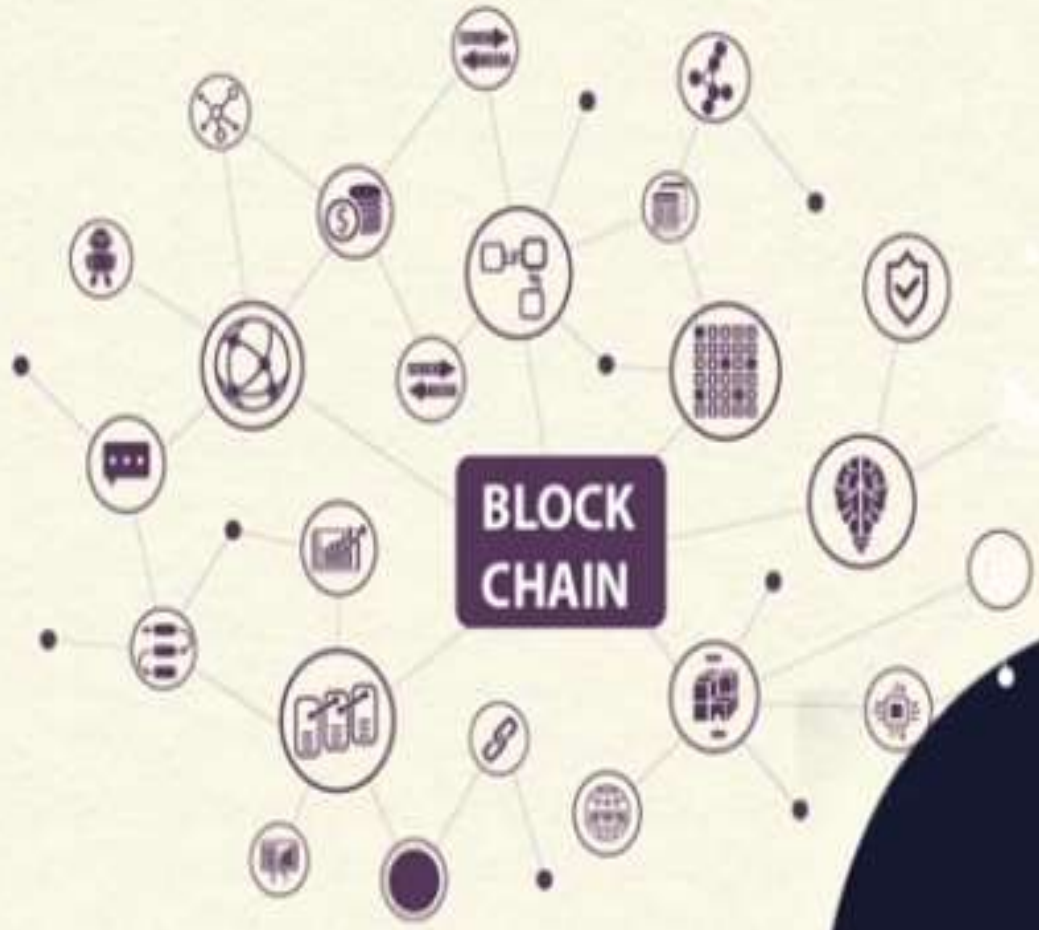


CONCEPTS COVERED

- The Blockchain Myths
- Decentralization – A Use-case



KEYWORDS

- **Cryptocurrency**
- **Blockchain**
- **Supply Chain Management**
- **Decentralization**



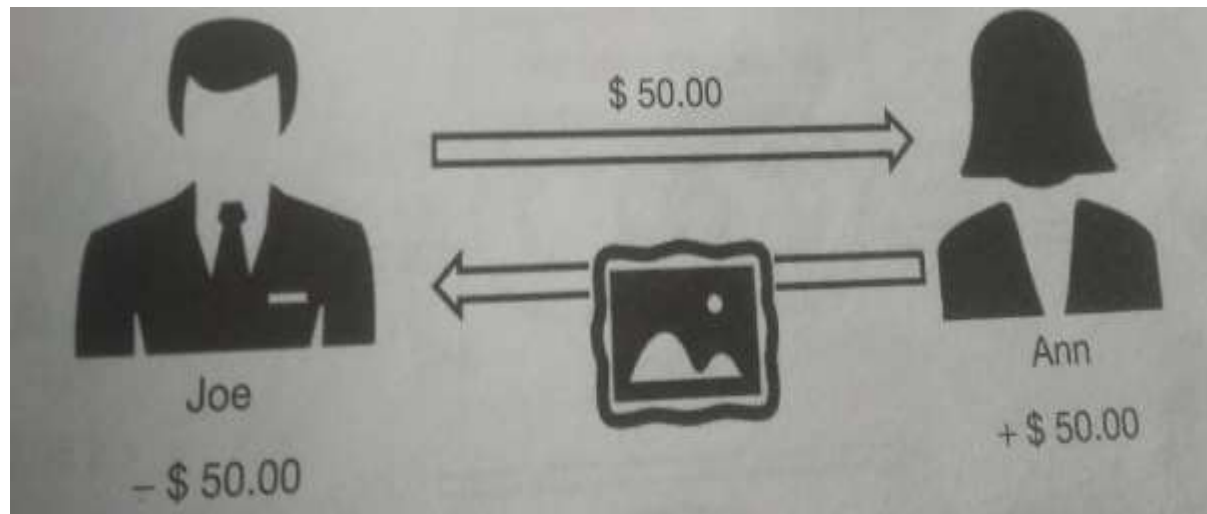
The Blockchain Myth

- Blockchain ≠ Bitcoin (or any other cryptocurrencies)
 - If you want to take this course to trade cryptocurrencies, this course is not for you !!
 - We do not want to argue on the legal issues of cryptocurrencies -- We want to learn the technology and its applications

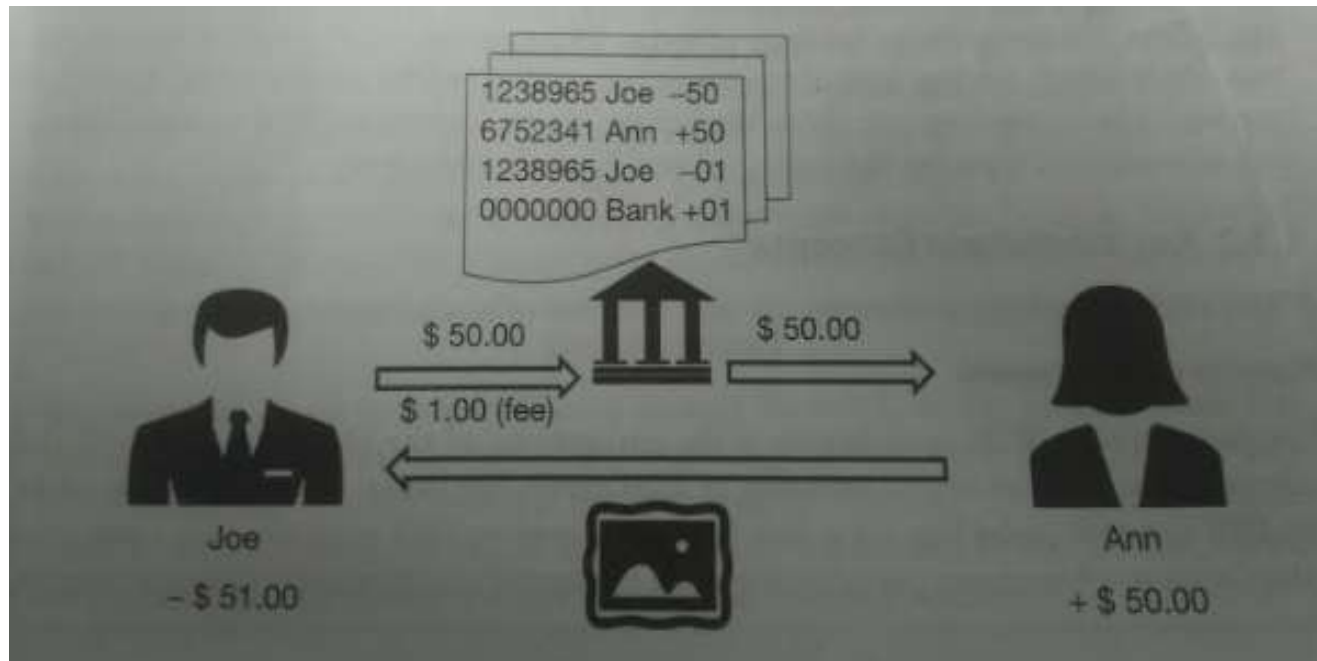
The Blockchain Myth

- Anything and everything in the world cannot be solved using a blockchain
 - Blockchain is good but it cannot change the society in a week or a month or a year
 - *"Want to prevent fraud and corruption? Use Blockchain" --*
Unfortunately, you are wrong! There can be a better technology to solve your problem ...
- You cannot replace a database with a blockchain
 - Blockchain is **not a distributed database**
 - Blockchain is not designed to securely store ANY data

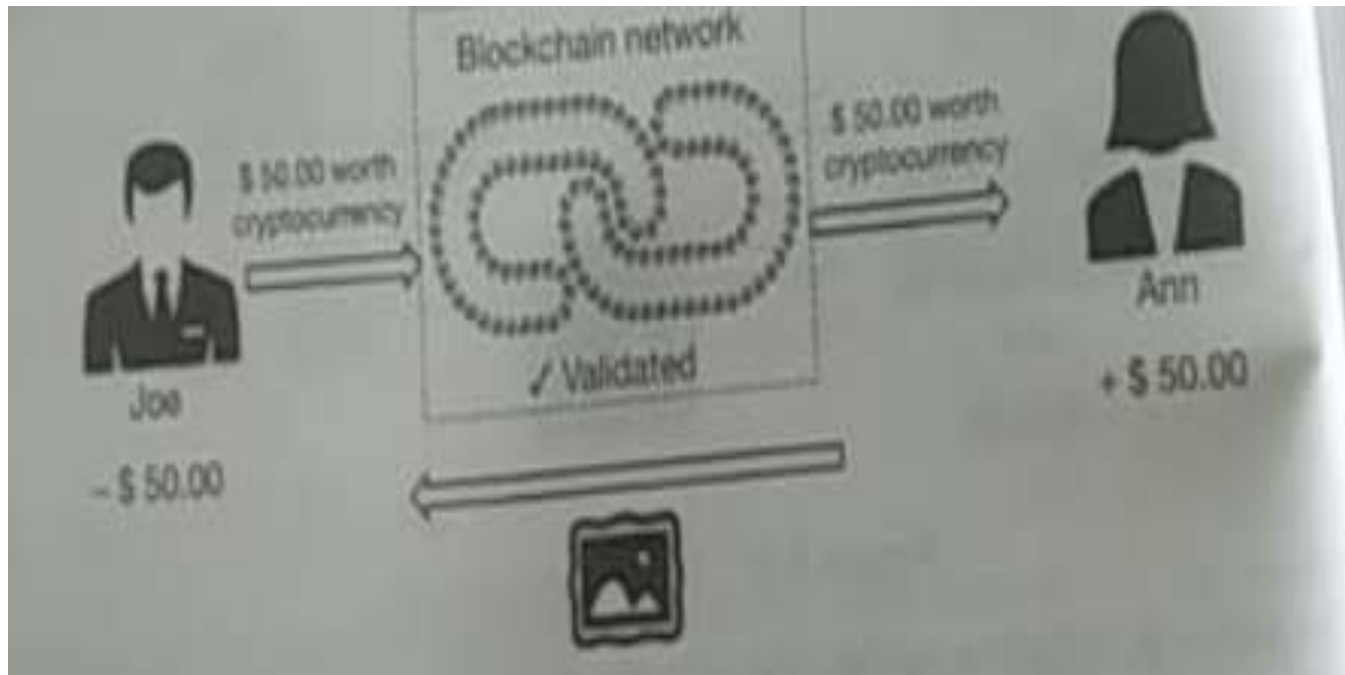
Example-Physical transaction



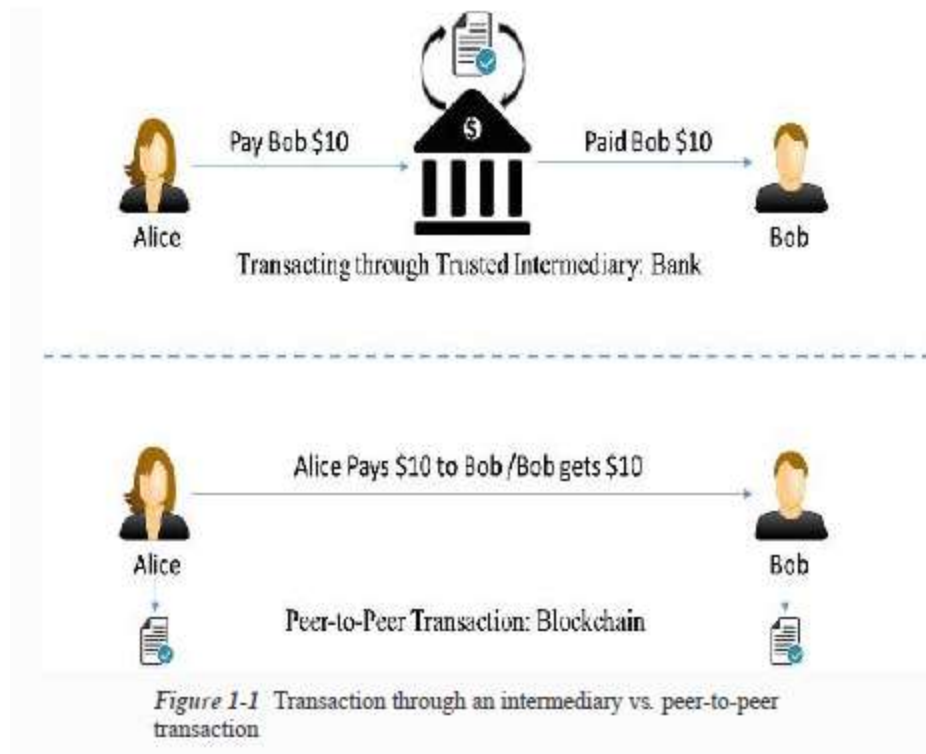
Example – Traditional Online Transaction



Example-Block chain transaction



Traditional and blockchain transaction



What is Blockchain?

Blockchain

- Blockchain is a system of records to transact value (not just money!) in a peer-to-peer fashion.
- There is no need for a trusted intermediary such as banks, brokers, or other escrow services to serve as a trusted third party

Decentralization – When Do you Need It?



What is Blockchain?



Self-sustaining, peer-to-peer database for managing and recording transactions with no central bank or clearinghouse involvement

“Blockchain” is named after how transactions are stored—blocks of data, encrypted by altering (or hashing) part of the previous block

Blockchain is the representation of the continuous **“change of state”**

Definition

- **Technically**
- Block chain is defined as a distributed, replicated peer to peer network of databases that allows multiple non-trusting parties to transact without a trusted intermediary and maintains an ever-growing, append only, tamper-resistant list of time-sequenced records.

(or)

- Block chain is digital, decentralized, distributed ledger database where blocks are linked cryptographically, and transactions are digitally signed and managed using consensus model.

Supply Chain Management -- A Use Case



Supply Chain in Petroleum Industry



**Crude
Purchase**

Supply Chain in Petroleum Industry



**Crude
Purchase**



**Crude
Transportation**

Supply Chain in Petroleum Industry



**Crude
Purchase**



**Crude
Transportation**



**Crude
Storage**

Supply Chain in Petroleum Industry



**Crude
Purchase**



**Crude
Transportation**

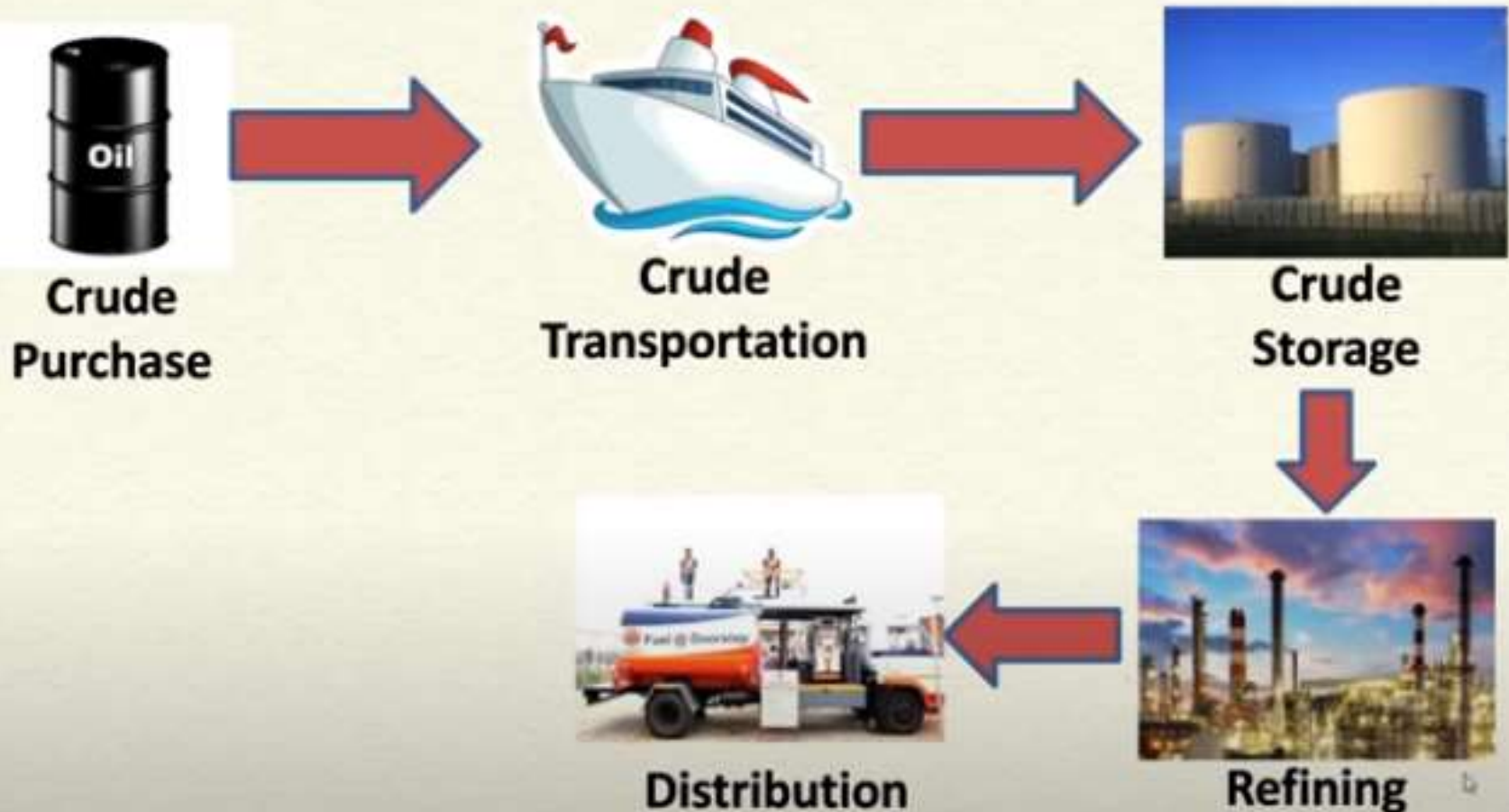


**Crude
Storage**

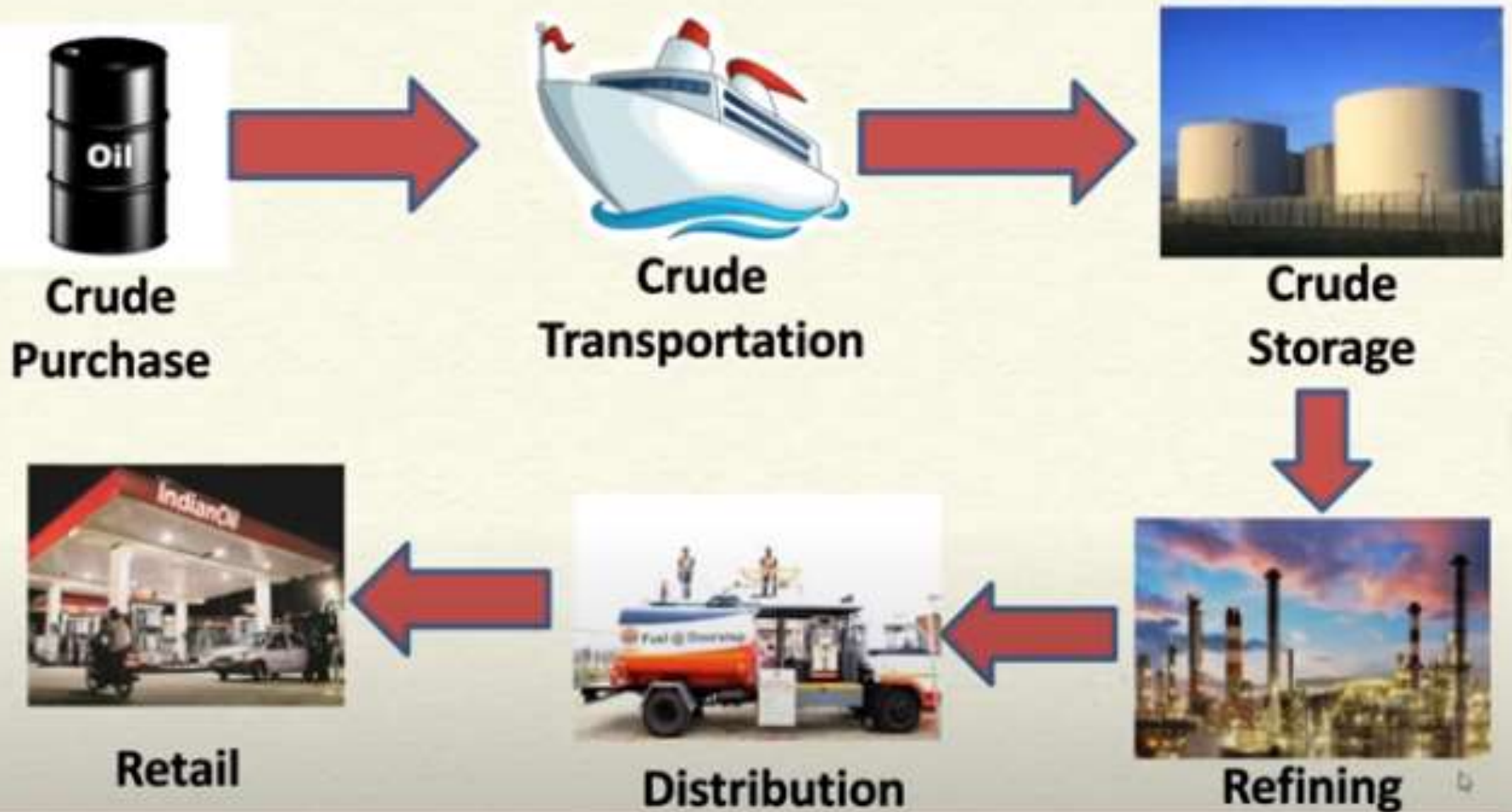


Refining

Supply Chain in Petroleum Industry

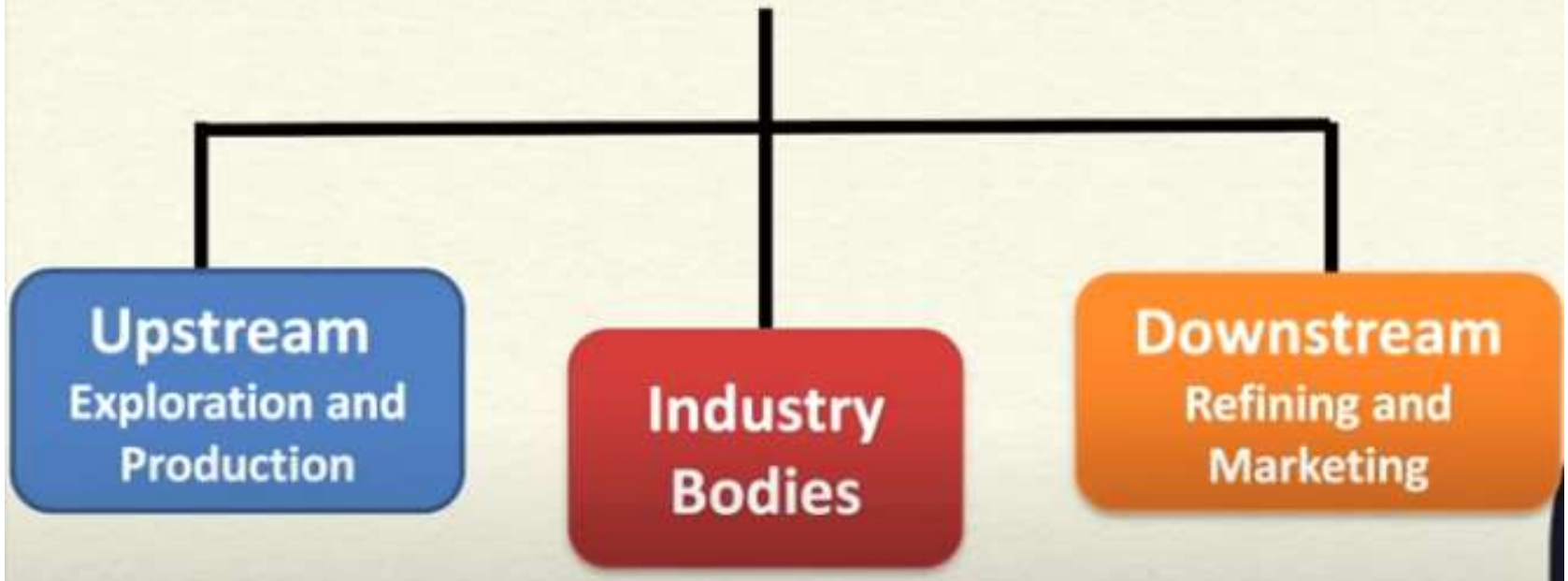


Supply Chain in Petroleum Industry



Petroleum Supply Chain in India

Ministry of Petroleum and Natural Gas



Petroleum Supply Chain in India

Upstream
Exploration and
Production

ONGC

OVL

Oil India Ltd

Pvt E&P Co

Petroleum Supply Chain in India

Downstream
Refining and
Marketing

Indian Oil
CPCL, BRPL

Bharat Petr.
NRL

Reliance
Ind. Ltd

Hindustan
Petr.
MRPL

Petroleum Supply Chain in India

Industry Bodies

- Petroleum Planning and Analysis Cell
- Center for High Technology
- PRCA
- PetroFed
- Oil industry Safety Directorate
- Petroleum India International

Requirements for a Successful Supply Chain

- Minimization of material procurement
- Maximization of manufacturing capacity and sales
- Meet demand numbers
- Respond quickly to market opportunity by purchasing the production shortfall from other players
- Objective of each production unit would be to maximize the throughput and its margin
- Procurement would purchase the feedstock with not the best yields at lowest cost

Requirements for a Successful Supply Chain

- Minimization of material procurement



Needs Strong Coordination among the Players

Requirements for a Successful Supply Chain

- Minimization of material procurement



Needs Strong Coordination among the Players

How do we obtain Real-time Information from the Stakeholders?

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A web-based portal?

Requirements for a Successful Supply Chain

- Minimization of material procurement



Needs Strong Coordination among the Players

How do we obtain Real-time Information from the Stakeholders?

A web-based portal?

What is the guarantee that the information submitted is correct?

Requirements for a Successful Supply Chain

- Minimization of material procurement



How do we obtain Real-time Information from the Stakeholders?

A web-based portal?

What is the guarantee that the information submitted is correct?

What if someone denies the information later on?

How do we obtain Real-time Information from the Stakeholders?

We need a decentralized solution – No one trusts each other, but they should cooperate

Requirements for a Successful Supply Chain

- Minimization of material procurement



- Respond quickly to market opportunity by purchasing the production shortfall from other players

Blockchain is the answer !!

Conclusion – Decentralization and Blockchain

- You have a network of different players (businesses, enterprises, commercial establishments, Government or Private bodies, or even the individuals)
- Everyone has their own interest – they want to fulfill their goal
- They do not trust each other
- If they cooperate, the society gets benefited
- **Trustless Decentralization = Blockchain**

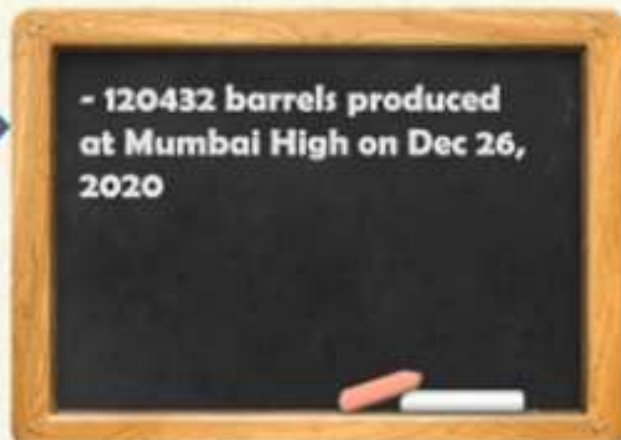
Moving towards Decentralization ...



Moving towards Decentralization ...



Moving towards Decentralization ...



Moving towards Decentralization ...



- 120432 barrels produced at Mumbai High on Dec 26, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 26, 2020 at 2:30 pm



Moving towards Decentralization ...



- 120432 barrels produced at Mumbai High on Dec 26, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 26, 2020 at 2:30 pm



The board has infinite space, you do not need to erase anything!

Moving towards Decentralization ...

Everyone
can see all
the logs
and verify

- 120432 barrels produced
at Mumbai High on Dec 26,
2020

- 16467 barrels transported
from Mumbai High to HPCL
Refinery on Dec 26, 2020 at
2:30 pm



Moving towards Decentralization ...

The board is not erasable, no one can deny later

- 120432 barrels produced at Mumbai High on Dec 26, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 26, 2020 at 2:30 pm



Moving towards Decentralization ...

**Simple one-step
auditing**

- 120432 barrels produced
at Mumbai High on Dec 26,
2020

- 16467 barrels transported
from Mumbai High to HPCL
Refinery on Dec 26, 2020 at
2:30 pm



Moving towards Decentralization ...

- 120432 barrels produced

Who will maintain this bulletin board?

Moving towards Decentralization ...



Who will maintain this bulletin board?

- Buy Cloud from amazon

Who will manage it and provide the cost?



Who will maintain this bulletin board?

- One of the enterprises maintain a private cloud

Who will maintain this bulletin board?

- **One of the enterprises maintain a private cloud**
What is the guarantee that it is not a fraud?

Who will maintain this bulletin board?

**Let everyone maintain the same copy of the board
individually and independently**

Moving towards Decentralization ...

- 120432 barrels produced

Who will maintain this bulletin board?

Let everyone maintain the same copy of the board individually and independently

BUT HOW?



Moving towards Decentralization ...



- 120432 barrels produced at Mumbai High on Dec 26, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 26, 2020 at 2:30 pm



Moving towards Decentralization ...



- 126432 barrels produced at Mumbai High on Dec 24, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 24, 2020 at 3:00 pm

- 126432 barrels produced at Mumbai High on Dec 24, 2020

- 14467 barrels transported from Mumbai High to HPCL Refinery on Dec 24, 2020 at 3:00 pm



- 126432 barrels produced at Mumbai High on Dec 24, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 24, 2020 at 3:00 pm



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- 126432 barrels produced at Mumbai High on Dec 24, 2020

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Moving towards Decentralization ...



- 100432 barrels produced at Mumbai High on Dec 24, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 24, 2020 at 3:00 pm

No one is the sole-owner of the data, but everyone has a copy of the data - there is no central database

- 100432 barrels produced at Mumbai High on Dec 24, 2020

- 16467 barrels transported from Mumbai High to HPCL Refinery on Dec 24, 2020 at 3:00 pm



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Moving towards Decentralization ...

Everyone holds exactly the same copy of the data at the same instance of the time



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What is a Blockchain?



**An immutable append-only
ever-growing chain of data.
Data once added cannot
be deleted or modified later**



What is a Blockchain?

There is no central database to store the chain – everyone keeps a copy of the chain and process data locally



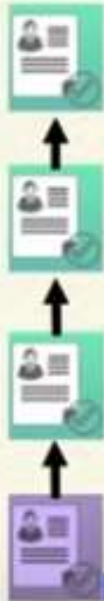
What is a Blockchain?

New information is added to the chain in the form of new blocks



What is a Blockchain?

New information is added to the chain in the form of new blocks



What is a Blockchain?



New information is added to the chain in the form of new blocks



Chain of blocks
Blockchain

What is a Blockchain?



Blockchain ensures that every party has the same view of the blockchain always



The Information is transparent to everyone – so everyone can verify and validate

Conclusion: Formally Defining a Blockchain



A decentralized immutable append-only public ledger