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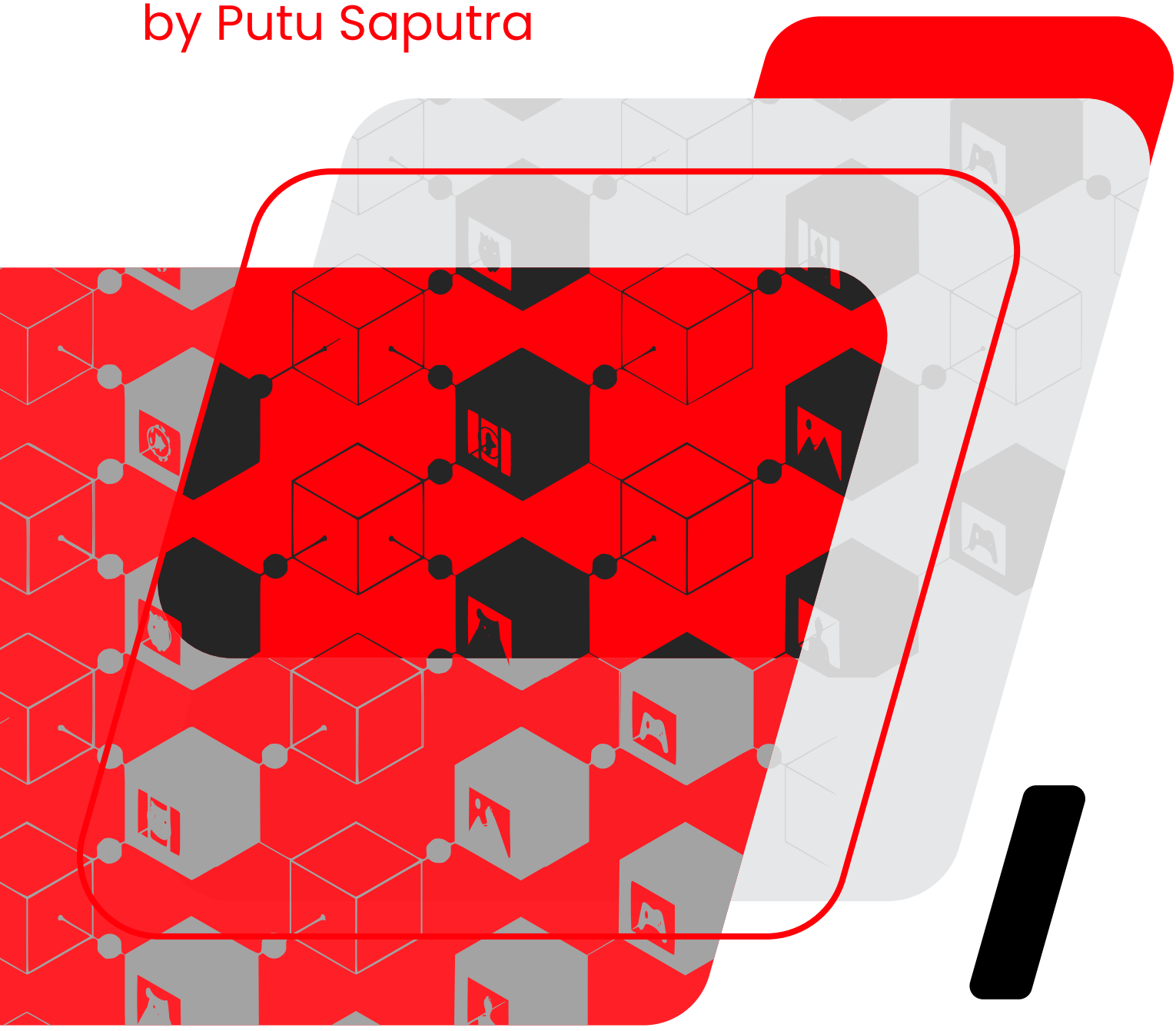
BLOCKCHAIN TECHNOLOGY

by Putu Saputra



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For Those Wanting to Learn More About Blockchain Technology

So, what exactly is blockchain technology? What about cryptocurrency assets?

How can this technology change the world?

To answer these questions, let's take a deeper look.

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- What is the Blockchain?
- Getting more familiar with the language
- Types of Blockchain Networks

Blockchain focus

Addressing the Need of People to Know Better About Blockchain Technology

What is Blockchain Technology and how does it work?

The world of the Blockchain is getting more and more popular in Indonesia and the higher the public's curiosity about the cryptocurrency world, the more the need to understand Blockchain technology.

The phenomenon that first began with the development of internet technology and was limited to the IT community is now increasingly in the public spotlight.

So, what exactly is Blockchain technology? What about cryptocurrency assets? How can this technology change the world? To answer these questions, let's have look at some of the basics.

The invention of the Blockchain

We're told that the Blockchain was invented by Satoshi Nakamoto (the pseudonym of an unknown person or persons) in 2008 "to serve as the public transaction ledger of the cryptocurrency Bitcoin, which made it the first digital currency to solve the double-spending problem without the need of a trusted authority or central server."

While the Blockchain is still largely confined to use in recording and storing transactions for cryptocurrencies such as Bitcoin, proponents of the technology are also developing and testing other uses for the Blockchain.

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Getting more familiar with **Blockchain Technology**

Everything will be tokenized and connected by a Blockchain one day
- Fred Ehrsam

The Blockchain is a technology that is used as a digital storage system or data bank that is connected with cryptography. Its use is inseparable from Bitcoin and other cryptocurrencies.

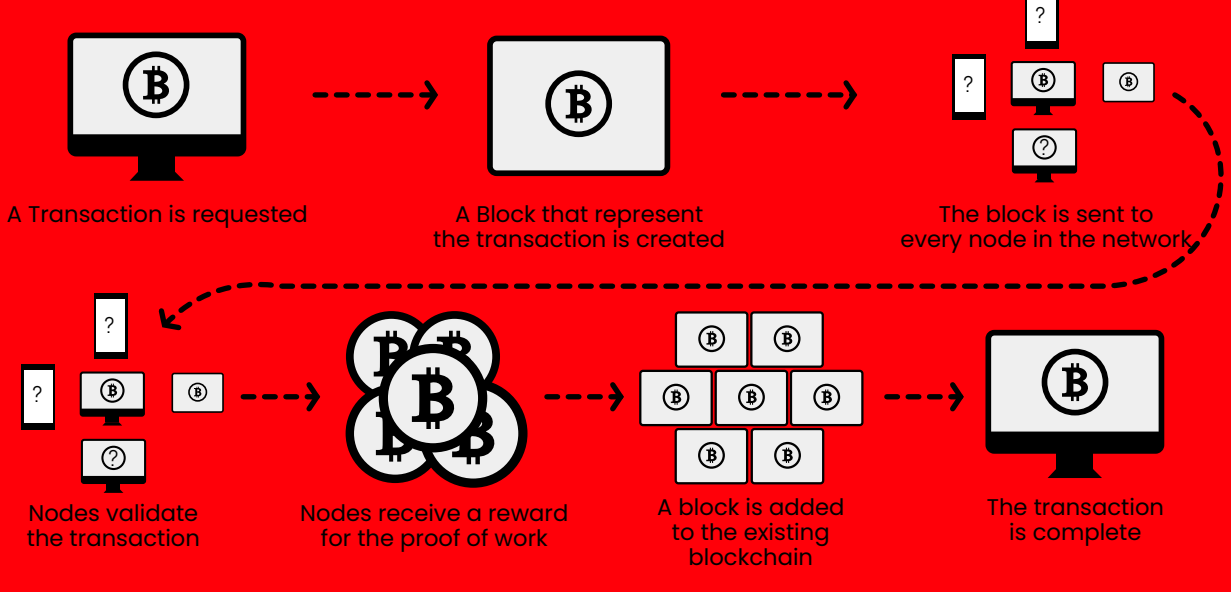
Even so, there are many other sectors that can take advantage of technological developments from this Blockchain, but first let's take a look at what the word 'Blockchain' actually means.

One of the meanings of the word 'block' is 'a quantity, number, or section of things dealt with as a unit' and 'chain' means 'a series of things linked, connected, or associated together.'

This should help us to understand why calling this technology Blockchain actually reflects how it works. Where, the technology utilizes computer resources to create connected blocks of related data.

These connected blocks are later used to execute a transaction. This technology is quite interesting because it is not centralized. The Blockchain is able to run by itself using computer algorithms without any particular system to regulate it. The technology is an advanced database mechanism that allows transparent sharing of information in business networks.

Blockchain databases store data in blocks that are linked together in a chain. Data is chronologically consistent because you cannot delete or change chains without consensus from the network. As a result, you can use Blockchain technology to create an immutable or fixed ledger to track orders, payments, accounts and other transactions. The system has a built-in mechanism to prevent unauthorized transaction entries and creates consistency in the shared view of these transactions.



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Difference between the Blockchain and Cryptocurrencies

They are different, but related, because 'crypto' is a digital currency and Blockchain is the technology and digital data storage related to cryptocurrency transactions. In short, a cryptocurrency is a digital currency system that is secured using cryptography, which means the currency cannot be counterfeited, while the Blockchain technology means databases cannot be changed or modified. In essence, the Blockchain is a technology used to safely store digital data connected to cryptography.

Main Blockchain Features

Blockchain Technology has the following main features:

Decentralization

Decentralization in the Blockchain refers to transfer control and decision making from a centralized entity (individual, organization, or group) to a distributed network.

The decentralized Blockchain network uses transparency to reduce the need for trust between participants. This network also prevents participants from exercising each other's authority or control in a way that could degrade network functionality.

Immutability

Immutability means something that cannot be changed or exchanged. No participant can tamper with transactions once they are recorded to the shared ledger. If the transaction log contains errors, you must add a new transaction to reverse the error, and both transactions are visible to the network.

Consensus

The Blockchain system establishes rules regarding participant consent to record transactions. You can record new transactions only if the majority of participants in the network give their consent.

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Types of Blockchain Networks

Type of Blockchain Network :

1. Public Blockchain Network
2. Private Blockchan Network
3. Hybrid Blockchain Network
4. Consortium Blockchain Network

Public Blockchain networks

The Public Blockchain does not require permission to use and allows anyone to join. All Blockchain members have equal rights to read, edit and validate the Blockchain. People generally use public Blockchains to exchange and mine cryptocurrencies like Bitcoin, Ethereum, and Litecoin.

Private Blockchain networks

One organization controls a Private Blockchain, which is also called a Managed Blockchain. An authority determines who can be a member and what rights they have in the network. Private Blockchains are only partially decentralized because they have access restrictions. Ripple, a digital currency exchange network for businesses, is an example of a Private Blockchain.

Hybrid Blockchain networks

Hybrid Blockchains combine elements of private and public networks. Companies can set up private permission-based systems along with public systems. In this way, they can control access to certain data stored on the blockchain while keeping other data public. The company uses smart contracts that allow public members to check if a private transaction has been completed. For example, a Hybrid Blockchain can provide public access to digital currencies while keeping bank currencies private.

Consortium Blockchain networks

A group of organizations can set up a Consortium Blockchain network. Pre-selected organizations share responsibility for maintaining the Blockchain and determining data access rights. Industries where many organizations share common goals and benefit from shared responsibilities often prefer Consortium Blockchain networks. For example, the Global Shipping Business Network Consortium is a non-profit Blockchain consortium that aims to digitize the shipping industry and enhance collaboration between maritime industry operators.

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Blockchain Protocol

The term Blockchain Protocol refers to the various types of Blockchain platforms available for application development. Each Blockchain Protocol adapts the basic principles of the Blockchain to suit a specific industry or application. Some examples of Blockchain Protocols include:

Hyperledger Fabric

Hyperledger Fabric is an open-source project with a set of tools and libraries. Corporations can use it to quickly and effectively build Private Blockchain applications. Hyperledger Fabric is a modular general-purpose framework that offers unique identity management and access control features. These features make it suitable for a wide range of applications, such as supply chain tracking and tracing, trade finance, loyalty and reward programmes, and clearing settlement of financial assets.

Ethereum

Ethereum is a decentralized open-source Blockchain platform that people can use to build Public Blockchain applications. Ethereum Enterprise is designed for business use cases.

Corda

Corda is an open-source Blockchain project designed for businesses. With Corda, you can build an interoperable Blockchain network to transact with strict privacy. Businesses can use Corda's smart contract technology to transact instantly, with value. Most of its users are financial institutions.

Quorum

Quorum is an open-source Blockchain protocol derived from Ethereum. Quorum is specifically designed for use in Private Blockchain networks, where only one member owns all nodes, or in Consortium Blockchain networks, where several members each own a portion of the network.

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Blockchain further....

According to 'Blockchain for Dummies,' the Blockchain owes its name to the way it stores transaction data; in blocks linked together to form a chain. As the number of transactions grows, so does the Blockchain. Blocks record and confirm the time and sequence of transactions, which are then logged into the Blockchain, within a discrete network governed by rules agreed to by the network participants.

Each block contains a hash (a digital fingerprint or unique identifier), timestamped batches of recent valid transactions, and the hash of the previous block. The previous block hash links the blocks together and prevents any block from being altered or a block being inserted between two existing blocks." In theory, the method renders the Blockchain tamperproof.

The four key concepts behind blockchain are:

Shared Ledger

A Shared Ledger is an "append-only" distributed system of record, shared across a business network. "With a shared ledger, transactions are recorded only once, eliminating the duplication of effort that's typical of traditional business networks."

Permissions

Permissions ensure that transactions are secure, authenticated, and verifiable. "With the ability to constrain network participation, organizations can more easily comply with data protection regulations, such as those stipulated in the Health Insurance Portability and Accountability Act (HIPAA)" and the EU General Data Protection Regulation (GDPR).

Smart Contracts

A Smart Contract is "an agreement or set of rules that govern a business transaction; it's stored on the Blockchain and is executed automatically as part of a transaction."

Consensus

Through Consensus, all parties agree to the network-verified transaction. Blockchains have various consensus mechanisms, including proof of stake, multisignature, and PBFT (practical Byzantine fault tolerance).

Each Blockchain network has various participants who play certain roles. These include:

Blockchain Users

Participants (typically business users) with permission to join a Blockchain network and conduct transactions with other network participants.

Regulators

Blockchain users with special permissions to oversee the transactions happening within the network.

Blockchain Network Operators

Individuals who have special permissions and authority to define, create, manage, and monitor the blockchain network.

Certificate Authorities

Individuals who issue and manage the different types of certificates required to run a permissioned blockchain.

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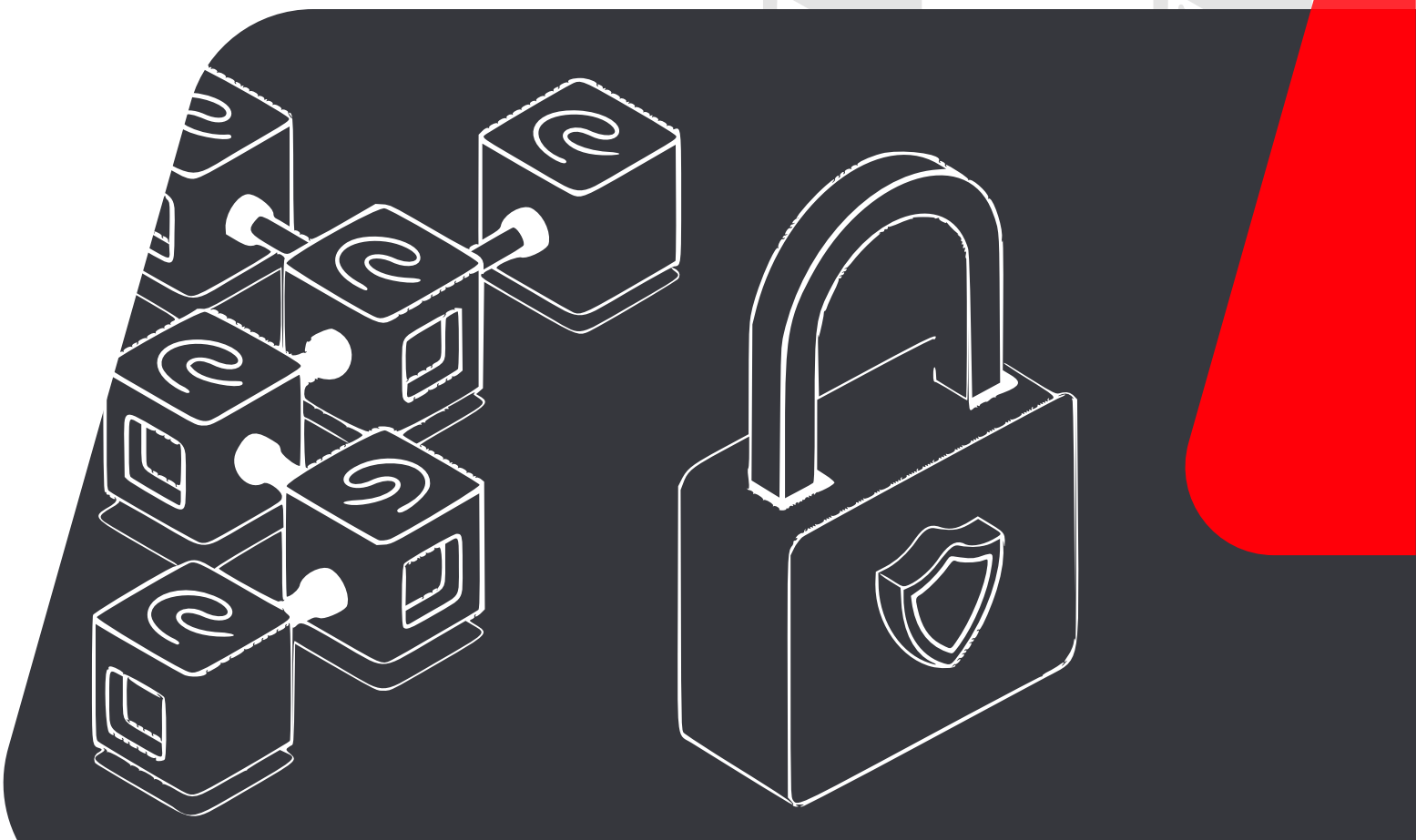
Blockchain Security

A private Blockchain consists of a permissioned network in which consensus can be achieved through a process called 'selective endorsement,' where known users verify the transactions. The advantage of this for businesses is that only participants with the appropriate access and permissions can maintain the transaction ledger. There are still a few issues with this method, including threats from insiders, but many of them can be solved with a highly secure infrastructure."

Blockchain technologies are growing at an unprecedented rate and powering new concepts for everything from shared storage to social networks. From a security perspective, we are breaking new ground. As developers create Blockchain applications, they should give precedent to securing their Blockchain applications and services. Activities such as performing risk assessments, creating threat models, and doing code analysis, such as static code analysis, interactive application security testing, and software composition analysis, should all be on a developer's Blockchain application roadmap. Building security in from the start is critical to ensuring a successful and secure blockchain application.

Everything will be tokenized and connected by a Blockchain one day

– Fred Ehrsam



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Main Components of The Blockchain

Distributed Ledger

A Distributed Ledger is a shared database on a Blockchain network that stores transactions, such as shared files that can be edited by everyone on the team. In most shared text editors, any party with editing rights can delete the entire file. However, distributed ledger technology has strict rules regarding who can edit and how to edit. You cannot delete an entry once it is logged, for example.

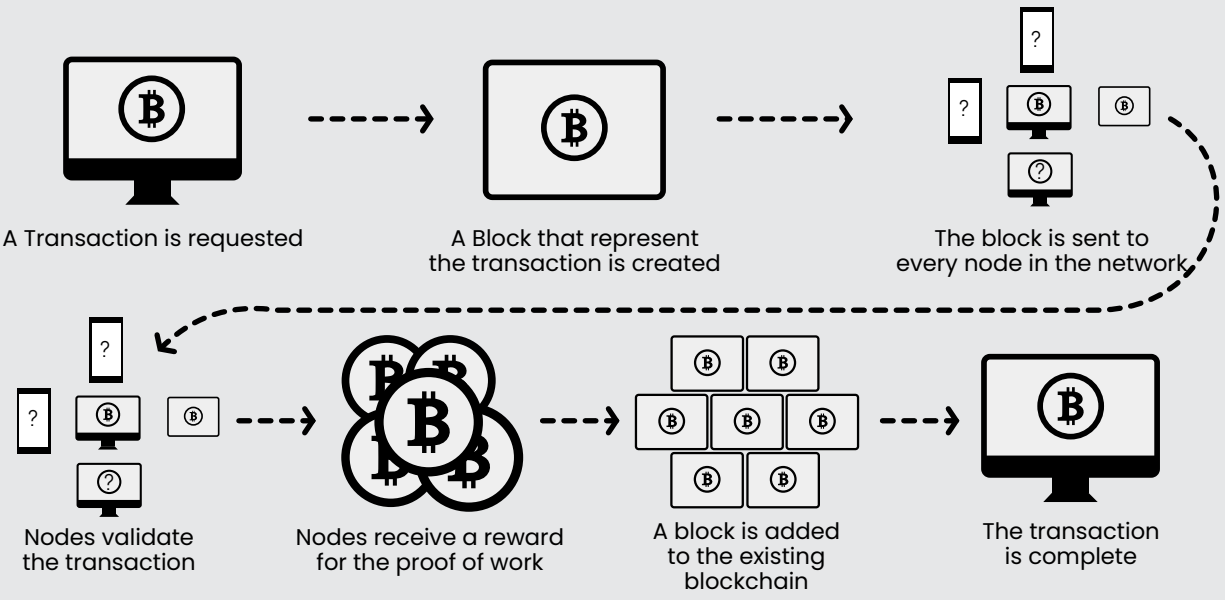
Smart Contracts

Companies use Smart Contracts to manage business contracts independently without the need for third party assistance. Smart Contracts are programmes stored in the Blockchain system that run automatically when pre-defined conditions are met. Smart Contracts perform "if-then" checks so transactions can be completed. For example, a logistics company could have a Smart Contract that makes payments automatically once the goods arrive at the port.

Public Key Cryptography

Public Key Cryptography is a security feature to uniquely identify participants in a Blockchain network. This mechanism generates two sets of keys for network members; one key is a public key that is common to everyone on the network, while the other key is a private key that is unique to each member. The private and public keys work together to unlock the data in the ledger.

For example, Julia and Terje are two members of the network. Julia records transactions encrypted with her private key. Terje can decrypt it with his public key. In this way, Terje was sure that Julia had made a deal. Terje's public key will not work if Julia's private key has been tampered with.



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