Supply Chain Management using Blockchain

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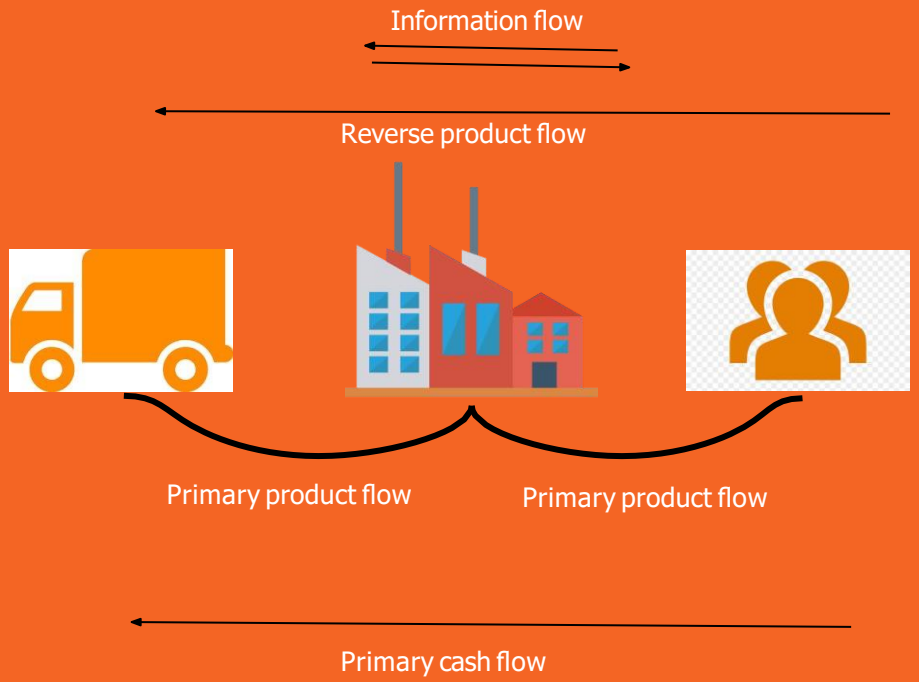
What is the supply chain?

A supply chain is a global network used to deliver products and services, from raw materials to end customers through an engineered flow of information, physical distribution and cash.

1. Basic Supply chain

A basic supply chain consists of three entities:

- **Supplier**
  Physical material flows from supplier to customer.
- **Producer**
  Product flow to customer
- **Customer**
  Flow of cash from the customer to the raw material supplier.



What are some issues with the supply chain?

- Lack of transparency due to insufficient or unavailable data
- Lack of interoperability
- Limited information on product lifecycle or transport history

So, we use blockchain to overcome these challenges.

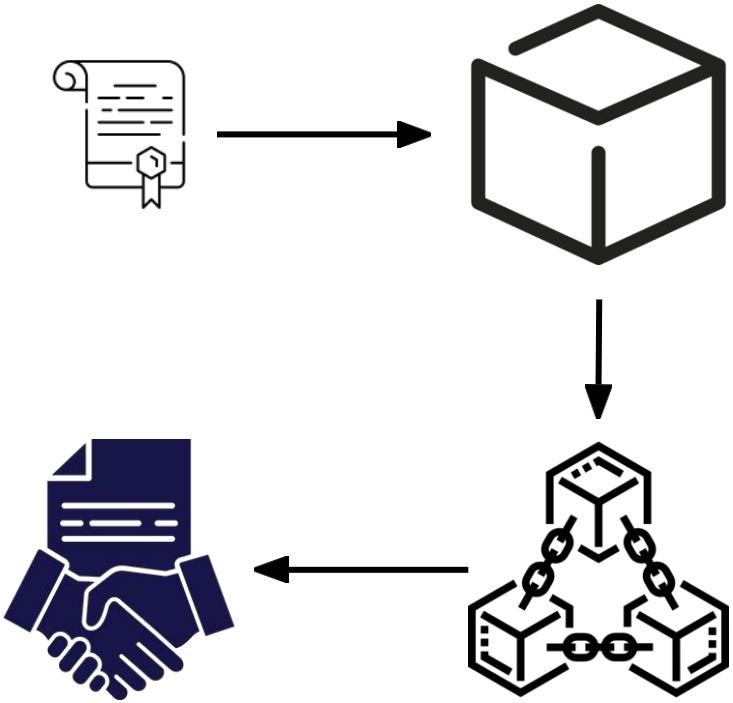
Recording every single transaction taking place.

Increasing security.

Smart contracts

They are programs that are stored in the blockchain when predetermined conditions are met.

- ➔ They ensure decentralization.
- ➔ They automate execution of an agreement.

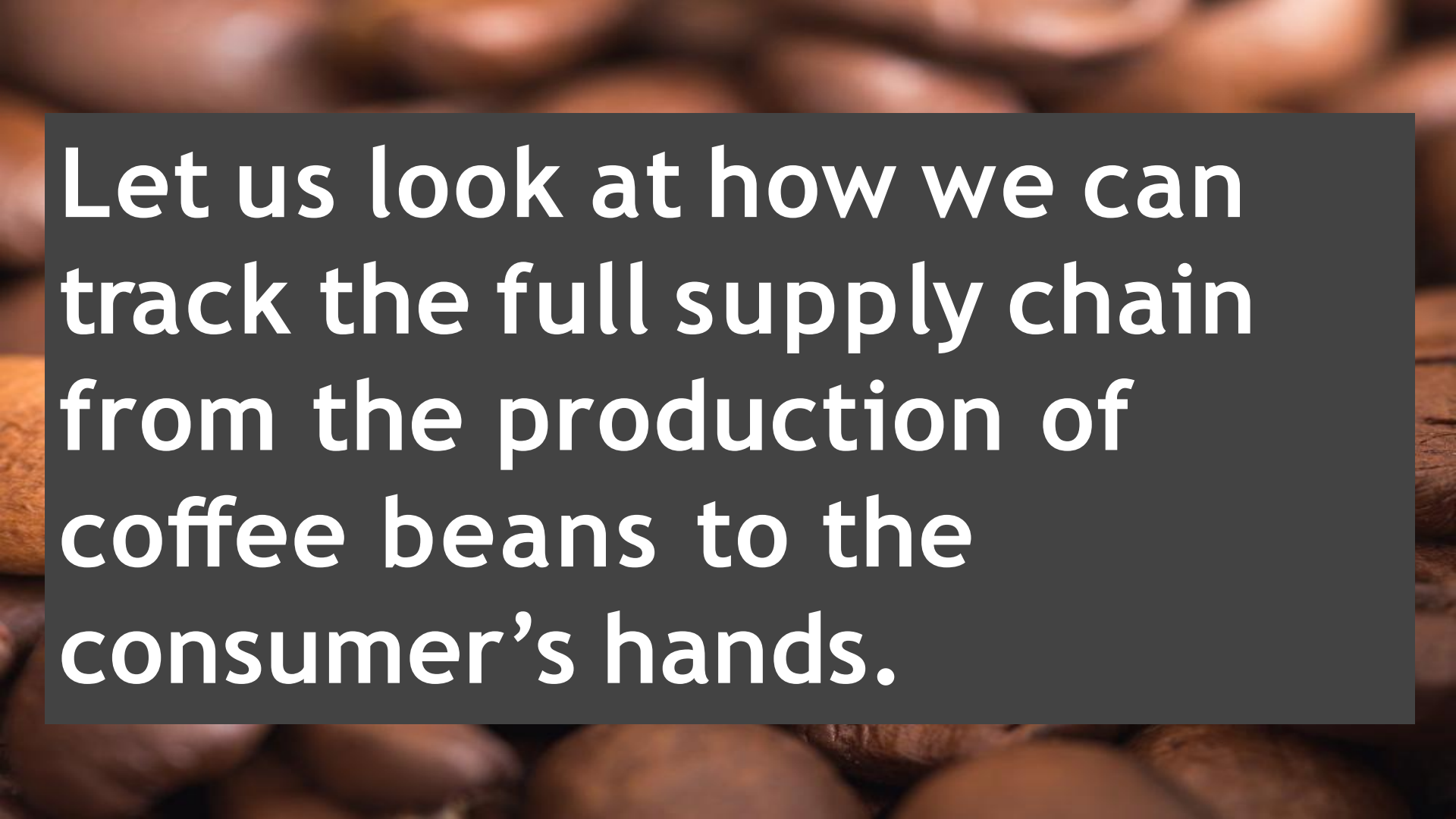


How do smart contracts work?

Smart contracts are run on the blockchain.

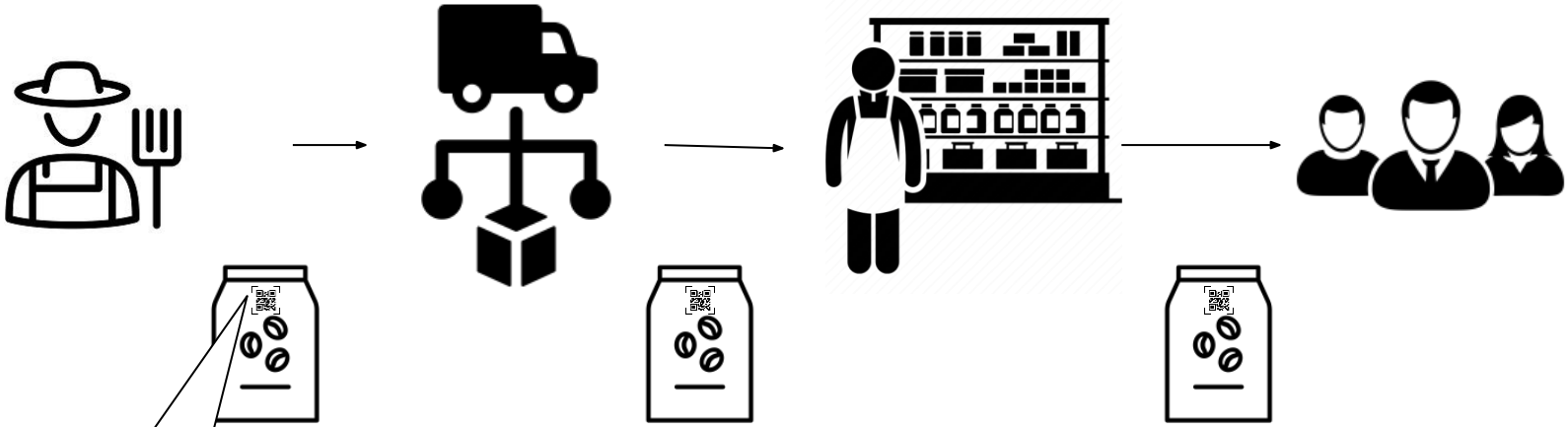
They are stored on a public database and hence cannot be changed.

They act as an agreement between the parties involved.


Let us look at how we can track the full supply chain from the production of coffee beans to the consumer’s hands.

We have 4 entities :

- Farmers
- Distributors
- Retailers
- Consumers



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Truffle

Truffle is the most popular development tooling for Ethereum programmers. Easily deploy smart contracts and communicate with their underlying state without heavy client side programming. An especially useful library for the testing and iteration of Ethereum smart contracts.

IPFS

IPFS is a peer-to-peer (p2p) storage network. Content is accessible through peers located anywhere in the world, that might relay information, store it, or do both. IPFS knows how to find what you ask for using its content address rather than its location.

Infura

Infura provides **the tools and infrastructure that allow developers to easily take their blockchain application from testing to scaled deployment** - with simple, reliable access to Ethereum and IPFS.

Conclusion

This project aims to bring an efficient system through the use of blockchain technology and help the supply chain industry make their processes and services more dynamic and transparent.

Base Paper:

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https://ieeexplore.ieee.org/document/8939222

Literature Survey

S. No.	Title of paper	Authors	Year	Algorithms	Merits	Demerits
1.	Blockchain Technology in Supply Chain Management: Preliminary Study	Soha Yousuf, Davor Svetinovic	2019	Analysis is performed in terms of the characteristics of trust and decentralizatio n with respect to forming a generalized framework.	Evaluate the suitability of blockchain based on its characteristics of providing increased trust and decentralization in the following supply chain stages: order fulfillment, supplier relationship management, manufacturing flow management and demand management.	Lacks a formal systematic review covering the rest of the SCM stages to formulate a complete framework

S. No.	Title of paper	Authors	Year	Algorithms	Merits	Demerits
2.	Study on Supply Chain Management using Blockchain Technology	Yaswanth Raj, Sowmiya B	2021	Various types of techniques and methods that are used in the field of supply chain under blockchain technologies	States about the various problems and related solutions faced in the supply chain using blockchain technology	Needs evaluation with the existing techniques and how far they are scalable with different blockchain technologies and methods.

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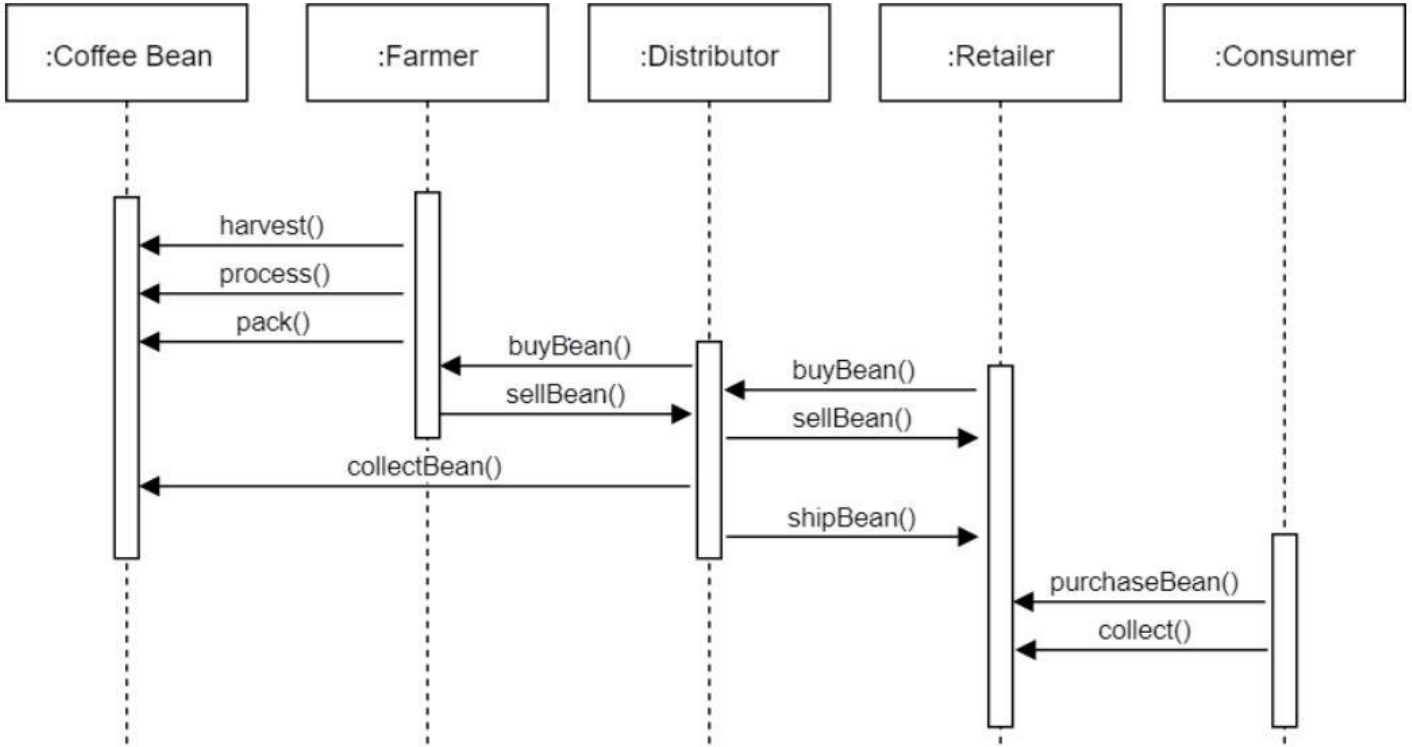
3.	A Platform-independent, Generic-purpose, and Blockchain-based Supply Chain Tracking	Sina Rafati Niya, Danijel Dordevic, Atif Ghulam Nabi, Tanbir Mann, Burkhard Stiller	2019	A SCT application which, employs SC on the Ethereum blockchain (BC). Uses DApp ASPIR	Provides a hardware-and platform-independent approach that flexibly enables multiple object combinations and transformations to be tracked with a use case-agnostic design and utilization	Needs evaluation with the existing techniques and how far they are scalable with different blockchain technologies and methods.

S. No.	Title of paper	Authors	Year	Algorithms	Merits	Demerits
4.	When blockchain meets supply chain: A systematic literature review on current development and potential applications	Shuchih E. Chang and YiChian Chen	2020	This study aims to explore the current status, potential applications, and future directions of blockchain technology in supply chain management.	aimed to provide a systematic review and analysis of extant literature focusing on SCM from a blockchain and smart contract perspective	Needs evaluation with the existing techniques and how far they are scalable with different blockchain technologies and methods.

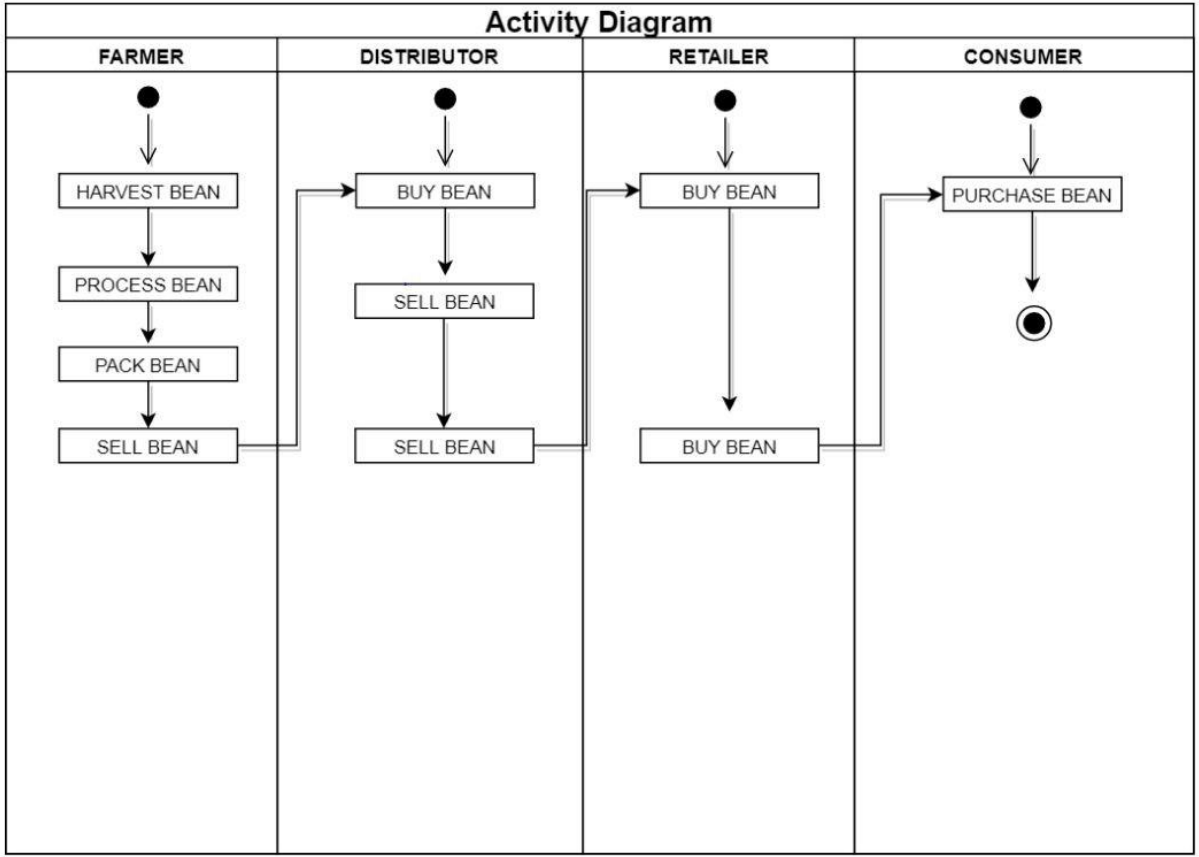
S. No.	Title of paper	Authors	Year	Algorithms	Merits	Demerits
5.	Blockchains and the supply chain: Findings from a broad study of practitioners	Sara Saberi, Mahtab Kouhizadeh, Joseph Sarkis	2019	Association of Supply Chain Management (ASCM)	Outcome showed that SMEs are more likely to use and apply this new technology since it might help them reduce many intermediary costs and increase their security.	Need to investigate the blockchain implementation evolution in the supply chain.

DESIGN AND METHODOLOGY

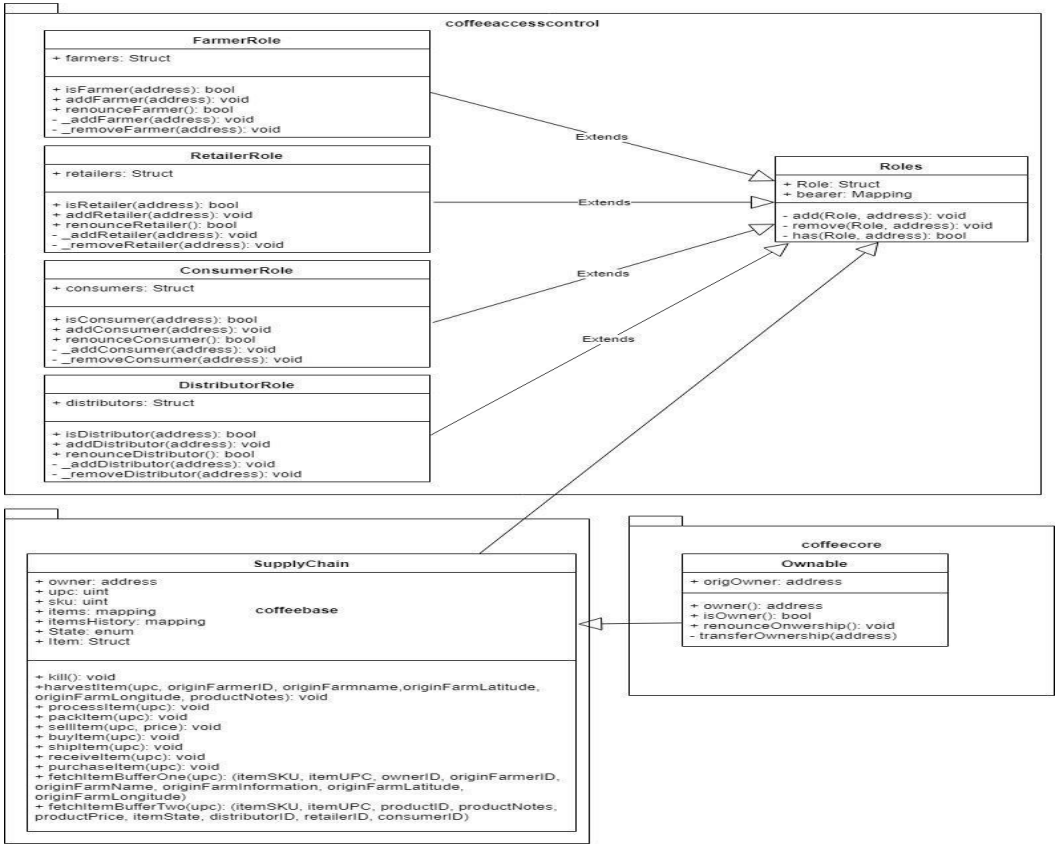
SEQUENCE DIAGRAM

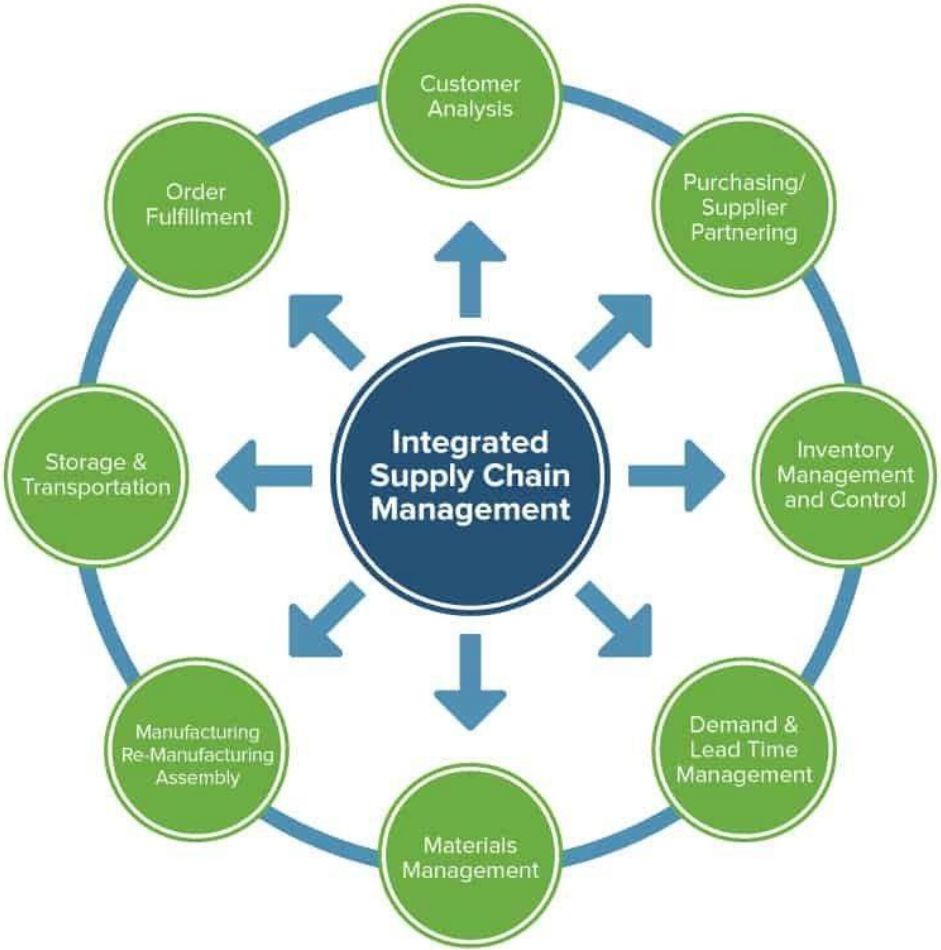


ACTIVITY DIAGRAM



DATA MODELING DIAGRAM

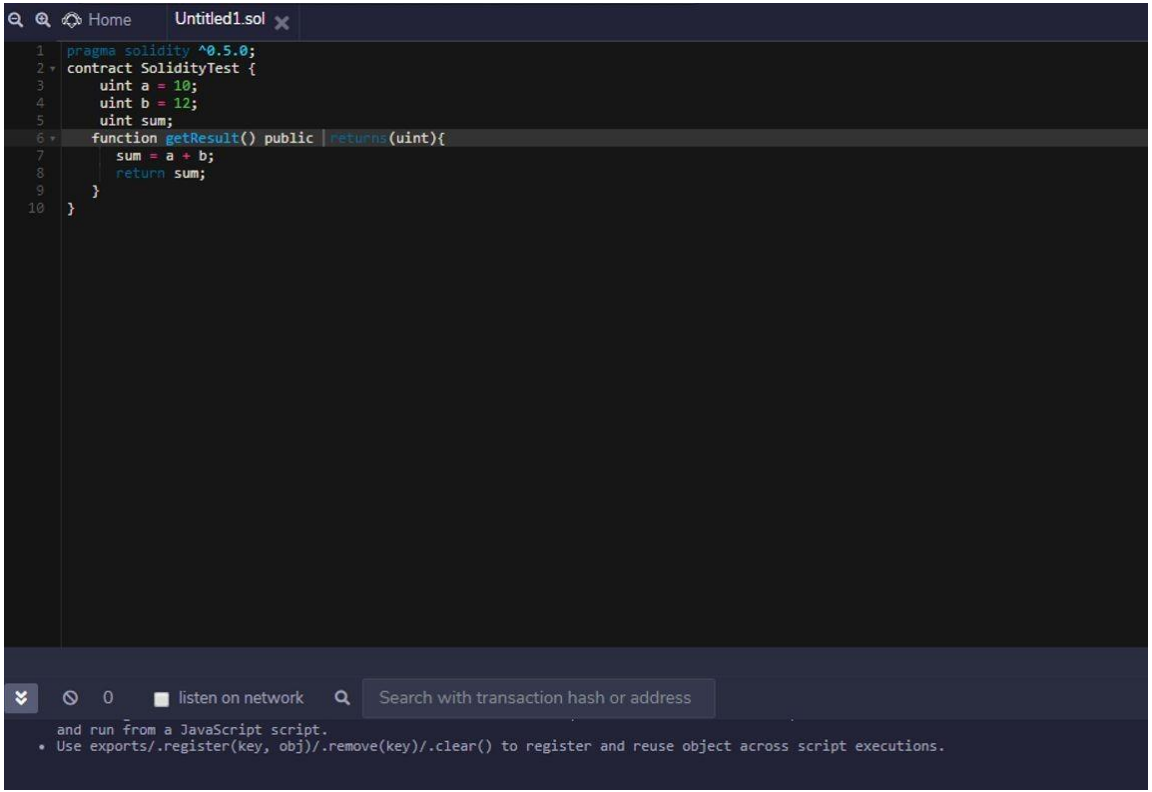


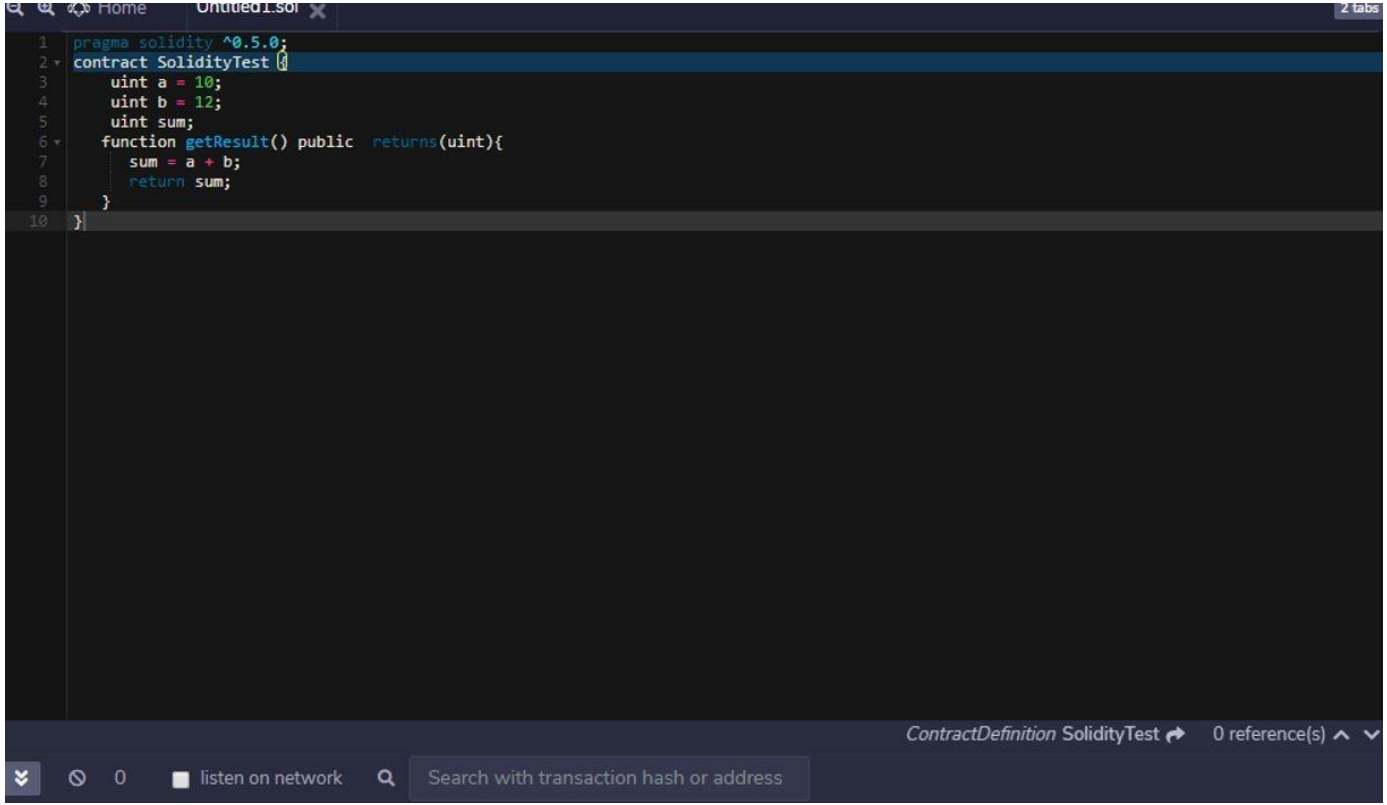


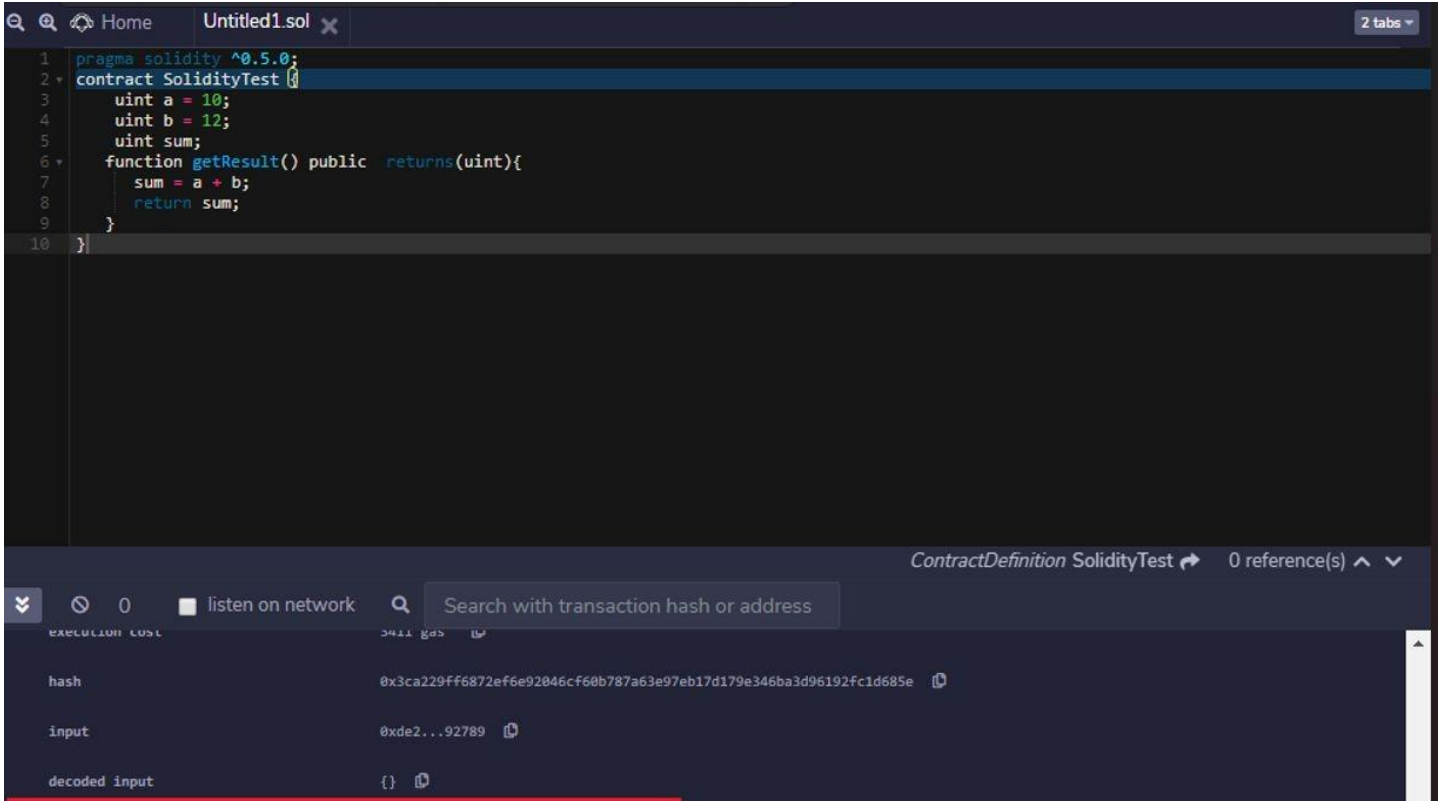
The modeling approach is based on the concept of the blockchain and Smart contracts. When transaction activities begin and conclude, the blockchain maintains an account of them. As a result, the operations of logistics companies may be viewed as information services that they provide to the blockchain architecture. Smart contract design, in this sense, may be thought of as the computation of start and completion timings for information services in a blockchain-driven cyber environment that mirrors real SC activities.

Coding

Creating smart contract




Home
Untitled1.sol
2 tabs
pragma solidity ^0.5.0;
contract SolidityTest {
uint a = 10;
uint b = 12;
uint sum;
function getResult() public returns(uint){
sum = a + b;
return sum;
}
}
ContractDefinition SolidityTest
0 reference(s)
0
listen on network
Search with transaction hash or address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Search with transaction hash or address
hash
0x3ca229ff6872ef6e92046cf60b787a63e97eb17d179e346ba3d96192fc1d685e
input
0xde2...92789
decoded input
{}

THE END