



IPB University
— Bogor Indonesia —



BRAIN
IPB University

Blockchain for Halal Traceability and Certification

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H20 Forum Agree on Four Halal Ecosystem Development Frameworks



Head of BPJPH M. Aqil Irham signs the H20 Semarang Communique, in Semarang, Saturday (11/19/2022) (Photo: Aan)

Semarang, the Halal Product Assurance Organizing Body (BPJPH) of the Ministry of Religion (Kemenag) after holding the Halal-20 Forum (H20). The forum which is part of the Indonesia G20 Presidency agreed on four frameworks and five points of agreement on the development of the halal ecosystem as contained in the 'H20 Semarang Communique'.

"H20 participants agreed on four frameworks and five points of mutual

H20 Forum 2022 and 2023

Recommends the use of **Blockchain and AI Technology** on the SiHalal (*Halal Information System*) Application to enhance transparency, efficiency, and integrity



Outlines



Artificial Intelligence for Halal Certification

What Blockchain Technology is?

Blockchain for Halal Ecosystem and Halal Certification

Closing

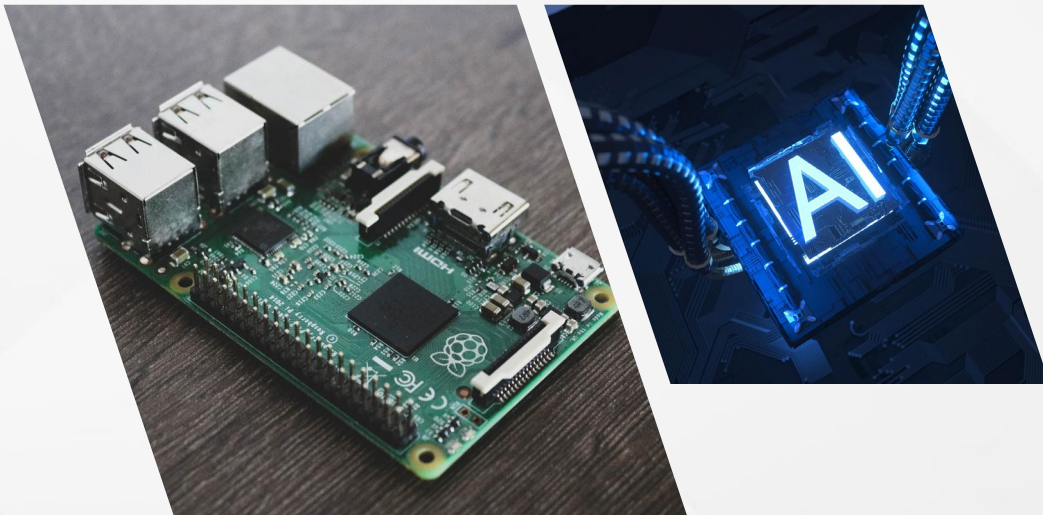




1

Artificial Intelligence for Halal Certification





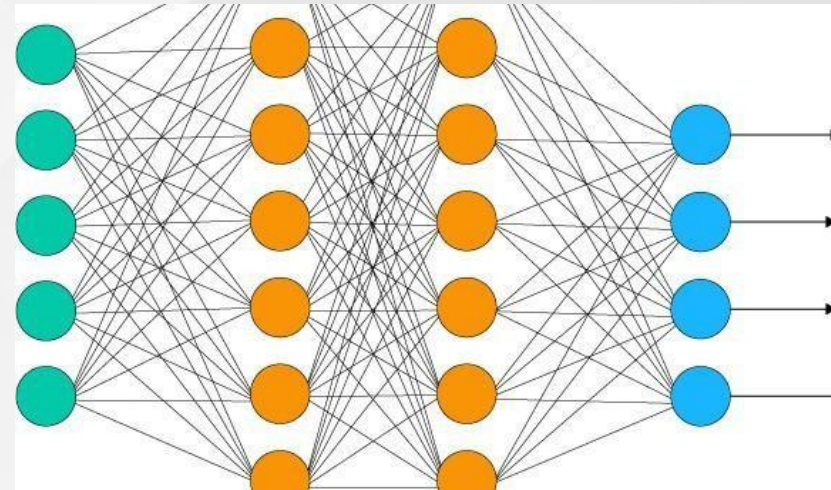
1. WHAT'S AI?

AI is the study of ideas that enable computers to be intelligent.

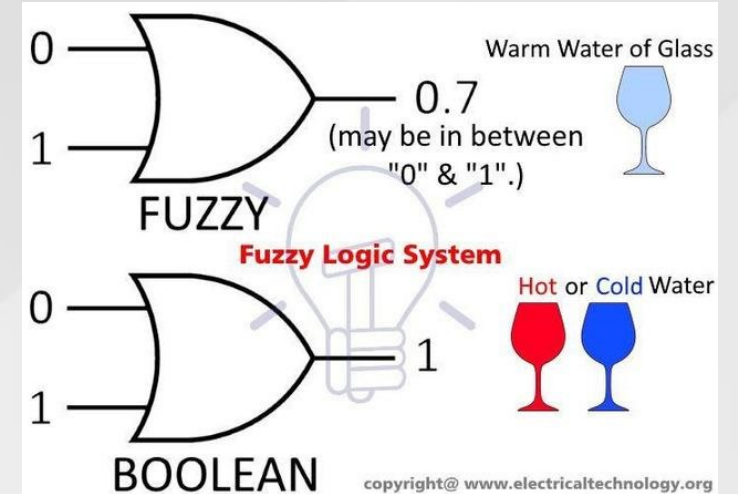
AI is the part of computer science concerned with design of computer systems that exhibit human intelligence

THE TOOLS OF ARTIFICIAL INTELLIGENCE

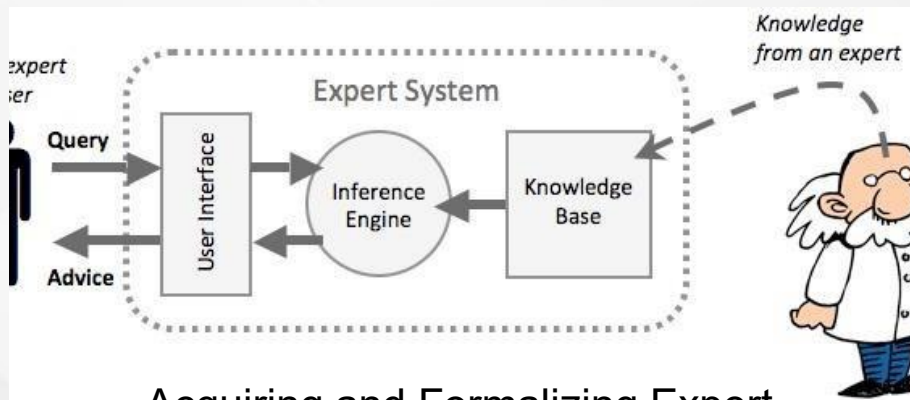
- Neural Networks
- Fuzzy Logic
- Expert Systems
- Genetic Algorithms
- Others



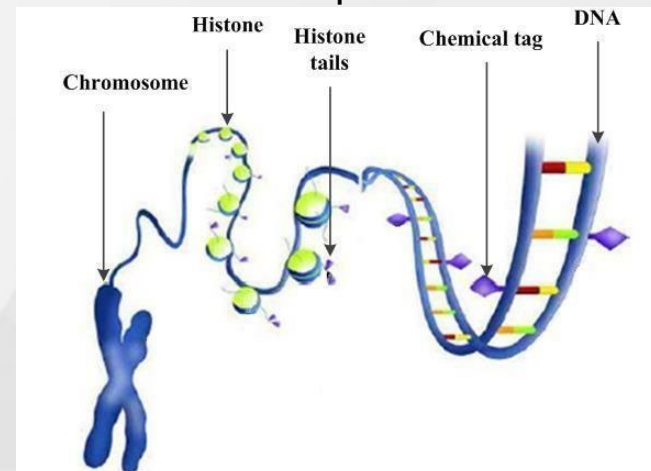
Learning by Example



Making Inference Based on Precise Input



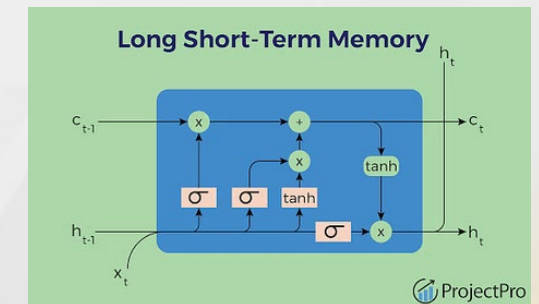
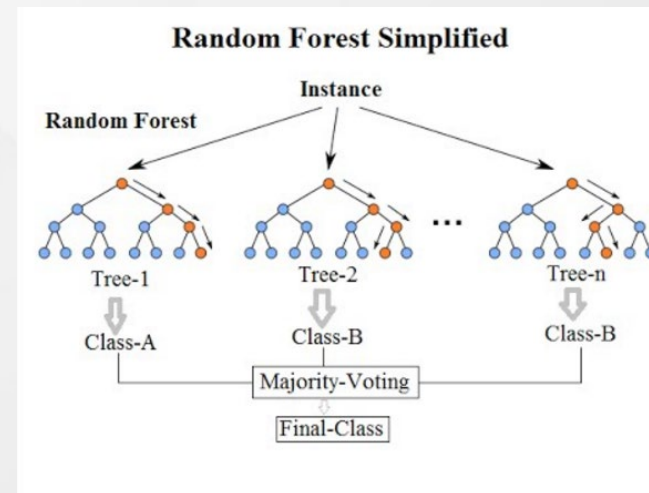
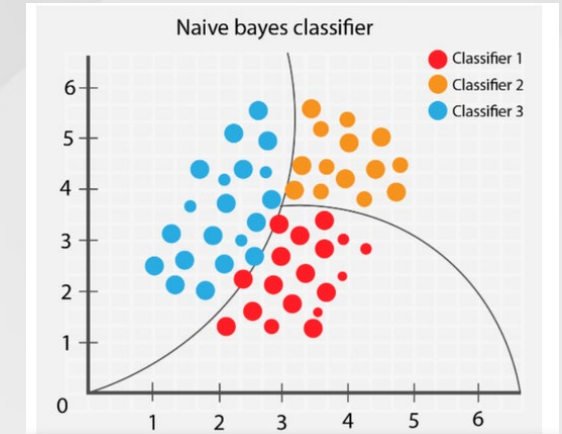
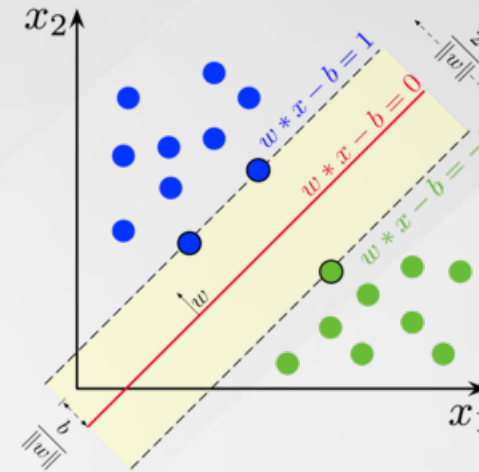
Acquiring and Formalizing Expert Knowledge



Searching the Best by Genetic and Evolutionary Principles

THE TOOLS OF ARTIFICIAL INTELLIGENCE

- Regresi Linier
- Regresi Logistik
- K-Nearest Neighbors (KNN)
- Support Vector Machines (SVM)
- Decision Trees
- Random Forests
- Naive Bayes
- Gradient Boosting Machines (GBM)
- Artificial Neural Networks (ANN)
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks (RNN)
- Long Short-Term Memory (LSTM)
- Generative Adversarial Networks





THE BENEFITS OF ARTIFICIAL INTELLIGENCE

Traditional Tools

(Intuitions, Judgments and Rules of Thumbs)

Manual

Inconsistent

No Explanation

Imprecise

Small-scale and simple problem

Limited learning capability

Modern Tools

(Quantitative, Scientific, Knowledge-based and Intelligent)

Computer-based

Consistent

Explanation Capability

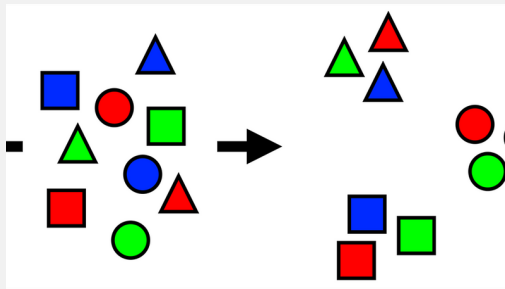
Precise

Large-scale and complex problem

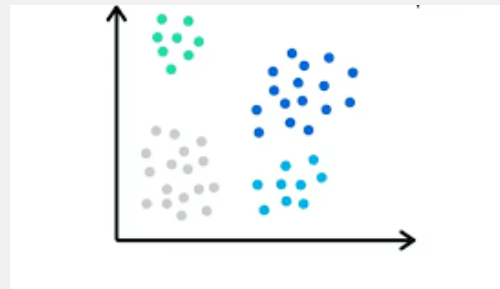
Unlimited learning capability



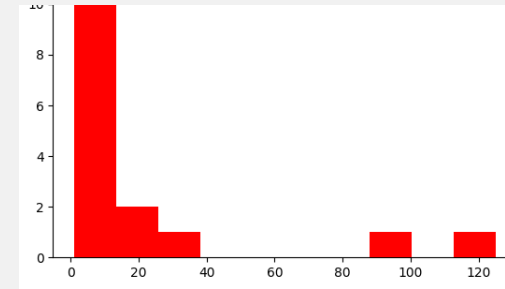
AI in SIHALAL Version 2023



Data Grouping



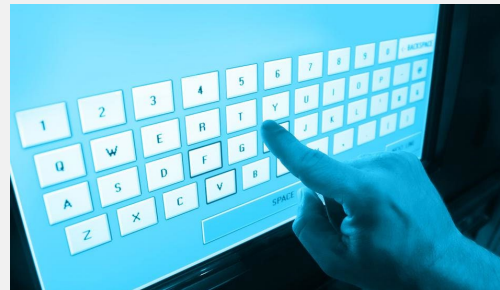
Data Clustering



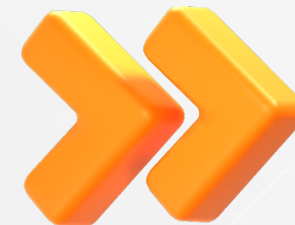
Data Trimming



Data Analytic



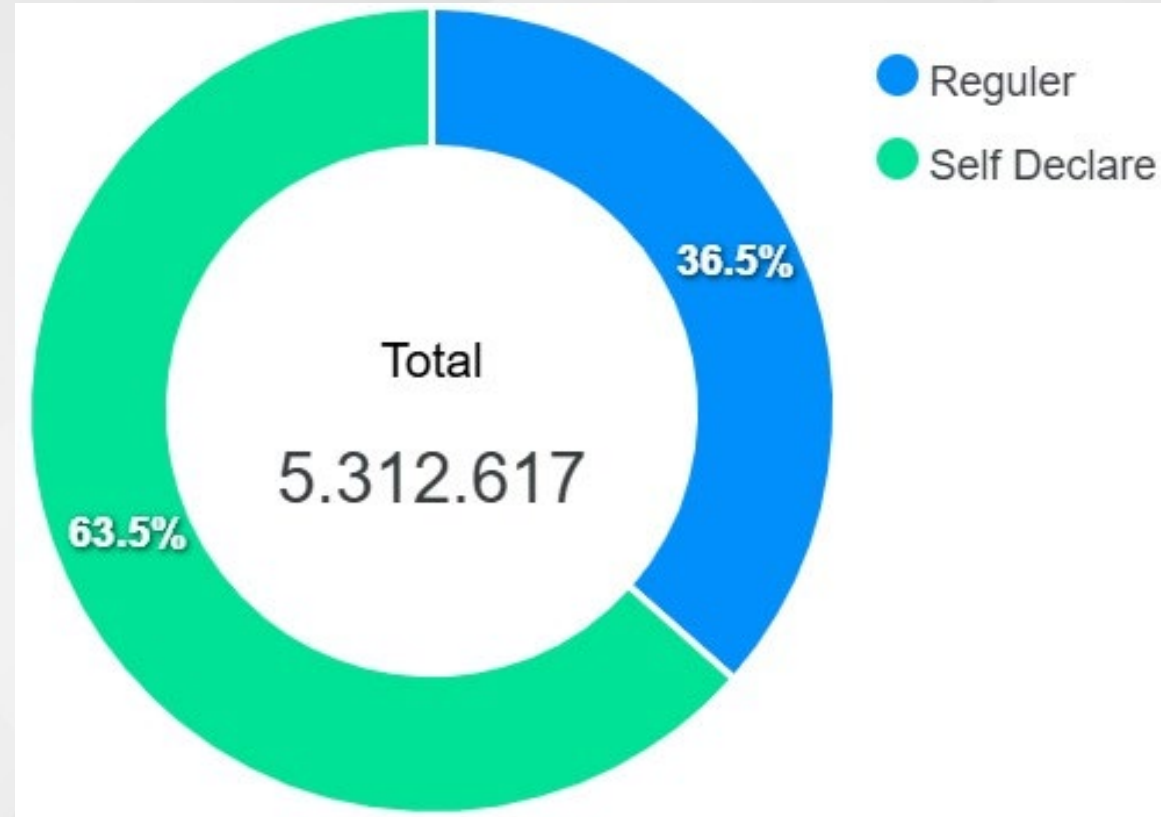
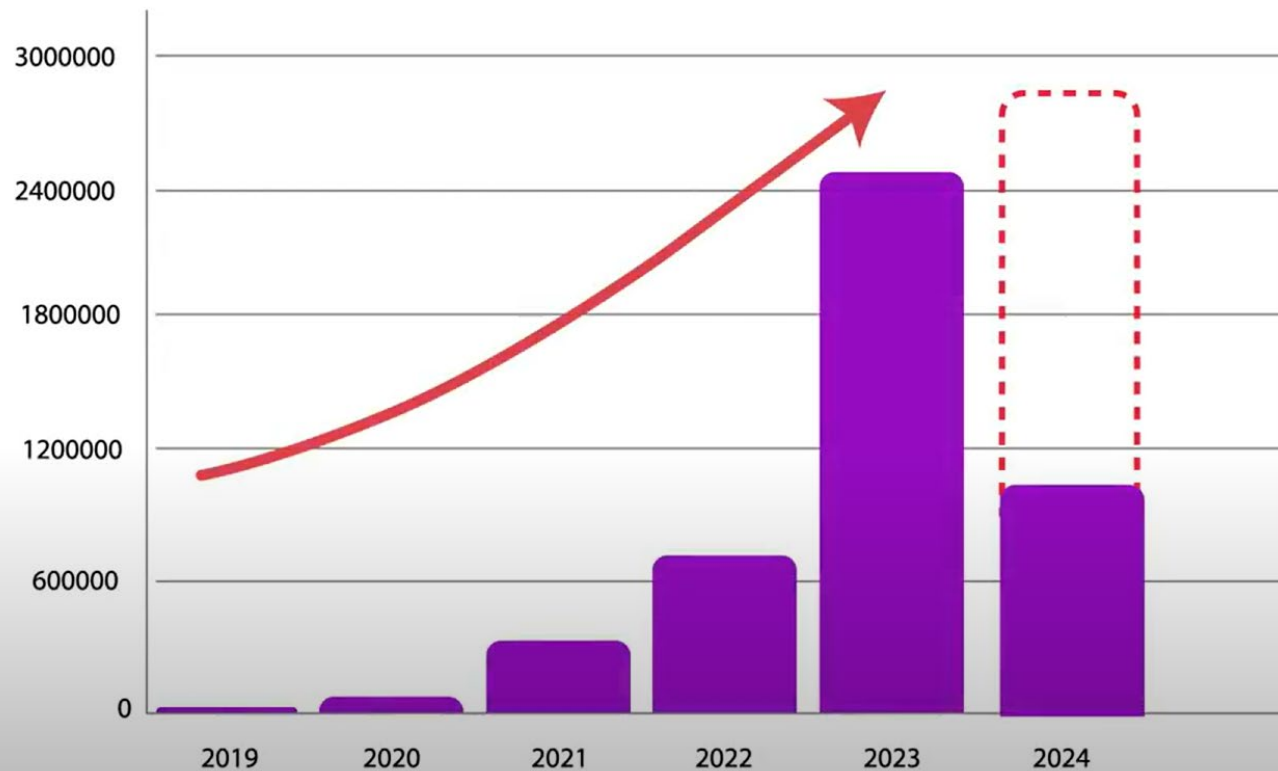
Data Input Error
Diagnostic



RESULT?



AI FOR HALAL CERTIFICATION





2

What is Blockchain?





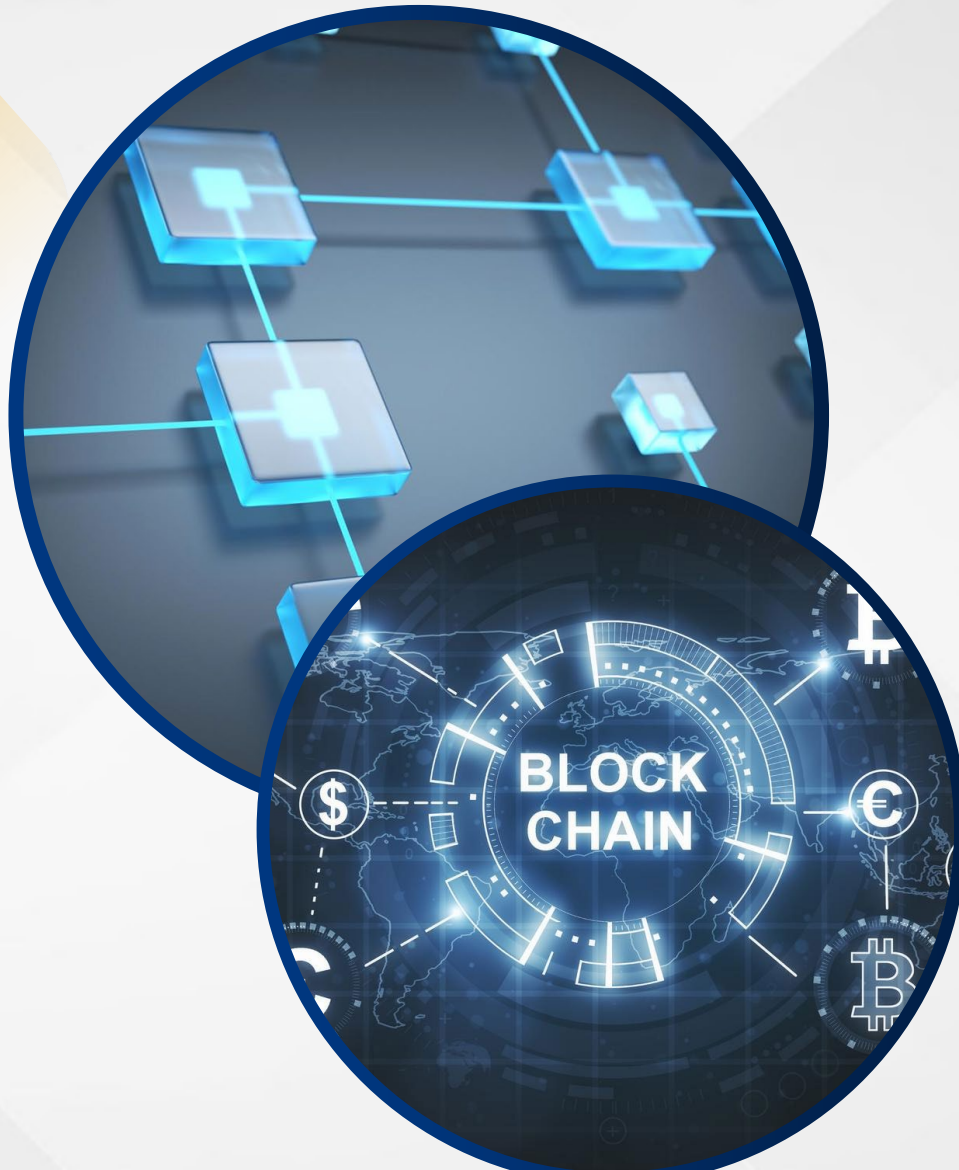
BLOCKCHAIN

Block (area to record transactions)

Chain (A chain that connects records with a cryptographic security system)

Distribution (Records are shared with all parties involved in the transaction)

Direct Transactions, no third party required
(Bank, notaris, et all)





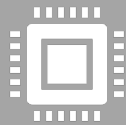
BLOCKCHAIN

Blockchain is a decentralized digital ledger. It allows transparent, secure, and immutable records.

Why Blockchain is 3T?



All transaction records (records or BLOCK) before being saved must be validated by all members (peers) and seen by all



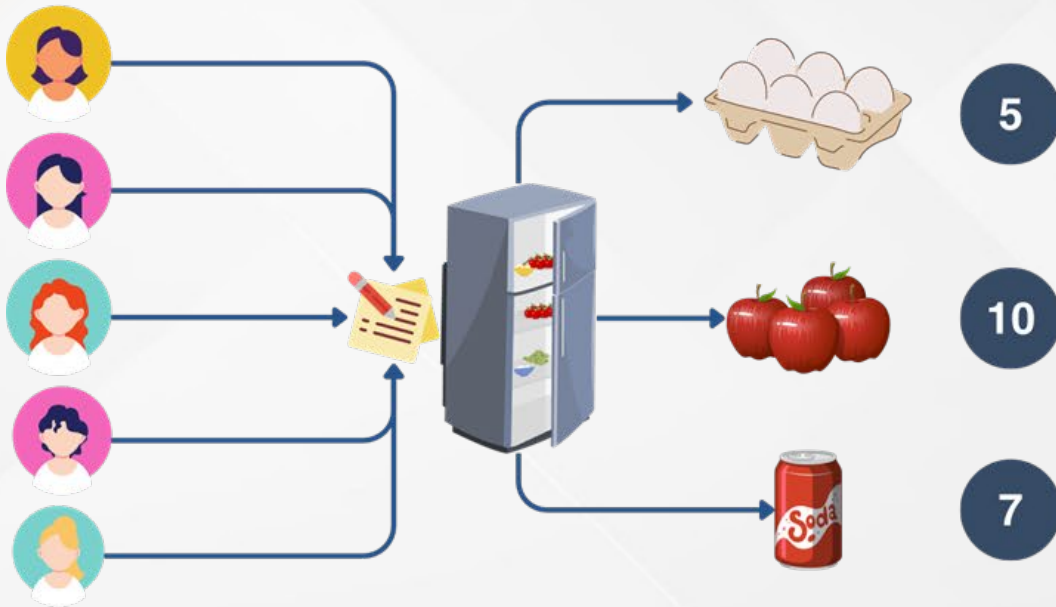
The current record is linked to the previous record and the next record (as a chain) and is locked with a highly secure cryptographic system (as a password) and irreversible



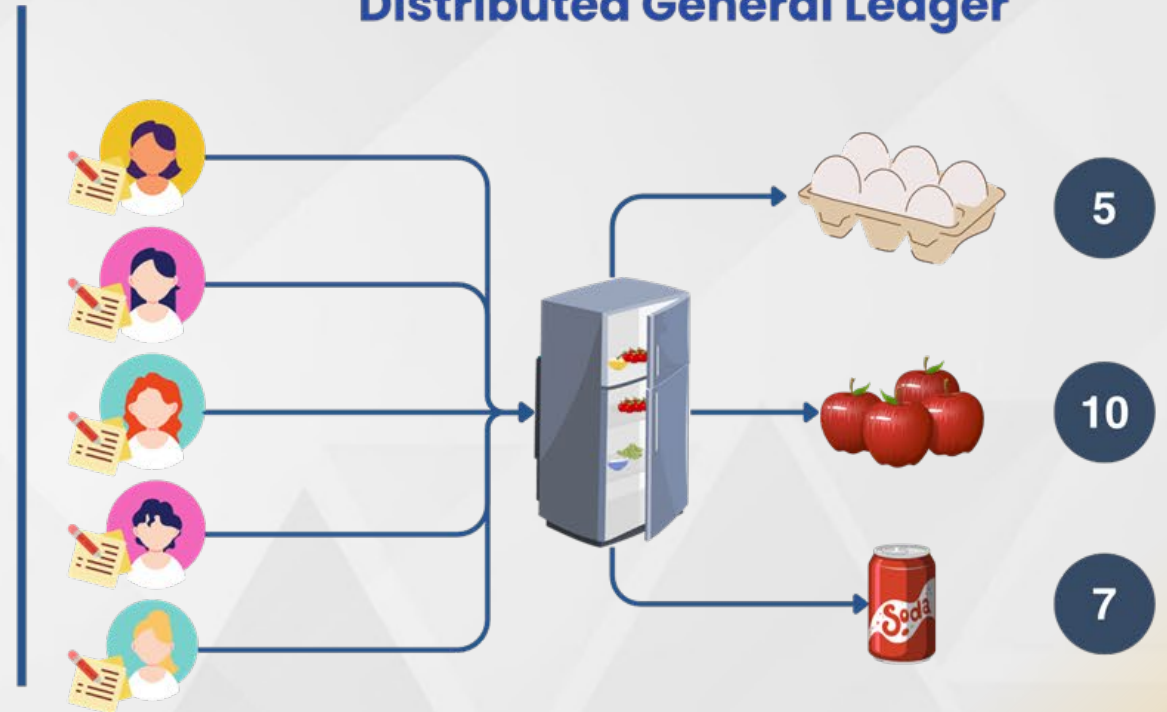
Because it is well structured (block & chain), transaction records are easy to trace both backwards and forwards (tracing and tracking)

DIFFERENTIATION BETWEEN CENTRALIZED AND DISTRIBUTED RECORDS

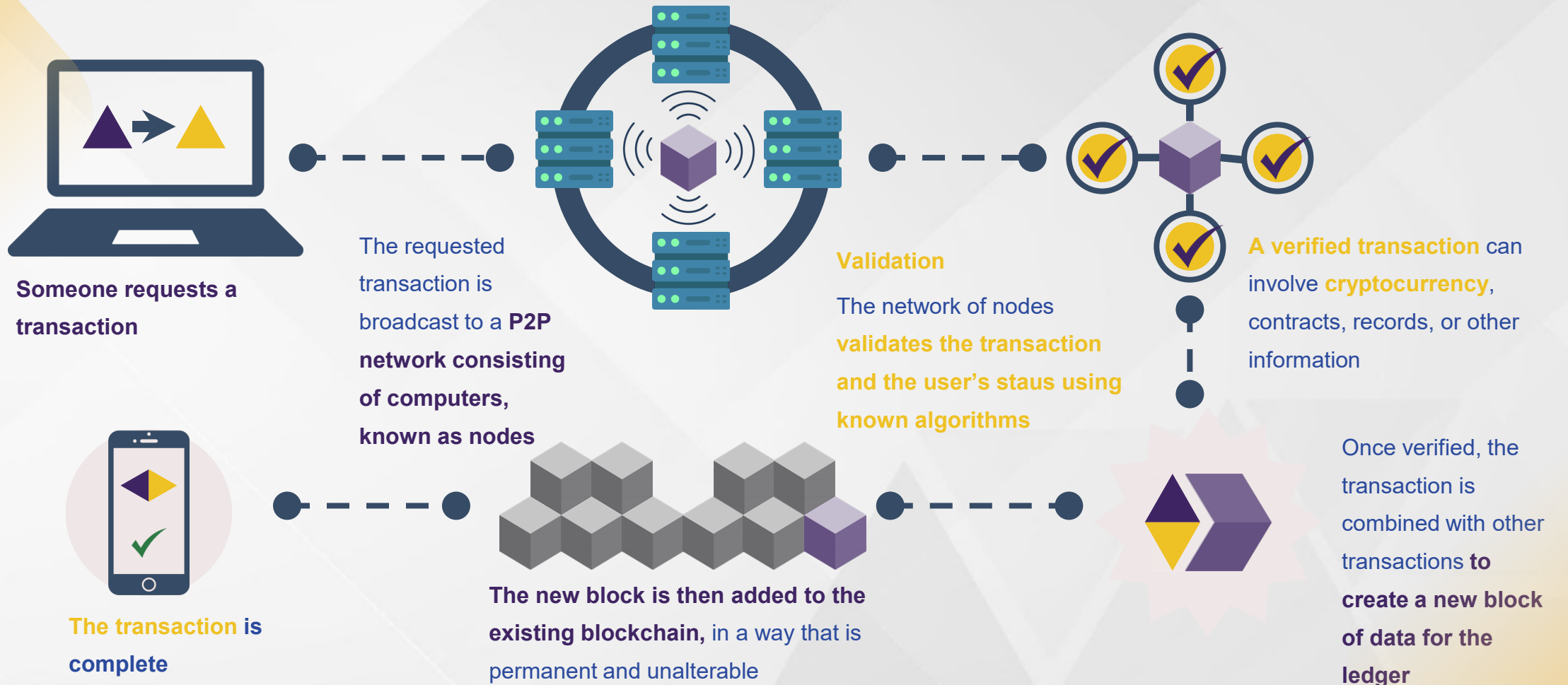
Common General Ledger



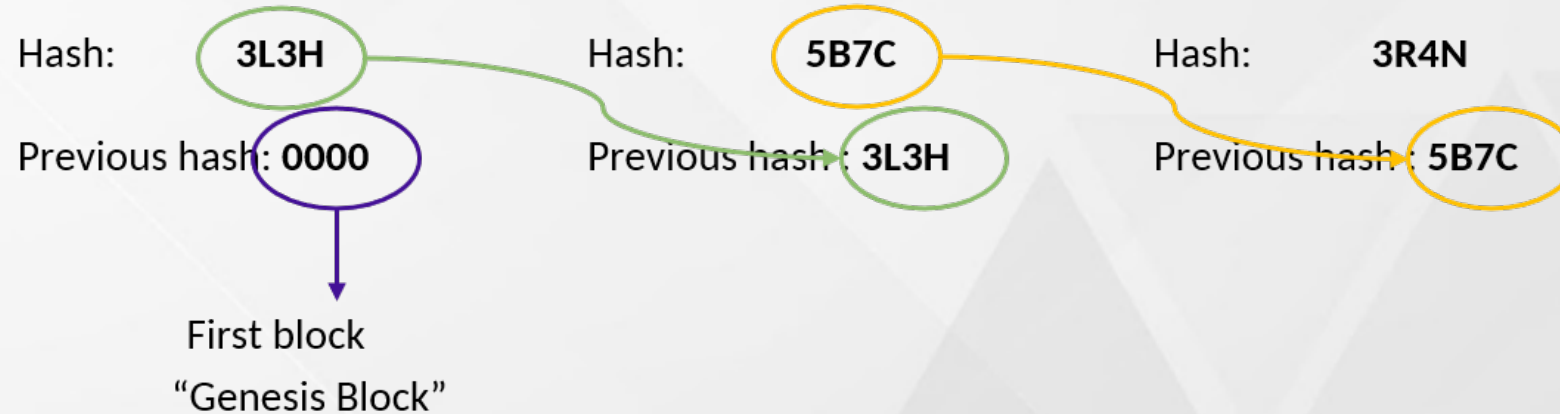
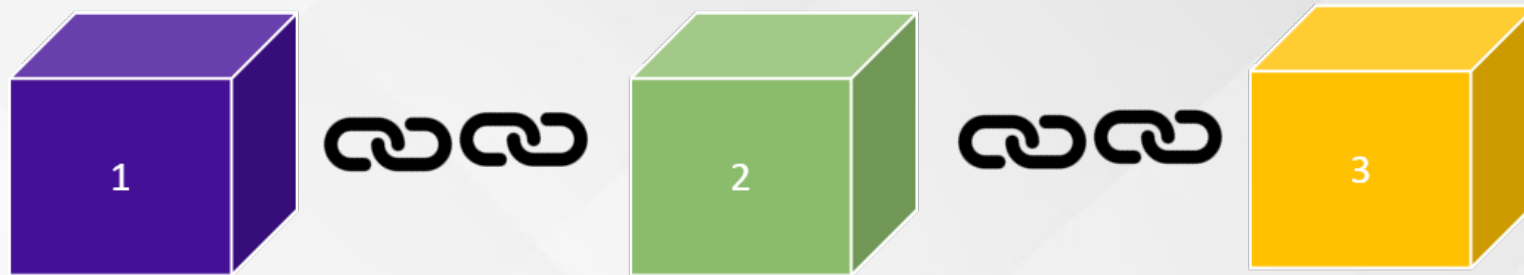
Distributed General Ledger



HOW DOES BLOCKCHAIN WORK?

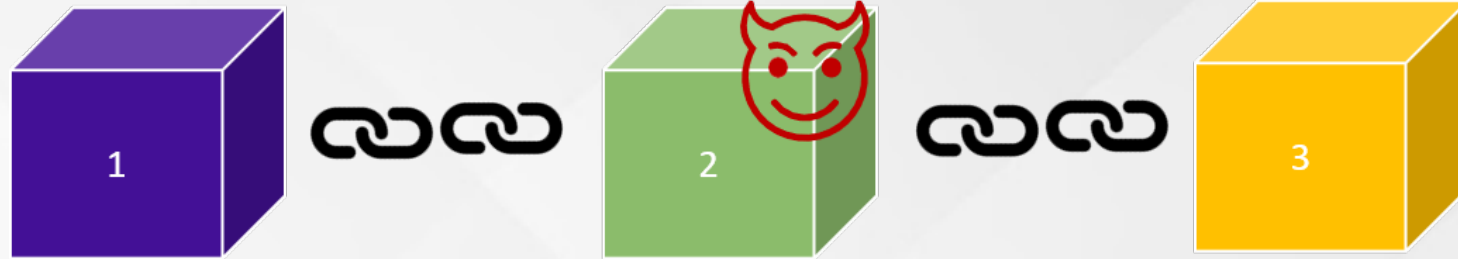


BLOCKCHAIN ILLUSTRATION





WHAT HAPPEN IF THE DATA IS ALTERED BY ONE PARTY?



Hash: 3L3H

Previous hash: 0000

Hash:



3R0R

Previous hash : 3L3H

Hash: 3R4N

Previous hash: 5B7C





3

Blockchain for Halal Traceability and Certification





Cattle Farm



Slaughterhouse



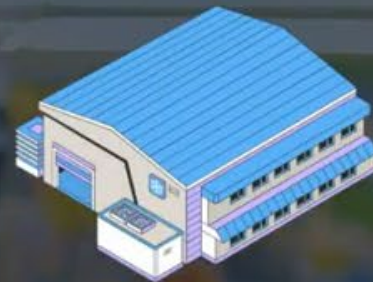
Wholesaler



Shipping Line



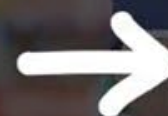
Cold Storage Truck



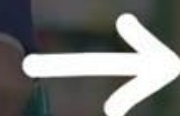
Raw Material Warehouse



Processing Industry



Finished Good Warehouse



Retailer



Customers



MANUFACTURER

Manufacturer transmits loads to suppliers, warehouse and 3PL providers.

3PL optimizes capacity and shipments in real-time as new loads are received.

3PL provider ships loads to carriers and provides visibility to all. Carrier provides shipment status at every stage to all.



- Certificate of Origin
- Batch Numbers
- Processing Data
- Barcodes
- Shipment Dates



- Packing List
- Order Number
- Batch Number
- Production Data
- Shipment Specification (DIMS)



- Bill of Lading
- Routing Instructions
- Shipment Date
- Commodity Description



- Delivery Signature
- Temperature
- Shipment Status



- Routing Instructions
- Pick Date
- Packaging Specifications
- Packaging Barcode



- Receive Date
- Invoice Number
- Customer ID
- Shipment Status
- Delivery Receipt

LOGISTICS BLOCKCHAIN CONSORTIUM



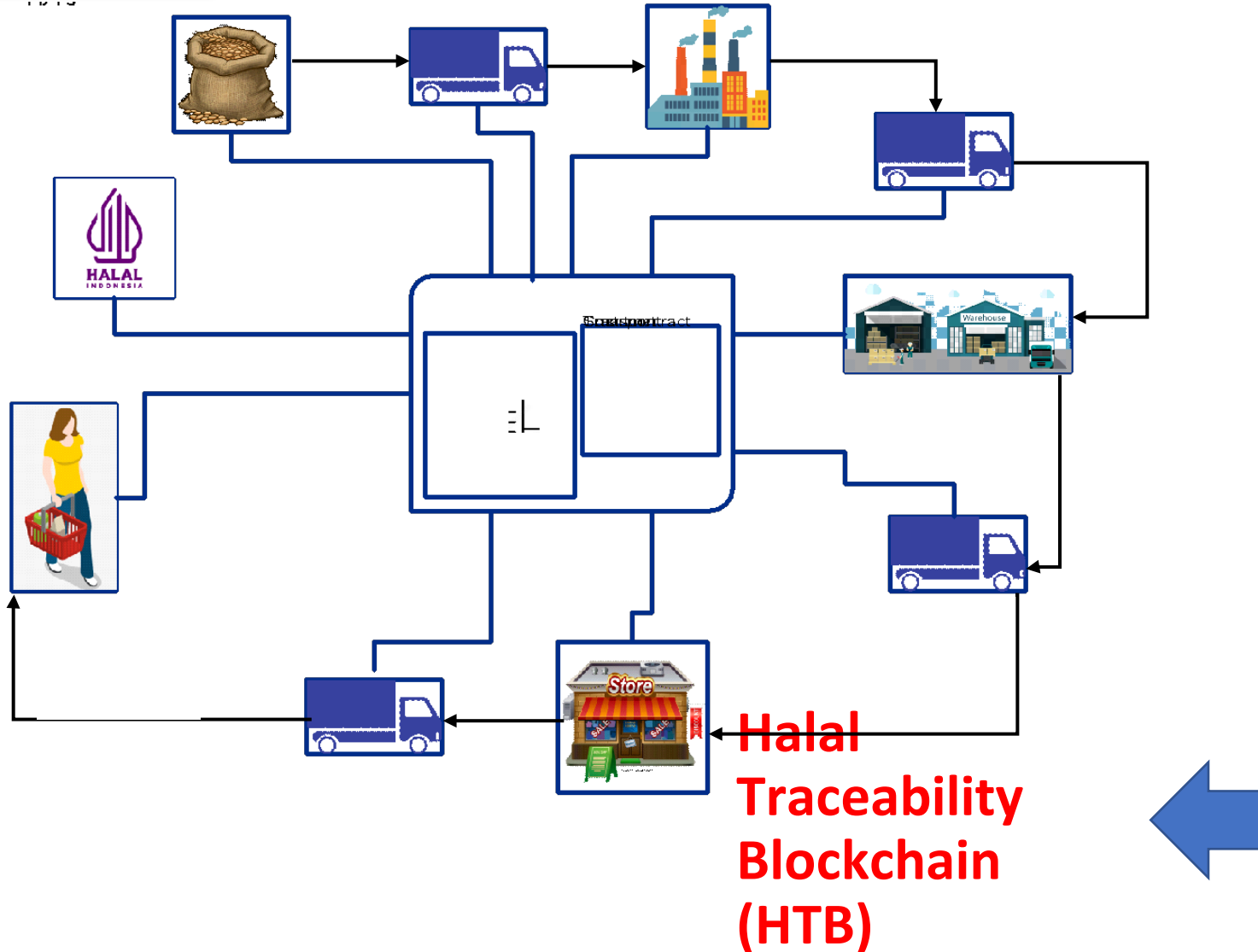
Identical encrypted distributed ledger via the Internet



Smart Contracts orchestrating shipment transaction flow based on codified parameters, process triggers and algorithms.



Implementation of Blockchain



Supply Chain Business Model with Blockchain

- Blockchain makes the system integrated. Every transaction from upstream to downstream is recorded properly with a trusted system
- Transaction records can be seen and must be validated (authenticated) by all peers (participants) so that it does not allow fraud to occur
- Reliable, Transparent and Traceable Information (3T) will help make it easier for auditors or consumers to track product halalness in all activities in the value chain

9 documents are stored on the blockchain



- 1 Sales & Purchase Contract
- 2 Health Certificate
- 3 Cargo Description
- 4 Inspection Certificate
- 5 Halal Certificate
- 6 COO (country of origin)
- 7 PL (Packing list)
- 8 Commercial Invoice
- 9 Inventory Report

An illustration depicting a global business transaction. Two men in suits are shaking hands in the center. The man on the right is holding a red folder. Behind them is a world map with various location pins and connecting lines. In the foreground, there is a blue truck with a red cab, and several stacks of brown cardboard boxes. The entire scene is set against a dark, muted background.

This ensuring transparency and security of processes from upstream to downstream



All data related to transactions and processes is also stored in the blockchain system





1

Ditelusuri dengan jelas
(trust)



2

Transparent

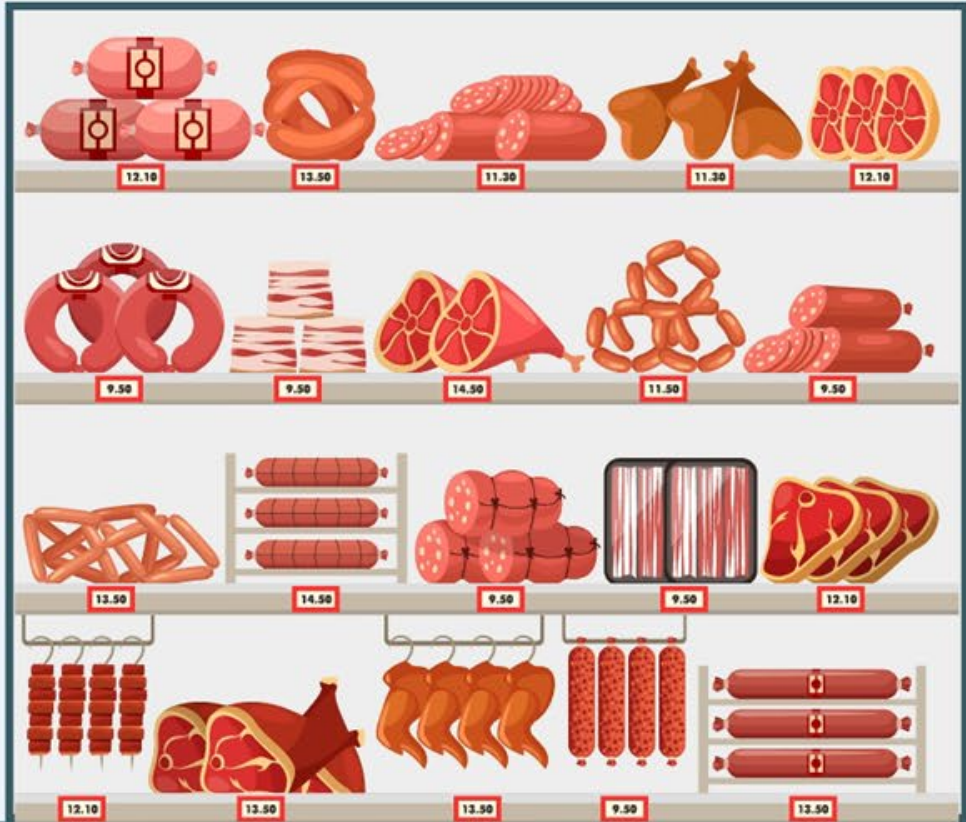


3

Terverifikasi
(traceable)



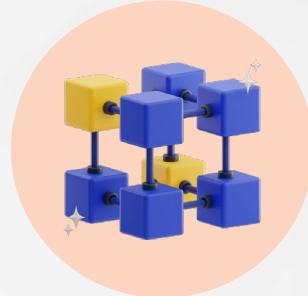
Each product is equipped with a QR code that can be scanned by consumers using a blockchain-based application.



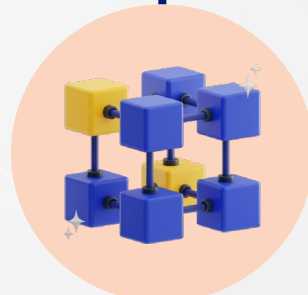
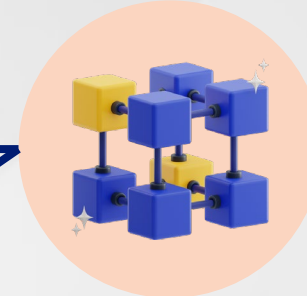


BLOCKCHAIN INTEROPERABILITY

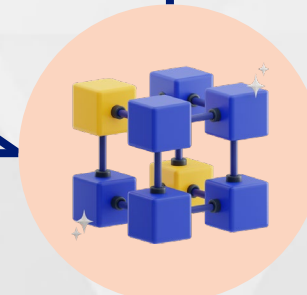
**Southeast Asia
Blockchain**



**Indonesia
Blockchain**



**World
Blockchain**



Other



Thank You

BRAIN IPB University Partners

