Types of Blockchain Ecosystem

Module 5

What is Blockchain Ecosystem?

- Blockchain is a distributed ledger technology that allows the storage of data in blocks of information, with each block containing batches of transactions from one moment in time. Its open, decentralized and secure nature of it allows blockchain to disrupt traditional transactional systems.
- Blockchain has the potential to transform the ecosystem by becoming an indispensable part of our daily lives. Understanding the underlying technology and its impact is imperative for those looking to capitalize on this new era.

- The blockchain ecosystem is the network of all the participants in the blockchain network that share the business process and business objectives. The ecosystem encompasses the different governing structures like:
  - Individual participation.
  - Data ownership.
  - Exit and entrance criteria.
  - Information and data shared with the system's participants.
- It can provide immutability, decentralization, flexibility for day-to-day operations, and scalability. The blockchain ecosystem is a boon for startups and new technology projects as it creates an interconnected network.

Types of Blockchain Ecosystem:

- **Single-party led blockchain ecosystem:** This ecosystem is led by a single organization where all the stakeholders have a mutual benefit for participating in the network. For example, Bumble Bee Foods has created a single-party-led blockchain ecosystem to improve the traceability of the yellowfin tuna fish. This helped to improve the buyer's confidence in the fish's freshness.
- **Joint venture blockchain ecosystem:** This is also known as the Consortium blockchain ecosystem. These are slowly becoming popular and they involve two or more organizations in the ecosystem. The participating organizations have an objective of participating in a common activity or pooling their resources for achieving a common goal. For example, BunkerTrace a marine fuel tracking solution is a joint venture blockchain ecosystem between Forecast technology Ltd. and Blockchain Labs for Open Collaboration (BLOC).
- **Regulatory blockchain ecosystem:** This ecosystem comprises various government agencies that hare a project and have to self-report for compliance. For example, a shared project between Marine Transport International and Recycling Association.

Consortium Blockchain

- Consortium blockchains are a hybrid model that combines elements of both public and private blockchains.
- In a consortium blockchain, a predefined group of known and trusted participants maintains control over the network, while still allowing for some degree of decentralization and transparency.
- Consortium blockchains are often used in industries where multiple stakeholders must collaborate and share data while maintaining privacy and security.
- Examples include IBM's Food Trust Network, which brings together food producers, distributors, and retailers to track and trace the provenance of food products.
- Each type of blockchain technology has its advantages and disadvantages, and the choice of which to use depends on factors such as the desired level of decentralization, privacy, scalability, and governance. Understanding the differences between these types is essential for organizations and developers looking to implement blockchain solutions for their specific use cases.

Consortium Blockchain

- **Advantages.** A consortium blockchain tends to be more secure, scalable and efficient than a public blockchain network. Like private and hybrid blockchain, it also offers access controls.
- **Disadvantages.** Consortium blockchain is less transparent than public blockchain. It can still be compromised if a member node is breached, the blockchain's own regulations can impair the network's functionality.
- **Use cases.** Banking and payments are two uses for this type of blockchain. Different banks can band together and form a consortium, deciding which nodes will validate the transactions. Research organizations can create a similar model, as can organizations that want to track food. It's ideal for supply chains, particularly food and medicine applications.

Why Blockchain Ecosystem is Important for Organizations?

- **Integration across enterprise boundaries:** Blockchain ecosystems enable integration across the enterprise boundaries allowing organizations to deliver products or services that they won't be able to deliver on their own due to the lack of technological capabilities.
- **Allow organizations to overcome traditional mindset:** The blockchain ecosystem helps organizations to move beyond their traditional mindset as well as the dynamic limitations of a particular supply-chain network.

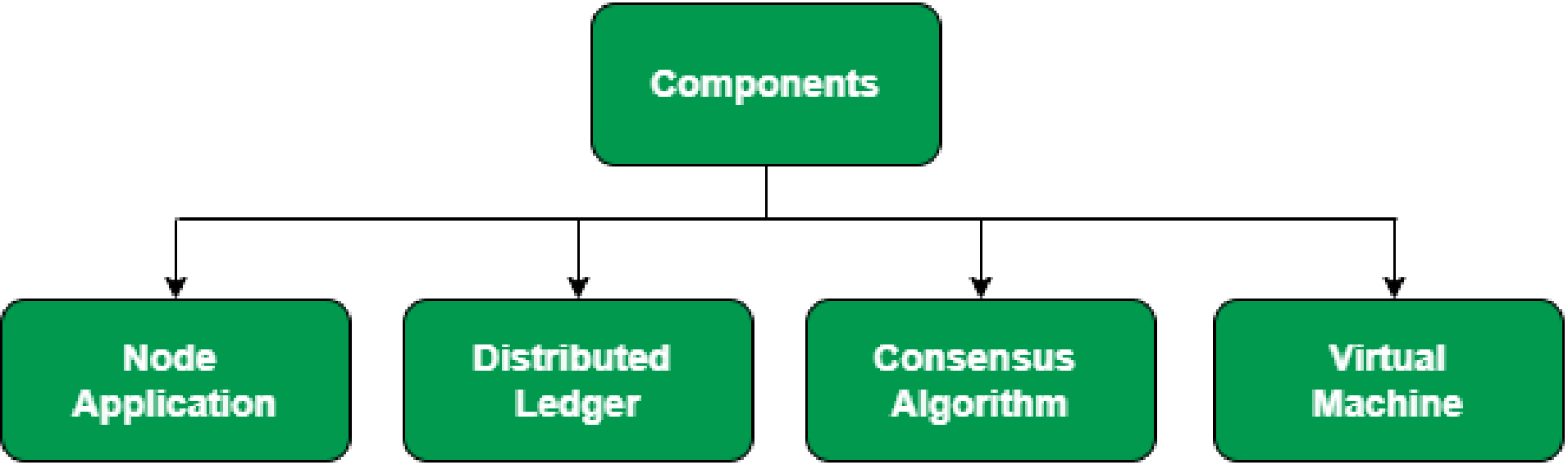
How can the blockchain Ecosystem Benefit Organizations?

- **Distributed:** With no centralized authority (i.e. a database administrator or single point of failure) this brings new functionalities for the employees and customers of an organization.
- **Remodel complete workflow:** The blockchain ecosystem will revamp the complete workflow and how projects are developed, from the starting stage to the end.
- **Smart contracts:** Smart contracts are essentially computer program that automatically executes agreed-upon terms in a contract when certain conditions are met. With the use of smart contracts the exchange of information is swift and can also remove intermediatory in a process that would extend the time to perform a task in a larger process. It logs transactions in a linear, chronological order, and creates an immutable set of records that are tamper-proof.
- **Improve ongoing operation:** The blockchain ecosystem should be viable for an organization when it can improve the ongoing operation that existing solutions can't do. For example, an organization where data sharing among various departments and individuals occurs at a higher rate could benefit from the blockchain structure of validating data among nodes or peers as fast as possible.
- **Facilitate cross-enterprise collaboration:** It can facilitate cross-enterprise collaboration with the benefit of decentralization, flexibility, distribution, and traceability.
- **Transparency:** All transactions are visible to all users of the network. Data can be traced back to its source, making it almost impossible to forge a digital item or transaction.
- **Consensus:** The participants in the blockchain ecosystem use the information they receive to make calculations and verify new blocks, using a consensus-based system. This makes it difficult for fraudulent transactions or duplicate items to get through.

Participants in Blockchain Ecosystem

- **Leaders:** Leaders take control of everything happening on the blockchain network. They are the organizations that have a vision of the future of the blockchain ecosystem and its business values. These are the creators of the project and are the main beneficiaries of the work in the ecosystem.
- **Core group:** The core group refers to the group of active or leading organizations in the network that gives shape to operational activities in the network. They are responsible for controlling, streamlining, and managing the blockchain ecosystem actively.
- **Active participants:** These are the group of primary network participants that take on the responsibility of contributing to workflow, governance, and data management.
- **Users:** They don’t get any responsibility for the active management of the network. Their only responsibility in the ecosystem is to obtain desired benefits from the network alongside accessing their own data.
- **Third-party service providers:** They are important participants in the network and offer different types of services on the network. They could offer desired services like IT support services or infrastructure and applications services in exchange for specific fees.

Components of Blockchain Ecosystem



- **Node application:** It is a particular internet application that every internet-connected computer must download for participating in a blockchain ecosystem. After node application installation, a user becomes a participant in the blockchain network. Once one has a node application installed, it can participate in the ecosystem.
- **Distributed ledger:** this is the logical component and the data structure that is managed inside the node application. Once the node application is installed, one can view the respective ledger contents from that ecosystem. One can run as many node applications as likes and is permitted to use, and each will participate in their respective blockchain ecosystems.
- **Consensus algorithms:** The consensus algorithm is implemented as a part of the node application in the blockchain ecosystem. They provide the rules of the game for how the ecosystem will arrive at the single view of the ledger. Different ecosystems have different ways of attaining consensus. There are different consensus algorithms like PoW, PoS, etc, each method qualifies nodes as honest in their own way before participating in the consensus-building process.
- **Virtual machine:** It is the representation of the computer environment created by a computer program and operated with instructions programmed in a language. The virtual machine implementation happens alongside the node application. For example, in the Ethereum blockchain ecosystem, the EVM resides inside the node application.

Steps in Forming Blockchain Ecosystem

- **1. Ecosystem value proposition:** This step includes defining the fundamental purpose of the ecosystem actions. some of the questions that should be asked in this step are:
- What business problem is addressed by the proposed solution for the ecosystem?
- How would the blockchain ecosystem impact each of the participants?
- **2. Expected participants:** This step involves brainstorming for the expected participants to determine why they want to join the blockchain ecosystem. Some of the questions that should be considered in this step are:
- Who are the expected participants and why do they want to join the ecosystem?
- What are the incentives for each of the expected participants to engage in the blockchain ecosystem?
- **3. Ecosystem model:** Organization will decide to have an idea on which collaboration model will be the best fit for their purpose. The organization should consider the following questions:
- Which single-party led, joint venture, or regulatory blockchain ecosystem s the best model?
- How model might need to change over time?

- **4. Ecosystem governance:** This is the most important step as it is very important to consider who will operate the network and how it will be governed. Below are some of the questions that should be discussed in this step:
- What governance will be required to bring the ecosystem to life?
- How will value and cost for the blockchain ecosystem be fairly allocated?
- **5. Organizations' preparation:** Each organization must have an idea about what benefits it can derive from joining the ecosystem. The organization should consider the questions like:
- What are the risks associated with the blockchain ecosystem?
- Is the proposed blockchain ecosystem lawful?
- What are the necessary capabilities and resource requirements for the development of the ecosystem?

Governance for Blockchain Ecosystems

- **Understanding 'Governance'**
  - The key term, '*Governance*' refers to the system by which a group of people or an organization makes decisions, implements policies, and exercises authority or control. It encompasses the structures, rules, and procedures that guide the actions and behavior of individuals or groups within a particular entity, such as a government, corporation, non-profit organization, or community. Unlike traditional centralized systems where a single authority exercises control, blockchain governance is typically distributed among a network of participants who collectively contribute to decision-making.

What is Governance in Blockchain?

- *Blockchain governance* aims to ensure that the network operates smoothly, maintains security, and evolves in a manner that aligns with the interests and values of its stakeholders.
- It involves making decisions about protocol upgrades, changes to consensus mechanisms, network parameters, economic incentives, and other aspects that affect the overall functioning of the blockchain.
- A compulsory requirement for a Blockchain project's success is that it maintains decentralisation. The project must also create governance that can deal with the complexity in decision making in order to reduce uncertainty, delays and costs when used by stakeholders over existing systems.

Types of Blockchain Governance Models

- **On-chain Governance**
  - This model involves making governance decisions directly on the blockchain through the use of smart contracts or decentralized voting mechanisms. Network participants can propose and vote on protocol upgrades or changes, and the results are implemented automatically based on predefined rules.

- Here are some key elements and mechanisms typically found in on-chain governance systems:
  - **Token Voting:** Many on-chain governance systems use a voting mechanism where token holders can cast votes to express their preferences on proposed changes. The voting power is often proportional to the number of tokens held, giving more weight to those with larger stakes in the network.
  - **Proposals:** Participants can create proposals to suggest changes or improvements to the protocol. These proposals can range from technical upgrades to changes in parameters, such as transaction fees or block sizes.
  - **Voting Period:** A specific period is defined during which token holders can cast their votes on a proposal. This period ensures that participants have sufficient time to review and consider the proposed changes.
  - **Governance Tokens:** Governance tokens represent voting rights and are used to participate in the decision-making process. These tokens are typically distributed to stakeholders during a token sale or a token distribution event.
  - **Execution of Decisions:** Once a proposal reaches a predefined threshold, such as a majority or supermajority vote, the decision is executed automatically on the blockchain without the need for centralized intervention.
  - **Upgradability:** On-chain governance frameworks often include mechanisms to facilitate protocol upgrades without requiring hard forks. This allows the blockchain network to evolve and adapt to changing circumstances more efficiently.

- **Off-chain Governance**
  - In this model, governance decisions are made outside of the blockchain. They are typically discussed and decided upon by core development teams, foundation members, or other entities responsible for maintaining the blockchain. Off-chain governance can involve formal governance processes or informal community discussions.

- Here are some common elements and mechanisms found in off-chain governance:
  - **Decentralized Governance Organizations (DGOs):** Off-chain governance often involves the establishment of decentralized organizations or entities that are responsible for making decisions and proposing changes to the blockchain protocol. These organizations may include foundations, committees, or consortiums composed of various stakeholders, such as developers, validators, or community members.
  - **Forums and Discussions:** Off-chain governance processes frequently rely on open forums, discussion platforms, and community engagement to gather feedback and generate proposals. These discussions can take place on social media channels, dedicated forums, or other communication platforms.
  - **Governance Proposals:** Similar to on-chain governance, off-chain governance involves the creation and submission of proposals to suggest changes or improvements to the blockchain protocol. These proposals are typically discussed, refined, and voted upon by the decentralized governance organization or the broader community.
  - **Voting Mechanisms:** Off-chain governance often employs voting mechanisms to gauge community sentiment and make decisions. These voting mechanisms may utilize off-chain voting systems, such as token-weighted voting, reputation-based voting, or other mechanisms that reflect the influence and preferences of the participants.
  - **Decision Implementation:** Once a decision is made through the off-chain governance process, it is typically implemented by coordinating actions on the blockchain. This may involve updating the protocol, introducing new features, or implementing changes through software upgrades. The actual execution of decisions is typically done on-chain, even though the decision-making process itself occurs off-chain.

- **Hybrid Governance**
  - Some blockchain networks combine elements of both on-chain and off-chain governance. They may use on-chain mechanisms for voting or signaling purposes, while actual decision-making and implementation are done off-chain by designated entities.