Q1. Which features distinguish databases from Blockchain ledgers? Provide a comparative

Ans: There are several key differences between databases and blockchain ledgers:
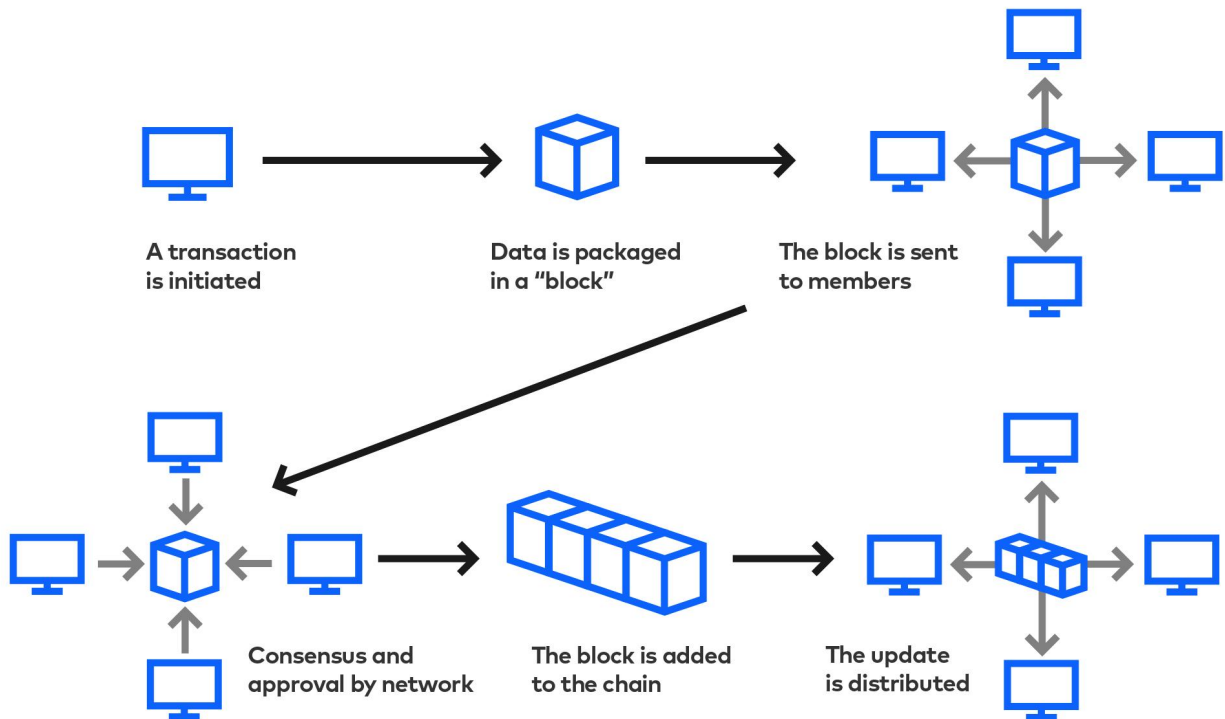
Database	Blockchain
Structure: A database is typically structured in a table or collection of tables, with rows representing records and columns representing fields within those records. In contrast,	A blockchain ledger consists of a series of blocks, each of which contains a list of transactions.
Decentralization: A database is usually controlled by a single entity or organization	A blockchain ledger is decentralized, meaning it is distributed across a network of computers and is not controlled by any single entity.
Data modification: In a database, data can be easily modified or deleted by a database administrator.	In a blockchain ledger, once data has been recorded, it is extremely difficult to change or delete. This is because each block in the chain contains a record of all previous blocks, and any attempt to alter a block would require the re-computation of all subsequent blocks.
Security: A database can be secured through various means, such as user authentication and access controls.	The decentralized nature of a blockchain ledger means that it is much more secure against tampering or unauthorized access. This is because the data is stored across multiple computers and any attempt to alter the data on one computer would have to be simultaneously made on all other computers in the network.

Speed:	the speed of a blockchain ledger can
Databases can typically process transactions much faster than blockchain ledgers, due to their centralized structure and the use of specialized hardware.	be improved through various means, such as sharding and off-chain transactions.

Q2. Analyze, using a diagram, how a distributed ledger works, present its main characteristics and explain how it differs from a "traditional" centralized ledger.

Ans:

A distributed ledger is a type of database that is maintained and updated by a network of computers rather than a single centralized entity. The main characteristics of a distributed ledger include decentralization, immutability, and transparency.

A transaction is initiated

Data is packaged in a "block"

The block is sent to members

Consensus and approval by network

The block is added to the chain

The update is distributed

1. **Transactions:** Users initiate transactions, which are then broadcast to the network.

2. **Validation:** The transactions are validated by network nodes, which ensure that they are valid and conform to the rules of the ledger.

3. **Blocks:** Valid transactions are grouped into blocks and added to the chain of previous blocks, creating a record of all transactions on the ledger.

4. **Consensus:** The network reaches a consensus on the state of the ledger by agreeing on the order and content of the blocks.

5. **Updates**: The ledger is updated with the new blocks, and the process repeats with new transactions being broadcast and added to the chain.

The main characteristics of a distributed ledger are:

1. **Decentralization:** A distributed ledger is decentralized, meaning it is not controlled by any single entity or organization. Instead, it is maintained and updated by a network of computers that work together to validate and record transactions.

2. **Immutability:** Once data has been recorded on a distributed ledger, it is extremely difficult to change or delete. This is because each record (or "block") in the ledger contains a record of all previous blocks, and any attempt to alter a block would require the re-computation of all subsequent blocks.

3. **Transparency:** All transactions recorded on a distributed ledger are visible to the entire network. This can help to build trust and ensure that the ledger is being used appropriately.

4. **Security:** The decentralized nature of a distributed ledger makes it much more secure against tampering or unauthorized access. This is because the data is stored across multiple computers and any attempt to alter the data on one computer would have to be simultaneously made on all other computers in the network.

In comparison to a "traditional" centralized ledger, a distributed ledger has several key differences:

1. **Control:** A centralized ledger is controlled by a single entity or organization, while a distributed ledger is decentralized and controlled by a network of computers.

2. **Data modification:** In a centralized ledger, data can be easily modified or deleted by the entity controlling the ledger. In a distributed ledger, once data has been recorded, it is extremely difficult to change or delete.

3. **Security:** A centralized ledger can be vulnerable to tampering or unauthorized access, as there is a single point of control. In contrast, the decentralized nature of a distributed ledger makes it much more secure.

4. **Transparency:** In a centralized ledger, only the entity controlling the ledger may have access to the full set of records. In a distributed ledger, all transactions are visible to the entire network.

Q3. Suggest which type of blockchain should be used for the security of donations in a charity organization. What benefits does blockchain technology introduce in such a scenario? Explain your answer using an example

Ans:
For the security of donations in a charity organization, it would be advisable to use a public blockchain. A public blockchain is a decentralized network that is open to anyone, and it allows for transparency and immutability of data. This would ensure that all donations are recorded on the blockchain and can be verified by anyone, providing an additional level of security and trust for donors. This is because a public blockchain is decentralized and transparent, meaning that it is not controlled by any single entity and all transactions are visible to the entire network.

There are several benefits that blockchain technology can introduce in this scenario:

1. **Improved transparency:** Donors can track the movement of their donations through the blockchain and see exactly where their money is going. This can build trust in the charity organization and ensure that donations are being used for their intended purposes.

2. **Enhanced security:** The decentralized nature of a public blockchain makes it difficult for fraudulent activity to go undetected. This can help to protect donors' money and ensure that it is not being misused.

3. **Reduced transaction costs:** Traditional financial systems can often have high transaction costs, especially for international transfers. Using a blockchain can potentially reduce these costs, allowing more of the donation to go toward the intended causes.

For example, consider a charity organization that receives donations from around the world. By using a public blockchain, the organization can create a transparent record of all donations, allowing donors to track the movement of their money and ensuring that it is being used for its intended purposes. The decentralized nature of the blockchain also helps to protect against fraudulent activity and reduces transaction costs, enabling more of the donations to go towards the charity's causes.