Title:

Write a survey report on types of Blockchain and its real time Use Cases

Introduction

Blockchain technology has evolved significantly since its inception in 2008 as the backbone of Bitcoin. Initially, it was envisioned as a decentralized, immutable ledger for cryptocurrency transactions. However, the technology has expanded into various industries, revolutionizing how transactions, data, and assets are handled securely and transparently. This report provides a comprehensive survey of the types of blockchains and their real-time use cases.

Types of Blockchains

Blockchains can be categorized into three primary types:

1. **Public Blockchains**
2. **Private Blockchains**
3. **Consortium (Federated) Blockchains**

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1. Public Blockchains

Definition:

Public blockchains are decentralized, permissionless networks where anyone can participate. These blockchains are entirely transparent, and the data is visible to all participants. Public blockchains are secured through consensus mechanisms like Proof of Work (PoW) or Proof of Stake (PoS).

Key Features:

- **Decentralized**: No central authority controls the network.
- **Transparency**: All transactions are visible to the public.
- **Immutability**: Once recorded, transactions cannot be altered.

Real-Time Use Cases:

- **Cryptocurrency**: Bitcoin, Ethereum, and other cryptocurrencies operate on public blockchains, allowing for peer-to-peer transactions without intermediaries.
- **Smart Contracts**: Ethereum enables self-executing contracts, eliminating the need for trusted third parties in various industries, including finance, insurance, and real estate.
- **Decentralized Finance (DeFi)**: Public blockchains power DeFi platforms, offering financial services such as lending, borrowing, and trading without intermediaries.

Example:

- **Bitcoin**: The first public blockchain, enabling secure, decentralized financial transactions.
- **Ethereum**: A blockchain that allows developers to build decentralized applications (DApps) and execute smart contracts.

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2. Private Blockchains

Definition:

Private blockchains are permissioned networks, meaning access is restricted to certain users. Unlike public blockchains, private blockchains are managed by a centralized entity that controls who can participate and validates the transactions.

Key Features:

- **Controlled Access**: Only authorized participants can join and validate transactions.
- **Faster Transactions**: Fewer participants lead to quicker validation times.
- **Privacy**: Data is accessible only to permitted participants.

Real-Time Use Cases:

- **Supply Chain Management**: Companies like Walmart use private blockchains to track the origin and movement of goods, ensuring product authenticity and improving transparency.
- **Healthcare**: Private blockchains are used to store and share sensitive patient information securely among authorized parties, improving data privacy and reducing fraud.
- **Financial Services**: Banks and financial institutions use private blockchains for faster cross-border transactions and to improve transaction transparency within their internal operations.

Example:

- **Hyperledger Fabric**: A private blockchain framework for building enterprise-grade applications, focusing on modularity and privacy.
- **Corda**: A blockchain platform designed for businesses, allowing them to transact directly and privately.

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3. Consortium (Federated) Blockchains

Definition:

Consortium blockchains are partially decentralized networks controlled by a group of organizations rather than a single entity. They offer a balance between decentralization and

centralized control, providing more privacy than public blockchains and more transparency than private ones.

Key Features:

- **Shared Control**: Multiple organizations govern the network.
- **Selective Transparency**: Some data is shared publicly, while sensitive information remains confidential.
- **Interoperability**: Designed to enable collaboration among different entities while maintaining a level of autonomy.

Real-Time Use Cases:

- **Banking and Finance**: Consortium blockchains are used for interbank settlements and trade finance. The reduced number of validators ensures higher throughput without sacrificing trust.
- **Energy**: In the energy sector, consortium blockchains manage the distribution of renewable energy between suppliers and consumers, improving transparency and efficiency.
- **Trade and Logistics**: Consortium blockchains streamline document verification and compliance checks, reducing delays in global trade.

Example:

- **R3 Corda**: A popular consortium blockchain used by financial institutions for secure and efficient transactions.
- **Energy Web Chain**: A blockchain network developed by energy sector companies to create a decentralized energy grid.

Comparative Analysis

Feature	Public Blockchain	Private Blockchain	Consortium Blockchain
Governance	Decentralized	Centralized	Partially Decentralized
Permission	Permissionless	Permissioned	Permissioned
Transparency	Fully Transparent	Controlled Transparency	Selective Transparency
Security	Highly Secure	Secure	Moderately Secure
Speed	Slower (due to PoW/PoS)	Faster (Few Validators)	Moderate (Few Validators)
Use Cases	Cryptocurrencies, DApps	Supply Chain, Finance	Finance, Energy, Trade

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Conclusion

Blockchain technology offers various architectures—public, private, and consortium—each serving distinct use cases based on the level of transparency, security, and control required. Public blockchains provide a decentralized solution for open, permissionless networks, best suited for cryptocurrency and DeFi. Private blockchains enable enterprises to improve security, efficiency, and transparency within closed networks, making them ideal for supply chain management and healthcare. Consortium blockchains balance transparency and privacy and are used in sectors like banking, energy, and trade logistics.

As blockchain technology matures, we expect increased adoption across industries, with more hybrid models combining the advantages of different blockchain types.

References

- Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System.
- Hyperledger Fabric (2016). The Linux Foundation.
- R3 Corda (2021). Blockchain for Business.