Chapter 6
Blockchain Applications and DiFi Foundations

6.1 Applications of Blockchain in Healthcare

Blockchain technology has a lot of potential applications in the healthcare industry. Here are some use cases in which blockchain can be used in healthcare:

1. **Health Records Management**:
    - **Electronic Health Records (EHRs)**: Blockchain can securely store and manage patients' EHRs, ensuring data integrity and access control. Patients have more control over their data, and healthcare providers can access up-to-date, accurate information.
    - **Interoperability**: Blockchain can facilitate interoperability by providing a standardized format for health data exchange, making it easier for different healthcare providers and systems to share information.
2. **Patient Identity Management**:
    - **Unique Patient Identification**: Blockchain can provide a robust and secure way to create and manage unique patient identities, reducing errors and ensuring data accuracy.
3. **Clinical Trials and Research**:
    - **Data Integrity**: Blockchain can help ensure the integrity and transparency of data collected in clinical trials and research studies, reducing the risk of data tampering and fraud.
    - **Data Sharing**: Researchers and organizations can securely share data with each other, enabling collaboration while protecting sensitive information.
4. **Drug Traceability**:
    - **Supply Chain Management**: Blockchain can be used to track the production, distribution, and authentication of pharmaceuticals. This can help combat counterfeit drugs and ensure the safety of patients.
5. **Prescription Management**:
    - **e-Prescriptions**: Blockchain can be used to securely transmit and manage electronic prescriptions, reducing the risk of prescription fraud and errors.
6. **Telemedicine and Telehealth**:
    - **Remote Patient Monitoring**: Blockchain can securely collect and transmit patient data from remote monitoring devices to healthcare providers, ensuring data privacy and integrity.
7. **Healthcare Payments and Insurance**:
    - **Claims Processing**: Blockchain can streamline claims processing by providing a transparent and immutable ledger, reducing fraud and administrative costs.
    - **Smart Contracts**: Smart contracts can automate payment processes and ensure that services are delivered before payment is released.
8. **Consent Management**:
    - **Patient Consent**: Blockchain can track and manage patient consent for data sharing, ensuring that patients have control over how their data is used.
9. **Healthcare Research Marketplace**:
    - **Data Marketplaces**: Blockchain can enable patients to sell or grant access to their health data for research purposes, allowing them to benefit from sharing their information.

10. **Public Health Surveillance**:
    - **Disease Tracking**: Blockchain can assist in real-time tracking of disease outbreaks by securely collecting and sharing data across healthcare providers and public health agencies.
11. **Credential Verification**:
    - **Provider Credentials**: Blockchain can store and verify the credentials of healthcare professionals, making it easier to verify their qualifications.
12. **Data Security and Privacy**:
    - **Patient-Controlled Data**: Patients can control who accesses their data and for what purpose, enhancing data privacy and security.

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6.2 Applications of Blockchain in Automotive Industry

Blockchain technology has the potential to bring significant benefits to the automotive industry by enhancing transparency, security, and efficiency in various aspects of the business. Here are some key applications of blockchain in the automotive sector:

1. **Supply Chain Management**:
    - **Parts Traceability**: Blockchain can be used to track the production and distribution of automotive components and parts, ensuring their authenticity and origin. This helps in reducing counterfeit parts and enhancing overall supply chain transparency.
    - **Maintenance and Service Parts**: Maintenance records and service history for vehicles can be stored on a blockchain, making it easier to verify the authenticity and quality of replacement parts.
2. **Vehicle Identity and History**:
    - **Immutable Records**: Vehicle histories, including accident reports, maintenance records, and ownership transfers, can be securely and immutably stored on a blockchain. This makes it easier for buyers to verify a vehicle's history and condition.
    - **Anti-Theft**: Blockchain can be used to create a tamper-proof record of vehicle ownership, reducing the risk of car theft and the sale of stolen vehicles.
3. **Automotive IoT and Telematics**:
    - **Data Security**: IoT devices in vehicles can generate a wealth of data. Blockchain can secure and manage this data, providing a transparent and secure way to store and share vehicle telemetry data.
    - **Smart Contracts**: Smart contracts can automate insurance claims, maintenance scheduling, and payments based on real-time data from IoT devices.
4. **Digital Identity and Access Control**:
    - **Vehicle Access**: Blockchain-based digital identities can grant and control access to vehicles, enhancing security and enabling secure car-sharing services.
    - **User Profiles**: Users can have secure digital profiles containing their driving history and preferences, making vehicle customization and access management more efficient.
5. **Connected and Autonomous Vehicles**:
    - **Data Sharing**: Blockchain can enable secure and decentralized data sharing among connected and autonomous vehicles for improved safety and traffic management.

6. **Ownership and Leasing**:
    - **Lease Agreements**: Smart contracts can facilitate leasing and rental agreements, automatically executing payments and handling contracts, which can reduce administrative overhead.
7. **Car Insurance**:
    - **Usage-Based Insurance**: Blockchain can facilitate usage-based insurance by securely recording driving data and automating premium calculations.
    - **Claims Processing**: Claims can be processed more efficiently and transparently using smart contracts, reducing fraud and delays.
8. **Vehicle Resale and Trade-ins**:
    - **Tokenized Assets**: Vehicles can be represented as tokenized assets on a blockchain, making it easier to buy, sell, or trade them.
9. **Emissions and Compliance**:
    - **Emissions Tracking**: Blockchain can be used to track emissions data, ensuring compliance with environmental regulations and enabling transparent reporting.
10. **Energy and Charging Infrastructure**:
    - **Decentralized Charging**: Blockchain can support peer-to-peer energy trading and secure charging infrastructure management.
    - **Billing and Payments**: It can provide secure and automated billing for electric vehicle charging services.
11. **Fleet Management**:
    - **Maintenance Scheduling**: Blockchain can automate maintenance scheduling based on vehicle usage and condition, reducing downtime and costs.
12. **Recalls and Safety**:
    - **Recall Management**: Recall notices and information can be stored on a blockchain, ensuring that vehicle owners are promptly informed about safety issues.

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6.3 Applications of Blockchain in the Government Sector

Blockchain technology has the potential to bring transparency, security, and efficiency to various aspects of the government sector. Here are some key applications of blockchain in the public sector:

1. **Digital Identity**:
    - **Secure Identity Verification**: Blockchain can be used for creating and verifying digital identities, ensuring the security and authenticity of individuals and organizations. This can help in reducing identity fraud.
2. **Voting Systems**:
    - **Secure and Transparent Elections**: Blockchain can provide a tamper-proof and transparent ledger for electoral processes, ensuring the integrity of the voting system and enabling remote or online voting.
3. **Supply Chain Management**:
    - **Transparent Procurement**: Governments can use blockchain to track the procurement of goods and services, making the process more transparent, reducing corruption, and ensuring that contracts are fulfilled.
4. **Property and Land Records**:

- **Immutable Land Records**: Blockchain can be used to securely record property and land ownership, making it more difficult for fraudulent land grabs and simplifying the transfer of property titles.

5. **Notary Services**:
    - **Notarization**: Blockchain can be used for notarizing documents and ensuring their authenticity, reducing the need for traditional notary services.
6. **Healthcare Data Management**:
    - **Secure Health Records**: Government health agencies can use blockchain to securely manage and share health records, improving data accuracy and privacy.
7. **Education Records**:
    - **Academic Credentials**: Academic certificates and transcripts can be stored on a blockchain, making it easier to verify the authenticity of educational records.
8. **Smart Contracts for Government Services**:
    - **Automated Processes**: Government agencies can use smart contracts for automating processes like permit approvals, licensing, and contract management, reducing administrative overhead and enhancing efficiency.
9. **Tax Collection and Compliance**:
    - **Transparent Tax Records**: Blockchain can provide a transparent and unchangeable record of tax payments, making it easier for citizens and businesses to track and comply with tax regulations.
10. **Public Health and Safety**:
    - **Disease Surveillance**: Blockchain can help in securely and transparently tracking disease outbreaks and vaccination records, aiding public health efforts.
11. **Disaster Relief and Aid Distribution**:
    - **Transparency in Aid Distribution**: Governments and aid organizations can use blockchain to ensure the transparent and efficient distribution of relief funds and resources during disasters.
12. **National Identity and Travel Documents**:
    - **Passports and Visas**: Blockchain can secure the issuance and verification of passports, visas, and other travel documents, reducing fraud and improving border security.
13. **Intellectual Property Rights**:
    - **Protecting IP**: Governments can use blockchain to protect intellectual property rights, copyrights, and patents, ensuring fair compensation for creators.
14. **Regulatory Compliance**:
    - **Transparent Regulation**: Regulatory agencies can use blockchain to make regulatory processes and compliance transparent, particularly in industries like finance, healthcare, and environmental regulation.
15. **Government Budgeting and Expenditure**:
    - **Transparent Budgets**: Blockchain can provide transparency in government budgets and expenditures, allowing citizens to track how public funds are allocated and spent.

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6.4 Applications of Blockchain in the Insurance Sector

Here are some key applications of blockchain in the insurance sector:

1. **Smart Contracts**:

- **Policy Management**: Smart contracts can automate the creation, issuance, and management of insurance policies. Claims processing can also be automated, reducing administrative overhead and fraud.

2. **Claims Processing**:
   - **Efficient Claims Handling**: Blockchain can streamline the claims process by securely recording and verifying claims data. Smart contracts can automatically trigger payments when predefined conditions are met.
   - **Fraud Detection**: Blockchain can help detect fraudulent claims by providing a transparent and immutable record of claims history and transactions.
3. **Policy Underwriting**:
   - **Risk Assessment**: Blockchain can enhance the accuracy of risk assessment by securely collecting and sharing data relevant to policy underwriting, such as health records for life and health insurance.
   - **Data Sharing**: Multiple parties, including insurance companies, medical providers, and customers, can securely share relevant data in real-time, reducing delays and inaccuracies in the underwriting process.
4. **Reinsurance**:
   - **Transparent and Efficient Reinsurance Contracts**: Reinsurance contracts and transactions can be automated and managed on a blockchain, reducing disputes and ensuring accurate data sharing among stakeholders.
5. **Fraud Prevention and Detection**:
   - **Immutable Records**: Blockchain provides a tamper-proof ledger for storing and sharing claims and policy data, making it more difficult for fraudulent activities to go undetected.
6. **Customer Verification**:
   - **KYC and AML Compliance**: Blockchain can securely manage and verify customer identities, helping insurers comply with Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations.
7. **Parametric Insurance**:
   - **Automatic Payouts**: Parametric insurance policies, which pay out based on predefined triggers (e.g., weather conditions), can be automatically settled through smart contracts on the blockchain.
8. **IoT-Enabled Insurance**:
   - **Telematics**: Blockchain can securely record and manage data from IoT devices, such as connected cars, for usage-based insurance or risk assessment.
9. **Microinsurance and Peer-to-Peer Insurance**:
   - **Decentralized Models**: Blockchain can enable the creation of decentralized insurance models, allowing individuals and communities to pool resources and provide coverage for each other.
10. **Data Security and Privacy**:
    - **Consent Management**: Customers can have greater control over who accesses their data and for what purpose, enhancing data privacy.
11. **Regulatory Compliance**:
    - **Transparency and Auditability**: Blockchain provides a transparent and immutable record of all transactions and activities, making it easier for insurance companies to comply with regulatory requirements.

12. **Supply Chain Insurance**:
    - Transparent Claims Processing: Blockchain can streamline claims processing for supply chain disruptions, such as those caused by natural disasters or unexpected events.

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6.5 Applications of Blockchain in Media and Entertainment

Here are some key applications of blockchain in the Media and Entertainment sector:

1. **Content Distribution and Copyright**:
    - **Digital Rights Management (DRM)**: Blockchain can be used to manage digital rights for content creators, ensuring that creators are fairly compensated for the use of their work.
    - **Provenance Tracking**: Blockchain can securely track the ownership and distribution history of content, making it easier to verify the authenticity of digital assets and prevent piracy.
2. **Streaming Services**:
    - **Microtransactions**: Blockchain can enable microtransactions for content consumption, allowing users to pay small amounts for individual articles, videos, songs, or other digital content.
    - **Royalty Management**: Smart contracts can automate royalty payments to content creators based on consumption data, ensuring that creators receive their fair share of revenue.
3. **Ticketing and Event Management**:
    - **Secure Ticketing**: Blockchain can prevent ticket fraud by providing transparent and tamper-proof records of ticket ownership and transfer.
    - **Event Logistics**: Smart contracts can automate event planning and logistics, including ticket sales, seating arrangements, and concessions.
4. **Content Monetization and Crowdfunding**:
    - **Decentralized Funding**: Content creators can raise funds through token sales, allowing fans to invest in and support their favorite artists, writers, or filmmakers.
5. **Transparency in Advertising**:
    - **Ad Campaign Verification**: Blockchain can verify the authenticity and effectiveness of digital advertising campaigns, reducing ad fraud and ensuring advertisers get what they pay for.
    - **Rewarding Consumer Attention**: Blockchain-based platforms can reward users for engaging with advertisements and sharing their data, giving users more control over their data and advertising experiences.
6. **Gaming**:
    - **Digital Asset Ownership**: Blockchain can provide true ownership of in-game assets, enabling players to buy, sell, and trade digital items across games.
    - **Secure Transactions**: Blockchain can facilitate secure and transparent in-game transactions, reducing fraud and ensuring the legitimacy of in-game economies.
7. **Licensing and Syndication**:
    - **Content Syndication**: Blockchain can streamline the licensing of content for syndication across different media outlets and platforms.
8. **Content Curation and Recommendation**:

- **Personalized Recommendations**: Blockchain can help users maintain control over their data and privacy while still receiving personalized content recommendations.

9. **Content Authentication**:
    - **Verifying Authenticity**: Blockchain can be used to verify the authenticity of content, including news articles, images, and videos, helping combat fake news.
10. **Social Media and Influencer Marketing**:
    - **Influencer Contracts**: Smart contracts can automate influencer marketing campaigns, ensuring that influencers are paid based on agreed-upon metrics.
11. **Data Security and Privacy**:
    - **User Data Control**: Users can have greater control over their data, deciding who can access and use their personal information.
12. **Film and TV Production**:
    - **Smart Contracts for Royalties**: Actors, directors, and crew members can receive royalties and compensation through smart contracts, ensuring fair and timely payments.
13. **Transparency in Ticket Sales and Distribution**:
    - **Fair Access to Tickets**: Blockchain can ensure that tickets to popular events are distributed fairly and prevent scalpers from profiting unfairly.

6.6 Distributed Ledger Technology

Distributed Ledger Technology (DLT) is a decentralized and distributed system of recording and storing data across multiple locations or nodes. DLT is the underlying technology behind blockchain. DLT provides a transparent and secure way to record and verify transactions without the need for a central authority or intermediary. Here are some key aspects of DLT:

1. **Decentralization**: DLT operates on a network of nodes, where each node has a copy of the entire ledger. There is no central authority, and decisions are made collectively through consensus algorithms.
2. **Immutability**: Once data is recorded on a DLT, it is extremely difficult to alter or delete. This immutability is a critical feature for maintaining a tamper-proof history of transactions.
3. **Consensus Mechanisms**: DLT networks use consensus algorithms to agree on the validity of transactions and updates to the ledger. Common consensus mechanisms include Proof of Work (PoW), Proof of Stake (PoS), and Delegated Proof of Stake (DPoS).
4. **Transparency**: Data recorded on a DLT is typically visible to all participants in the network. This transparency helps ensure the integrity of the ledger and builds trust among participants.
5. **Security**: DLT uses cryptographic techniques to secure data and control access to it. Transactions are cryptographically signed, and access to data can be restricted based on permissions and keys.
6. **Privacy**: Some DLT systems allow for private or permissioned networks where only approved participants can access and validate transactions. This is important for businesses and organizations that need to protect sensitive information.

7. **Smart Contracts**: DLT platforms often support smart contracts, which are self-executing contracts with the terms and conditions of the agreement directly written into code. These contracts can automate actions based on predefined conditions.
8. **Interoperability**: DLT can facilitate interoperability between different systems and networks, enabling the exchange of data and assets across various platforms.
9. **Scalability**: Scalability is a concern in DLT, especially for public blockchain networks. Solutions like sharding and layer 2 solutions aim to address scalability challenges.
10. **Use Cases**: DLT has a wide range of applications beyond cryptocurrencies, including supply chain management, healthcare, finance, identity management, voting systems, and more.
11. **Challenges**: DLT faces challenges related to regulatory compliance, energy consumption (in the case of PoW), and the need for standardization.
12. **Public vs. Private DLT**: Public DLT networks are open and permissionless, while private DLT networks are restricted to approved participants. Each has its own use cases and benefits.

6.7 Distributed Ledger Technology: Governance and Regulation

Governance and regulation of Distributed Ledger Technology (DLT), including blockchain, are crucial aspects to ensure the technology's responsible and secure use. Here are key considerations for DLT governance and regulation:

1. Regulatory Frameworks:

- **Legal Classification**: Governments and regulatory bodies need to classify cryptocurrencies and tokens based on their functionality. Are they considered securities, commodities, or something else? Different classifications come with different regulatory requirements.
- **AML/KYC**: Anti-Money Laundering (AML) and Know Your Customer (KYC) regulations may apply to DLT platforms to prevent illicit activities and ensure user identity verification.

2. Smart Contracts and Legal Enforceability:

- **Contract Law**: The legal status of smart contracts is still evolving in many jurisdictions. Clear definitions and legal recognition of smart contracts are essential.
- **Dispute Resolution**: The legal framework should address how disputes arising from smart contracts will be resolved, as well as the role of traditional legal processes.

3. Data Privacy and Security:

- **Data Protection**: DLT platforms need to comply with data protection regulations such as GDPR (General Data Protection Regulation) in Europe. Data privacy is critical in DLT systems.
- **Cryptography Regulation**: Governments should establish policies on the use and export of cryptographic technologies to balance security with the need to prevent misuse.

4. Consumer Protection:

- **Investor Protection**: Regulations should protect consumers and investors from fraudulent or risky DLT projects and initial coin offerings (ICOs).
- **Market Surveillance**: Regulators should monitor DLT markets to detect and prevent market manipulation and fraud.

5. Tokenization and Securities:

- **Securities Regulation**: Tokens representing ownership in assets or companies may be subject to securities regulations, including registration and disclosure requirements.
- **Tokenization Standards**: Establishing standards for token issuance, trading, and custody can help provide legal clarity and reduce risk.

6. Regulatory Sandboxes:
- Some countries have created regulatory sandboxes that allow blockchain and fintech startups to experiment within certain regulatory parameters. This fosters innovation while maintaining some level of oversight.

7. Interoperability and Cross-Border Transactions:
- DLT is often cross-border, and international regulatory cooperation is vital to ensure consistent standards and prevent regulatory arbitrage.

8. Taxation:
- Governments should determine how to tax transactions involving cryptocurrencies and how to treat gains and losses in the DLT space.

9. Central Bank Digital Currencies (CBDCs):
- The introduction of CBDCs requires regulatory frameworks to ensure their proper functioning, security, and compliance with monetary policies.

10. Education and Collaboration:
- Regulators, industry participants, and legal experts need to collaborate to understand DLT technology and its implications fully. Education programs and industry associations play a vital role in fostering cooperation.

11. Regulatory Adaptability:
- Regulations should be flexible and adaptable, as the DLT space is rapidly evolving. Regulators must keep pace with technological advancements.

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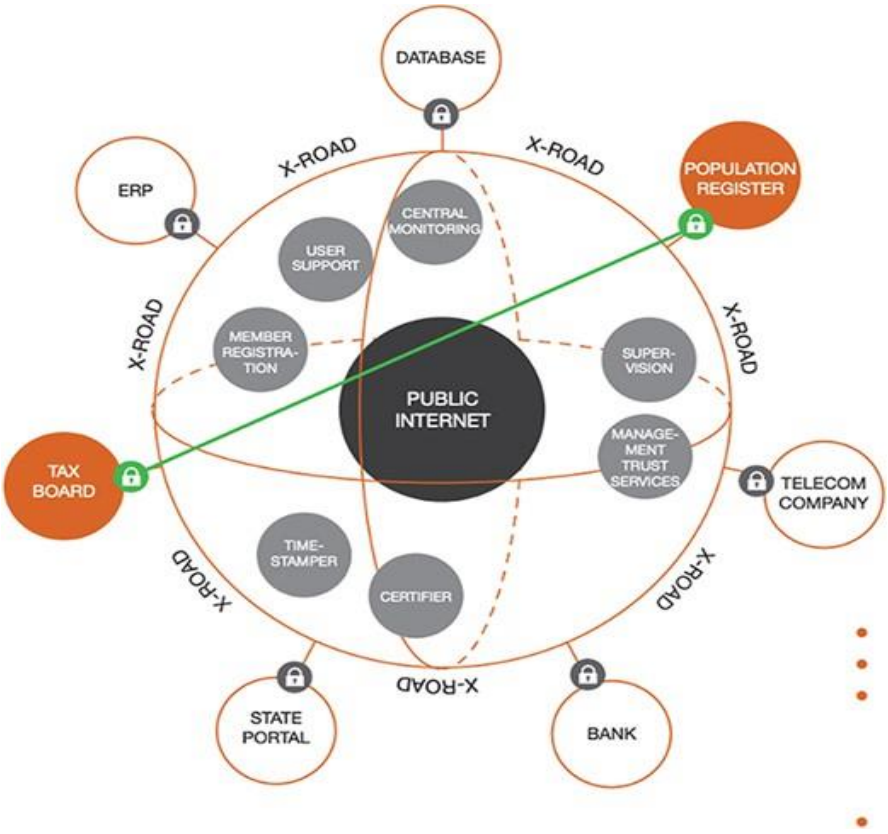
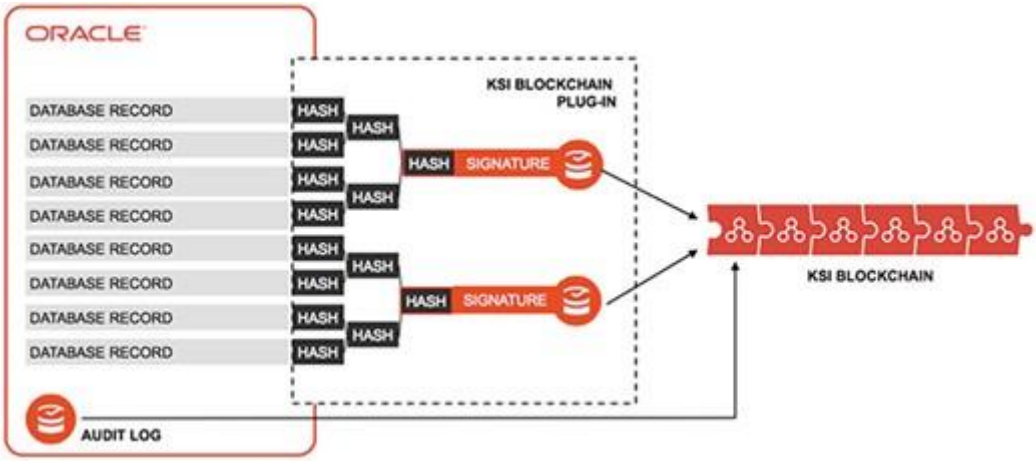
6.8 Estonian Blockchain

1. Estonia was the first Nation-State in the world to deploy blockchain technology in production systems – in 2012 with the Succession Registry kept by the Ministry of Justice.
2. Estonia is popularly claimed to use blockchain technology to secure e-voting and to provide "the ability to 100% trust government data in any situation".
3. Estonia Blockchain relies on three distinct digital systems, so-called "three technological pillars of the digital state": "**e-ID**", "**X-Road**", and "**KSI Blockchain**".
4. "**e-ID**" refers to the electronic identity document, i.e., a **Digital Identity service**, which includes an electronic ID-card-based system used to access digital services.
5. "**X-Road**" refers to an open-source **data exchange** layer solution that enables **interoperability** between institutional organizations. X-Road is "a decentralized technological and organizational environment enabling secure Internet-based data exchange between information systems. X-Road serves to exchange information between public institutions in a secure way and allows data to be automatically exchanged not only internally, but also between countries.



6. The technology chosen for Estonian systems is **Keyless Signature Infrastructure (KSI)** Blockchain, also used by NATO and the U.S. Department of Defense. It allegedly refers to a timestamp system used for "preserving the **integrity** of the digital documents within multiple public registries (e.g., healthcare, property), identities, transactions and data privacy of its users". In basic terms, from each document, a "hash" is extracted, i.e., a unique sequence of codified characters that represent exactly that document. If the document is ever changed, its hash would change, and thus if a document is tampered with, it would be easily detected. The hash signatures are recorded in the "KSI Blockchain", as a sequence of those hashes.



7. Estonia uses blockchain technology to enforce the integrity of government data and systems. Estonian Information Systems Authority (RIA) is an integral service provider for the Government, guaranteeing the access to the blockchain network for the State Agencies via the X-road infrastructure.

8. Selected State Registries backed by the blockchain technology are: Healthcare Registry, Property Registry, Business Registry, Succession Registry, Digital Court System, Surveillance/Tracking Information System, Official State Announcements, State Gazette.

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6.9 Role of Quantum Computing in Crypto Ecosystem

1. Quantum computing is a revolutionary field of computing that uses the principles of quantum mechanics to perform computations.
2. Quantum computing possesses immense computational power, which has the potential to disrupt the current cryptographic algorithms that secure cryptocurrencies.
3. Quantum computing has the potential to significantly impact the cryptocurrency ecosystem in various ways, primarily due to its capacity to solve complex mathematical problems more efficiently than classical computers. While the full-scale deployment of quantum computing is still in its early stages, it presents both opportunities and challenges for the crypto space:

Opportunities:

(a) **Breaking Cryptographic Algorithms**: Quantum computers can efficiently solve certain mathematical problems that underlie widely used cryptographic algorithms, such as RSA and ECC (Elliptic Curve Cryptography). As a result, they could break the encryption protecting cryptocurrencies and other secure communications.

(b) **Quantum-Resistant Cryptography**: The emergence of quantum computing has led to the development of quantum-resistant or post-quantum cryptographic algorithms. These algorithms are designed to withstand attacks from quantum computers. The cryptocurrency community can adopt these new encryption methods to enhance security.

(c) **Secure Quantum Communication**: Quantum computing also offers the potential for ultra-secure quantum communication channels, which can be used to improve the security and privacy of cryptocurrency transactions.

(d) **Faster Blockchain Operations**: Quantum computers could be used to optimize and accelerate certain blockchain operations, potentially increasing the transaction throughput and scalability of blockchain networks.

Challenges:

(a) **Security Risks**: The most immediate challenge posed by quantum computing in the crypto ecosystem is its ability to break existing cryptographic schemes. This could lead to the theft of private keys and unauthorized access to wallets and funds.

(b) **Transition to Quantum-Resistant Cryptography**: Transitioning to quantum-resistant cryptographic algorithms is a complex and resource-intensive process. Existing cryptocurrencies and blockchains may need to undergo significant upgrades to implement these new algorithms.

(c) **Timeframe Uncertainty**: The timeline for achieving practical, large-scale quantum computing capabilities is uncertain. It could be several years or decades before quantum computers become a real threat to existing cryptographic systems.

(d) **Quantum-Safe Infrastructure**: Building a quantum-safe infrastructure that can withstand quantum attacks while maintaining security is a challenging task. This involves updating hardware, software, and network components.

(e) **Quantum-Secure Key Management**: Developing and implementing quantum-secure key management solutions is essential to protect existing blockchain networks and ensure the security of future transactions.

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6.10 Key ingredient for Decentralized Finance (DeFi)

(i) Decentralized Finance (DeFi) is all about monetary systems using public blockchains.

(ii) At the core, the term "public" is important here. It can be equated to similar to that of Ethereum public blockchain. In the public blockchain, there is no place for centralized authority.

(iii) The need for DeFi comes from the fact that financial services are not available to everyone around the world. Almost 1.7 billion people all around the world have no means and access to financial services. The financial institutes can also not provide the necessary infrastructure to make people more access to money. The existing infrastructure is huge, but it does lack when it comes to reaching everyone out there.

(iv) With decentralization, the current infrastructure failures are solved. It removes the failure point and ensures that the records can be stored and shared among different nodes across the network. It can work on a **peer-to-peer network** without any centralized authority.

(v) Another key element of the DeFi is the **decentralized apps** (dApps). DApps enable the financial institutes to create functional apps on the public blockchain and ensure that anyone can interact with them with minimal cost per interaction.

(vi) DeFi eliminates the fee that banks and other financial institutions charge for using their services and promotes the use of P2P transactions.

(vii) DeFi is open, pseudonymous, flexible and fast.

(viii) Key ingredients of DeFi are:

1. **Lending and Borrowing**: With DeFi lending, investors deposit crypto through a decentralized application, and someone can then borrow the crypto through a P2P network, paying interest on the loan.
2. **Stable Coins**: These are crypto that has its value pegged to another asset like fiat money, exchange-traded commodity, etc.
3. **Decentralized Exchanges (DEX)**: Connect buyers and sellers and allows users to make transactions via P2P network.
4. **Derivatives**: These are the contracts whose values are derived from the performance of the underlying financial asset.
5. **Crypto-margin Trading**: It means utilizing the borrowed funds to increase the position in a certain asset.
6. **DeFi Insurance**: It ensures the guarantees of compensation in exchange for payment of a premium.