

Overview of Distributed Ledger Technology

Knobbe Japan Practice Series

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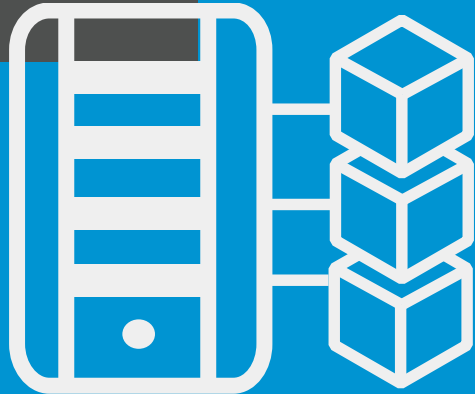
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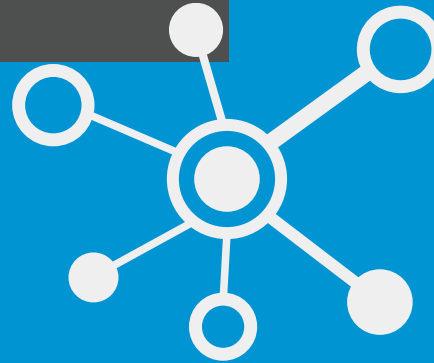
Technical Description 技術説明

Distributed Ledger Technology (DLT) 分散型台帳技術

IMMUTABILITY



DECENTRALIZED
STORAGE



ELIMINATION OF
TRUSTED THIRD
PARTIES



- Immutability 不変性
 - DLT-based systems can be characterized in that transaction data is recorded and it will be maintained in a manner that does not allow for the modification of the transaction.
 - This makes the transaction data, once accepted by the DLT based system, immutable (e.g., not capable or susceptible to change).
 - DLT based systems can be distinguished from other technologies, such as a distributed database, in which data maintained may be subject to change or require additional verification that the data has not been changed.

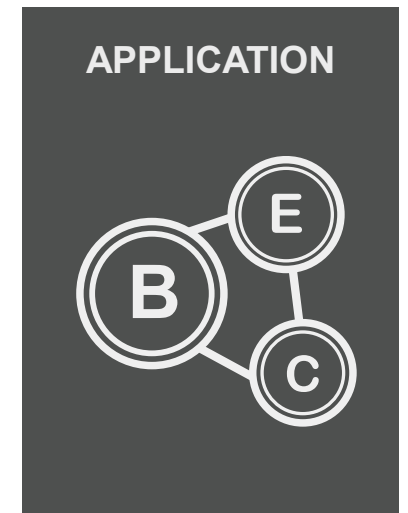
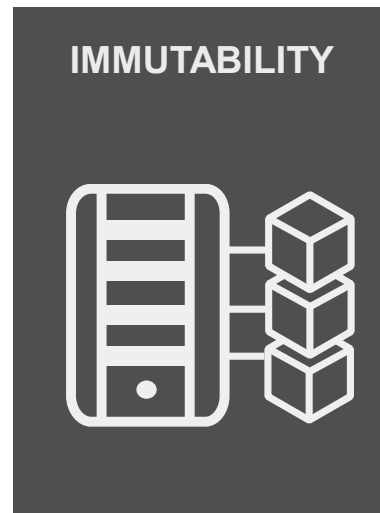
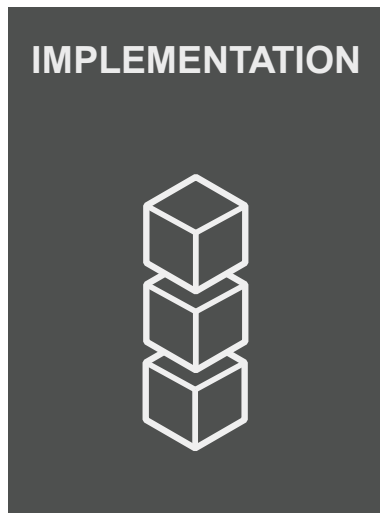
- Decentralized storage 分散型ストレージ
 - DLT based systems can be further characterized in not having any form of centralized data storage or administrative functionality.
 - Transaction data will be replicated and maintained by multiple computing systems/devices utilizing some form of consensus algorithm.
 - DLT based systems can be distinguished from other distributed technologies, such as embodiments of a distributed database, in which a distributed database requires form of centralized data source (e.g., a designated origin source) and central administration for controlling the distribution of the distributed data and reconciliation of differences in data.

- Elimination of trusted third parties 信頼する第三者の排除
 - DLT based system can be further characterized in that the various components that are configured to function may be outside of the control of any single entity or organization.
 - The DLT based system components may be considered to be provided by, or associated with, third party systems such that no individual component can be trusted.
 - DLT based systems can be distinguished from other distributed technologies, such as embodiments of a distributed database, in which such systems are of a closed nature to allow a single entity/organization to maintain control.

Public Block Chain (DLT) 公衆ブロックチェーン

General Principles

- Public Blockchain corresponds to a subset of DLT-based systems for receiving, maintaining, and providing transaction data defined in the utilization of a sequence of “blocks” as the technical mechanism for maintaining transaction data.
- An individual block is configured to be of a sufficient size to maintain a set of transaction data and associated metadata describing the transaction (e.g., thousands of individual pieces of transaction data).
- Although not required, a Public Blockchain system is often defined in that transaction data within any individual block can be unrelated and may be associated from different entities.

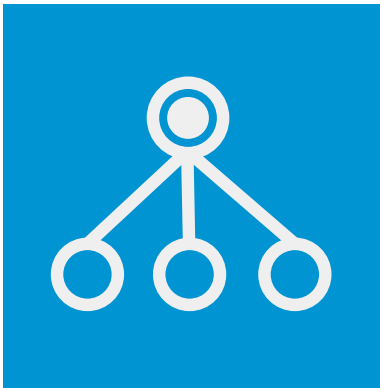


Directed Acyclic Graphs (DAG) 有向非巡回グラフ

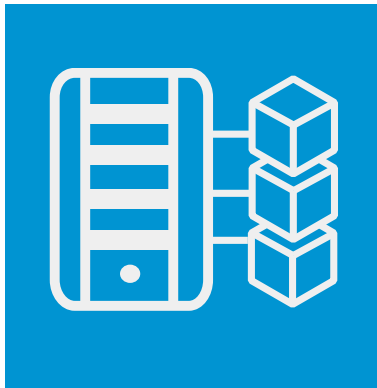
General Principles

- DAG corresponds to a subset of DLT-based systems for receiving, maintaining, and providing transaction data defined in the utilization of a sequence of “nodes” as the technical mechanism for maintaining transaction data.
- An individual node is configured to be of a sufficient size to maintain a single piece of transaction data and associated metadata describing the transaction. The transaction data may be generally available to general public, depending on the specific policies of the DAG system.

IMPLEMENTATION



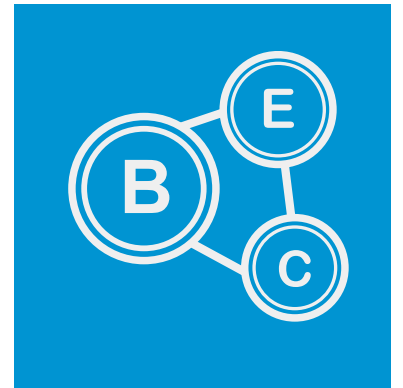
IMMUTABILITY



INTERFACES



APPLICATION



Mining Layer 発掘層

- Algorithms/techniques for addressing immutability

Propagation Layer 伝播層

- Algorithms/techniques for receipt and distribution of transaction data between nodes

Semantic Layer セマンティック層

- Algorithms/techniques for implementing consensus between “nodes” for distribution of transaction data or generating results

Application Layer アプリケーション層

- Deploying applications or systems that utilized the DLT transaction data (e.g., smart contracts, digital currencies, exchanges, etc.)

Applications アプリケーション

Transaction data relates to transactions involving a digital asset (e.g., coin)

- Transaction data is maintained by the DLT in an immutable and distributed manner
- Transaction data is associated with a digital signature of the current “owner” of the coin including the owner’s private key
- Transaction data is generally publicly available using public key

Application interface

- Maintain encryption keys
- Provide transaction data for addition to the DLT and replication
- Provide request for previously stored transaction data in the DLT
- Requires some form of compensation (e.g., wallet) for interface actions

Transaction data includes executable code that is maintained in a DLT

- Executable code is maintained by the DLT in an immutable and distributed manner
- Request to execute contract will be executed by a “winning node” and validated by the other distributed nodes
- Executable code can perform various information gathering or information processing actions to generate the results

Application interface

- Provide terms or code to DLT miners for addition to the DLT and replication
- Provide request for execution of the code (e.g., run the smart contract) and receive the consensus result from the DLT
- Requires some form of compensation (e.g., wallet) for interface actions

Non-Fungible Tokens (NFT) ノンファンジブル トークン

Transaction data includes digital assets that are maintained in a DLT

- Digital assets and associated transaction data are maintained by the DLT in an immutable and distributed manner
- Immutable nature of the digital asset (e.g., image, video) create the value proposition of the NFT
- Transaction data creates ownership chain

Application interface

- Provide transaction data for addition to the DLT and replication
- Provide request for previously stored transaction data in the DLT
- Requires some form of compensation (e.g., wallet) for interface actions

Ownership vs. Copyright

- NFT is directed to uniqueness of digital asset and ownership history/chain
- Copyright issues still remain related to distribution, publication and replication

Patentable Inventions – DLT 特許可能発明

High energy consumption 大消費電力

Scalability スケーラビリティ

- Metered block creation 従量制ブロックの生成
- Block validation ブロックの検証

Security 機密性

- Majority consensus attacks 大多数コンセンサス攻撃
- Orphan chains 孤立したチェーン
- Data privacy データプライバシー

Broken Links 壊れたリンク

Trademark and Copyright – DLT 商標と著作権

- Cryptocurrency names can cause consumer confusion and potentially infringe trademark rights 仮想通貨という名前による消費車の混乱と商標権侵害の可能性
- Even if a party prevails in a trademark infringement suit, anonymity can make it more difficult to enforce such rights 商標権侵害訴訟で買った場合でも匿名性が権利行使をより困難になる
- Purchase of an NFT does not necessarily include a transfer of the underlying copyright NFCの購入は背景となる著作権の移転を含むとは限らない

USPTO Updates 米国特許商標庁の現状

DLT Examination is Evolving DLT審査の進化

- Majority of DLT applications being routed to Art Units 3685 or 2434
多くのDLT出願の審査部門は3685か22434
- Historically, USPTO has treated DLT applications as being directed to finance/business methods 歴史的に、財務・ビジネスモデルとして取り扱われていた
- Now, turnover in examiners being assigned to blockchain and cryptocurrency art units
現状は、ブロックチェーンや仮想通貨の審査部門
 - Examiners more likely to have a background in DLT technology 審査官はDLT技術を知っている人がより多くなった
 - Examiners with a background in finance/business methods are transferring to different art units 財務・ビジネスモデルを知る審査官は他の部門に異動

Thank you!