible data record.
 - Computational logic compatible.

Conventional vs. Distributed Network



Server-based



P2P-network

(https://classes.dma.ucla.edu/Fall15/161/projects/chan_c/Desma%20161/Project2.html)

*All nodes sync at a given time interval.

- **Transparent**

- All members of the Blockchain can see contents of each block in chain.

- **Pseudo-Anonymous**

- Blockchain utilizes a user address, which is a 33-34 alphanumeric character

- **Irreversible**

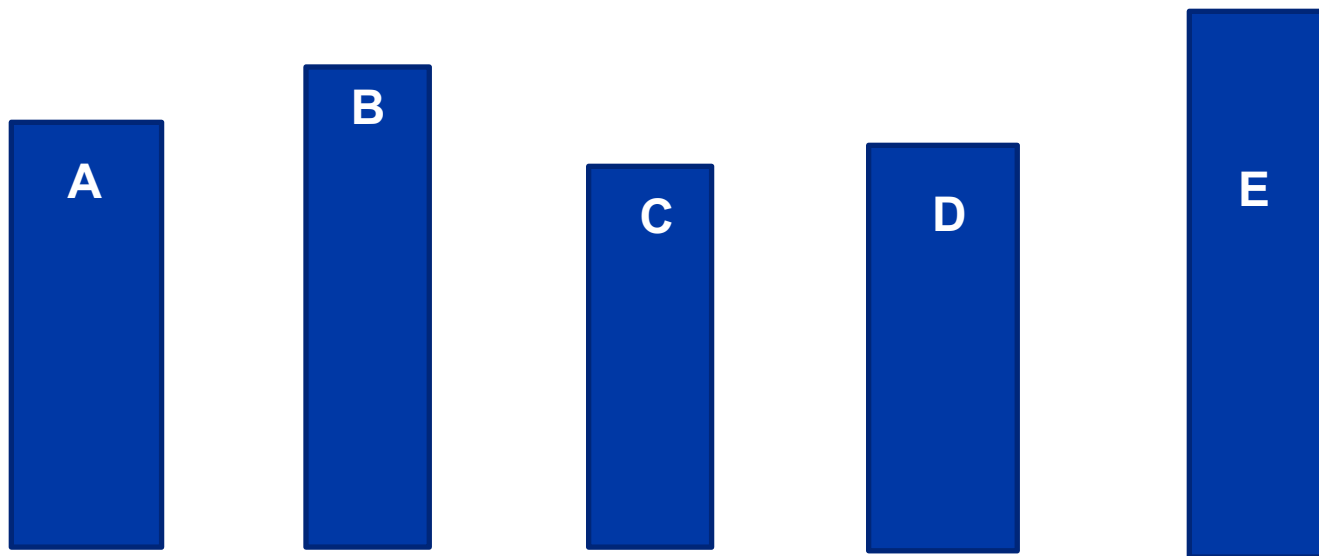
- Implements features to prevent changing the data in the block.

- **Computational Logic**

- Executing and triggering automatic action

Traditional Data Storage

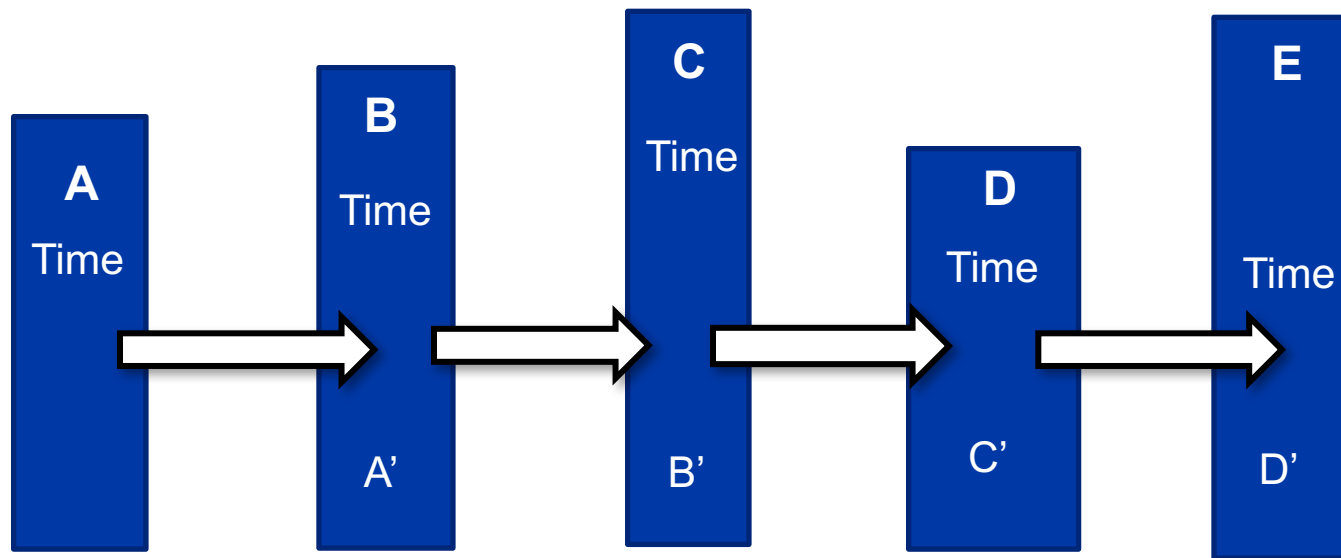
Each File is Independent



Difficult to know that active data file is different than the original file or if elements were missing.

Blockchain Data Storage

Each File is Time Stamped and Linked to the Previous Block
Each File is Independent



New blocks added through consensus mechanism – majority of nodes okay addition or other rules implemented in the program.

- Only new blocks are added, original blocks are not edited.
- Hashed “copy” of previous block data must match to update
- Hacker would have to change all copies and all embedded hash “copies” within sync interval.

Supply Chain



Walmart Partnered with IBM to develop a supply chain blockchain to track mangoes from tree to shelf

<https://www.youtube.com/watch?v=SV0KXBxSoio>



Supply Chain



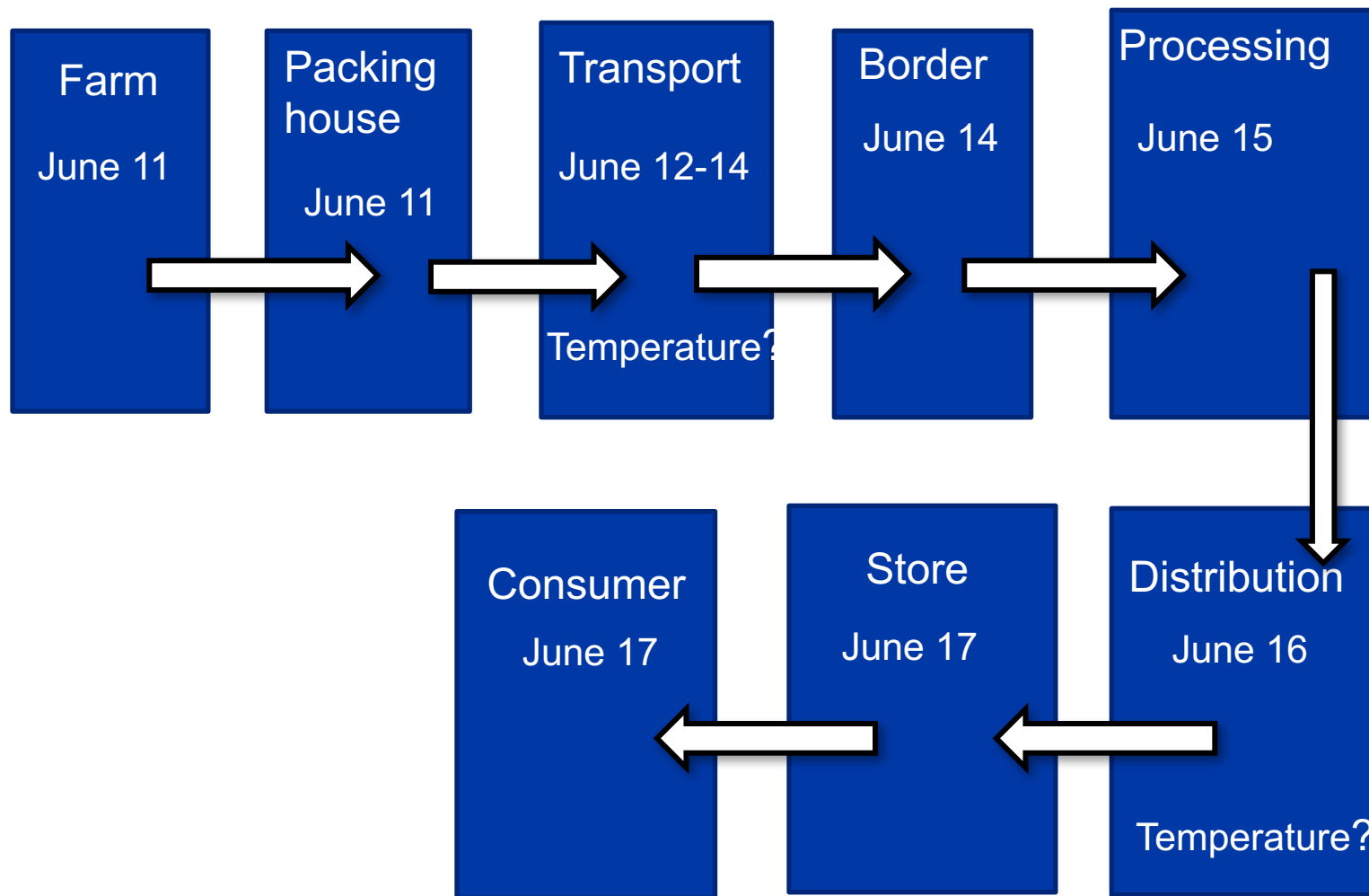
- Internal team tasked with tracing mango package to its source
- 6 days, 18 hours, 26 minutes before blockchain
- 2.2 seconds after blockchain

Before: 152,760 seconds

After: 2.2 seconds

Walmart Mango Example

Each File is Time Stamped and Linked to the Previous Block





Example – Tracking Mango from Farmer to Consumer

Block 1

Action: Seed is planted

Location: Small farm in Mexico

Mango Number: 118

Date: June 11, 2018



Example – Tracking Mango from Farmer to Consumer

Block 2

Action: Processing

Location: Packing house in Mexico

Mango Number: 118

Date: July 15, 2025



Example – Tracking Mango from Farmer to Consumer

Block 3

Action: Shipped by Distributor from Processor to Facility Center

Place: St. Louis, MO

Mango Number: 118

Date: July 16, 2025



Example – Tracking Mango from Farmer to Consumer

Block 4

Action: Shipped to Walmart distribution center for refrigeration

Place: St. Louis, MO

Mango Number: 118

Date: July 16, 2025



Example – Tracking Mango from Farmer to Consumer

Block 5

Action: Transported to store

Place: St. Louis, MO

Mango Number: 118

Date: July 17, 2025

Consumer could request Walmart to show her the Blockchain showing the travel from harvest to plate for the mango to ensure she is getting what was sold.

Risk Mitigation: Smart Contracts

- A fully or partially self-executing contract.
- Software program containing the terms and obligations of the transaction are agreed upon and pre-programmed into the smart contract.
- Actions automatically occur when certain conditions exist or are sensed.
- Initiating shipment automatically
 - Automate ordering of fertilizer based upon sensor readings in field
- Automate payments based upon delivery of items
 - Peer to Peer Transaction
 - No invoicing and payment delays
- Record of actions can be stored in the blockchain as immutable record.

Take Aways

THANK YOU!

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