Assignment - II

Q. Which features distinguish databases from Blockchain ledgers? provide comparative analysis of the two.

Ans:- Difference Between Blockchain and a database

Database :- Generally a database is a data structure which is used for storing information. It is a organiced collection of data which is able to store a new data or access a existing data. The data stored in a database can be organized using database Management system. The database administrator can modify the data stored in the database. A database implemented using the client - Server architecture.

Blockchain :- A blockchain is a glowing list of records, called blocks, that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp and transcation data. Here, modification of data is not permissible by design. It allows decentralized control and eliminates the oursks of modification of data by other parties with

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sufficient access to the system.

Database	Blockchain
• Databases uses centralized Storage of data	• Blockchain uses decentralized Storage of data
• Databases needs a Database admin or Database administrator to manage the stored data	• There is no administrator in Blockchain
• modifying data requires Permission from database admin	• Modifying data does not require permission. Users have a copy of data and by modifying the copies does not affect the master copy of the data as Blockchain is irresistable to modification of data
• Centralized database keep information that is up-to-date at a particular moment	• Blockchain keeps the present information as well as the past information that has been stored before.
• centralized databases are used as database for a really long time and have a good performance record, but are slow for certain functionalities	• Blockchain is ideal for transcation platform but it slows down when used a databases specially with large

Blockchain is one type of distributed ledger.
Distributed ledgers use independent computers (referred to as nodes) to record, share and synchronize transactions in their respective electronic ledgers (instead of keeping data centralized as in traditional ledgers. Blockchain organizes data into blocks, which are chained together in an append only mode.

- Blockchain/DLT are the building block of "internet of value", and enable recording of interactions and transfer "value" peer-to-peer without a need for a centrally coordinating Entity. "value" refers to any record of ownership of asset. for Eg:- money, securities, land titles, and also ownership of specific information like identity, health information and other personal data.

Blockchain vs centralized Database:-
If we compare blockchain and database, the first thing we will notice is how authority works. Blockchain is designed to work in a decentralized manner, where as the database are always centralized.

The unique feature of blockchain gives it the leverage it needs to become the new generation

of technology.

Decentralization brings a lot of implementation changes to the current systems and processes used by the different industries It empowers networks to work independently and removes any need for centralized control.

Every blockchain may be considered as a database, but every database cannot be considered as a blockchain. Why-?
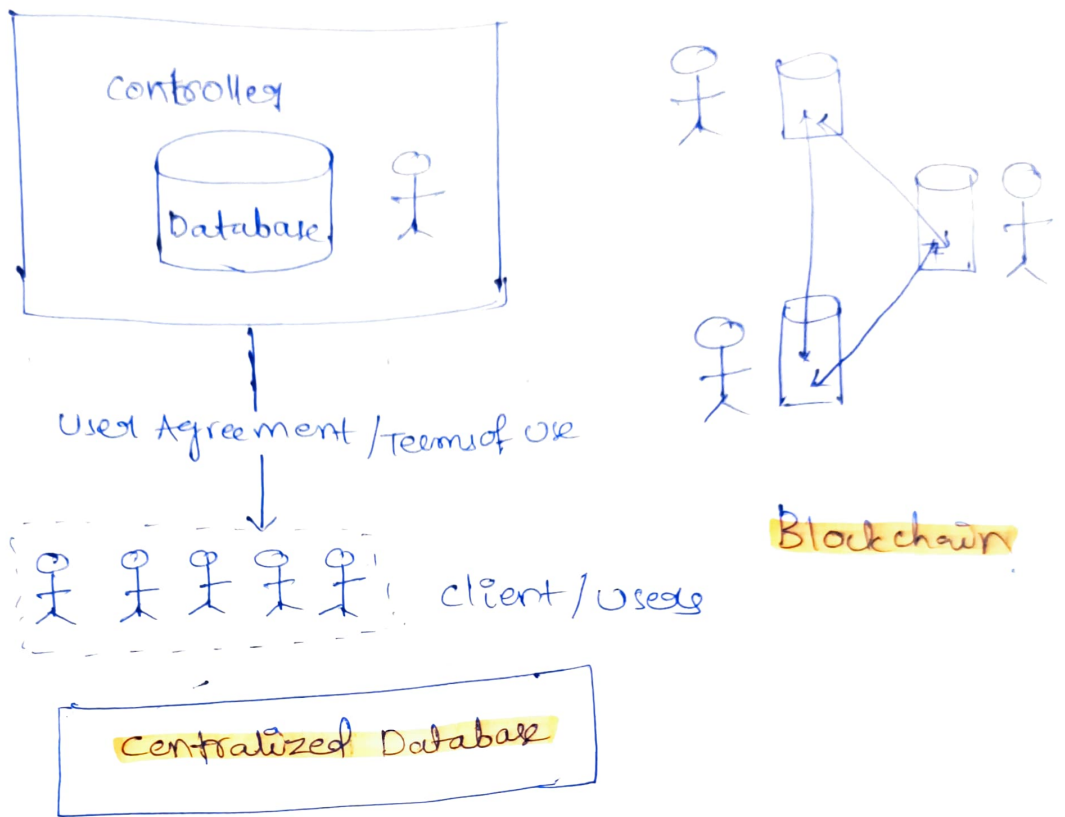
Blockchain database doesn't exist. A blockchain is kind of a database because it is a digital ledger that stores information in data structure called blocks. on other hand, a traditional database is a datastructure used for storing information.

A database can be modified, managed, updated, and controlled by a single user called an administrator. This is where central control comes in. A database always has an Administrator who has complete control over it. The administrator can create, delete, modify, and change any record which is stored in database. A large database generally tends to slow down the performance index. So admins run optimization methods to ④
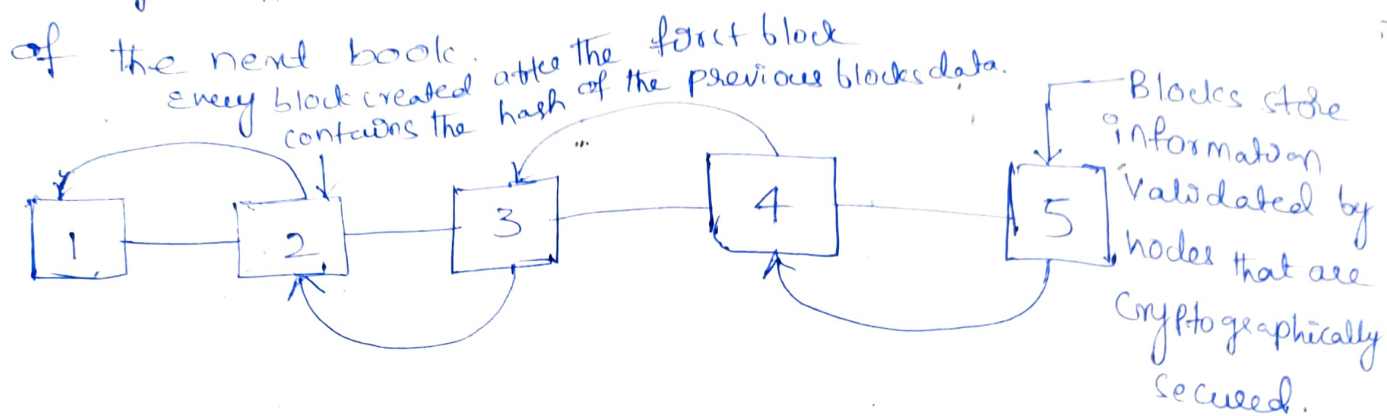
to improve the performance of the database.

centralized Database VS Blockchain

while a traditional database is centralized, a blockchain function differently. A blockchain stores information in blocks that are uniform in size. Each block contains the hashed information or hashcode from the previous block to provide Cryptographic Security. Unlike databases, this added security feature engrossed Within blockchains makes them Extremely difficult to hack and tamper.

hashing uses a SHA-256 mechanism which is predominantly a one-way hash function. The hashed information is the data and digital

and digital signature from the previous block and the hashes of previous blocks that go all the way back to the very first block or the genesis block in the blockchain that information is run through a hash function that further points to the address of the next book.

every block created after the first block
contains the hash of the previous blocks data.

Blocks store information Validated by nodes that are Cryptographically secured.

A blockchain is a linked list that consists of pointers.

Data base	Blockchain
* centralized	* Decentralized
* permissioned	* permission-less
. Requires administrator	* No administrator.

Difference between blockchain and relational Database

Decentralized control:- Generally, blockchains allow different parties to share information with each other without requiring a central administrator. databases have completely different usability. A central administration is required in a database as certain situations arise where we cannot depend on a consensus.

History of itself:- Centralized databases record present information only. They do not trace information that was previously recorded. With blockchains, the case is different. They not only keep information that is relevant in real-time but also can trace back information of transactions that have come before. Blockchains can create databases that have histories of themselves i.e: They grow like ever-expanding archieves of their own history.

Performance:- while blockchains are used as systems of records and are ideal as transcation platforms, they are considered as slow as databases when considered for digital transcation technology. There will certainly be improvements to the performance and nature of blockchain technology, no doubt but databases are offering

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The same anyway. They have been around for decades and have witnessed their performance surge in multi-folds.

Confidentiality :- A permissioned blockchain, like a centralized database, can be both write and read controlled. If confidentiality is the only goal. blockchains have no advantage over centralized databases.

Blockchain Real life usecases

The basic qualities of Blockchain technology are to Establish trust and transparency, as being a public ledger system, it allows access to Everyone for the information Blockchain proves its worth in places where there is a need for validating information. as in the case of B2B Business-to-Business transactions related to supply chain, distribution, and inventory. Blockchain can help when there is need to track and prevent fraud.

A Blockchain can Be Idealy suited for

financial translations Transfer of value verify data for trustworthiness like identity, credibility, Integrity. etc.
voting mechanism
Authorization works
Decentralized Apps (dApps)

Q2 :- Analyse, using a diagram, how distributed ledger works, present its main characteristics and explain how it differs from a traditional centralized ledger

Distributed ledger Technology :-

DLT is a digital system for recording the transcation of assets in which the transcation and their details are recorded in multiple places at the same time. unlike traditional databases, distributed ledgers have no central data store or administration functionality.

In a distributed ledger, Each node processes and verifies every item, thereby generating a record of each item and creating a consensus on its veracity. A distributed ledger can be used to record static data, Such as a registry, and dynamic data. Such as financial transcations.

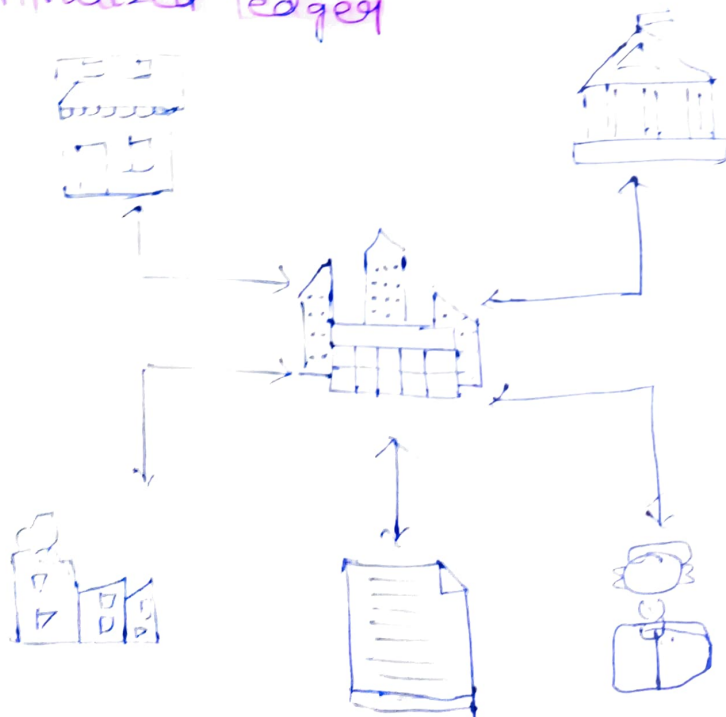Blockchain is a Well known Example of a distributed ledger technology.

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Distributed ledger technology (DLT) refers specifically to the technological infrastructure and protocols that allow the simultaneous access, validation and updating of records that characterizes distributed ledgers. It works on a computer network spread over multiple entities or locations.
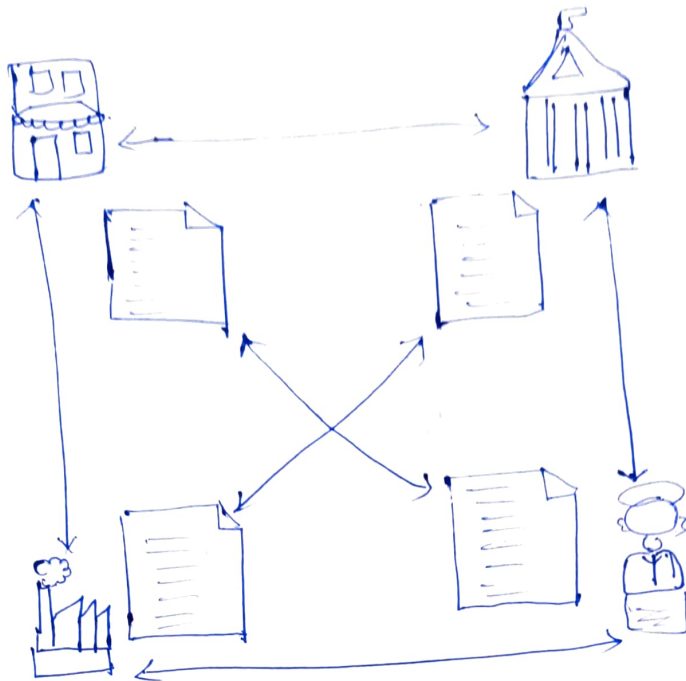
DLT uses cryptography to securely store data. Cryptographic signatures and keys to allow access only to authorized users.

The technology also creates an immutable database which means information, once stored, cannot be deleted and any updates are permanently recorded for posterity.

Centralized ledger

Distributed ledger :-

Distributed ledger

This architecture represents a significant change in how information is gathered and communicated by moving record-keeping from a single, authoritative location to decentralized system in which all relevant Entities can view and modify the ledger.

As a result, all other Entities can see who is using and modifying the ledger. This transparency of DLT provides a high level of trust among the participants and practically eliminates the chance of fraudlent activities occuring in the ledger.

As such, DLT removes the need for Entities using the ledger to rely on a trusted central authority.

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That controle the ledger, or an outside, third party provider to perform That role and act as a check against manipulation.

Interest in a distributed ledger technology grew significantly in the decade after the 2009 launch of bitcoin, a cryptocurrency, powered by blockchain technology that was the first to demonstrate that the technology not only worked but could scale and remain secure.

from that time onward, organizations across Industries Experimented with DLT and how it could be used in Enterprise processes, financial services, healthcare and pharmaceutical sectors were Early leaders, and supply chain Management a common application.

It's important to note that the concept of distributed ledger is not new. Organizations have long gathered and stored data in multiple locations Either on paper or in siled software bringing the data together in a centralized database only Periodically. A company for Example might have different bits of data held by Each of its divisions. with that data

a centralized ledger only when required. Similarly, multiple organizations working together typically hold their own data and contribute it to a centralized ledger controlled by an authorized party only when requested or required.

The great advancement of DLT is its ability to minimize or eliminate the often time consuming and error-prone processes needed to reconcile the different contributions to the ledger, ensure that everyone has access to the current version and that its accuracy can be trusted.

Examples of DLT

Blockchain, which bundles transcations into blocks that are chained together, and then broadcasts them to the nodes in the network, is the best-known type of DLT. It powers bitcoin and other cryptocurrencies.

Tangle, another type of DLT, is geared toward IOT ecosystems. The Eclipse Foundation the IOTA foundation created the tangle ⓑ

working group, which describes Tangle as "a permissionless, feeless, scalable distributed ledger, designed to support trustworthy data and value transfer between humans and machines."

other well-known distributed ledger technologies include corda, ethereum, and hyper ledger fabric

How Distributed ledgers work.

Distributed ledgers are held, recognized, and controlled by individuals called nodes. The database is constructed independently by each node. Every transaction occurring on the network is processed, and a conclusion on the development of the database is created by each node.

Based on the transaction, voting is carried out on the changes completed on the database. All nodes participate in the voting, and if at least 51% of them agree, the new transaction is accepted on the database. Afterward, the nodes update the versions of the database so that all the devices or nodes will be of the same version. The new transaction is written onto a block on the blockchain.

Nodes in proof-of-work blockchain are also called Miners. When a miner successfully puts a new transaction into a block, they receive a reward. It requires a dedicated 24×7 computer power. It is the responsibility of miners to compute the cryptographic hash for new blocks. Whoever, among the miners, successfully finds the hash first, gets the reward.

Miners dedicating more computational power to find the hash will be more successful. However, as blocks keep generating, it becomes more difficult to find subsequent hash scales. The goal is to keep a constant speed of generating the blocks.

Benefits of Distributed Ledgers :-

1. Highly transparent, Secure, tamper-proof, and immutable

In distributed ledgers, the entries happen in the database without third-party involvement. After records are written into distributed ledgers, they cannot be altered by any other party. Hence, until the ledgers are distributed, the records cannot be tampered with.

The need for a third party is Eliminated:

Although it is not necessary to always operate the distributed ledgers without a third party, it can save a lot of money and time in some cases. In the supply chain business, results can be written directly by sensors to the blockchain without the need for third party. It Saves a considerable amount of money, effort, and time.

Inherently decentralized :-

The distributed ledgers inherently decentralized nature adds another layer of security. As the database is spread globally, it is difficult to attack.

Highly transparent :-

Distributed ledgers present with a high level of transparency. They allow the stored information to be freely and easily viewable. It provides a significant amount of transparency desired by many industries

3Q. Suggest which type of blockchain should be used for the security of donations in a charity organization. What benefits does the blockchain technology introduce in such a scenario? Explain with example.

How is blockchain helping to make the world a better place?

Charities, nonprofits and non-governmental organizations (NGOs) often do not have the right technology to reach the corporate donors who are willing and able to help. Whether it's a question of funding a more modern IT infrastructure, expanding in-house skills, or finding other resources, the critical connections can be lost or just never made. In addition, the levels of fiduciary accountability and financial visibility required by corporate donors can overwhelm these organizations.

Blockchain technology can power new models for change, advancing knowledge and helping social organizations create shared systems of record that respond to corporate donor's requirements
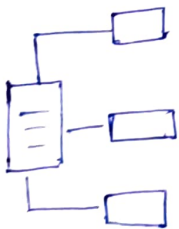
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Newlight Technologies creates high-performance consumer goods from greenhouse gas. Blockchain Ensures product processes and impact on the Environment can be tracked, audited and communicated.

How blockchain helps humanitarian Efforts

A single view of the truth

Blockchain technology creates a distributed shared system of record among network members that eliminates the need for — and disagreements caused by — different ledgers.

Immutable, tamper-proof records

Consensus from all members of a blockchain network is required to validate Each transcation, and all validated transcations are permanently recorded on the blockchain, No one can delete them — not Even system administrators

Permissioned participation

Each member of the network must have access privileges in order to participate, keeping out bad actors. Furthermore, information is shared with other networks members on a need-to-know basis only.

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Charity is a critical part of democratic society.
It is known that there are many incidents take
place in this world which causes tragic loss
whether it can be related to wealth or life and cause
extensive damage every year. To recover from various
types of losses many require help from organiztne
who prooviding services which can be fonanical aid to
basic necessities. People are now becoming gluttonous
to contribute to the society. So, charity is a
highly growing sector in today's world and
it has evolved from its traditional organiztnal
concepts to a decentralized crypto-currency based
system.

The traditional system suffers from various
problems such as lack of transparency, lack of trust
between donors and corruption. Blockchain is a remarkably
transparent and decentralized way of maintaing this
kind of different chality based transecatione.

So blockchain based decentralized system that
acts as a platform to donate money for donors
to beneficiaries and this entire system taking
place under maximum security and fulfilled
trust

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Fake charities try to take advantage of our generosity and compassion for others in need. Scammers will stealy your money by acting as genuine charity. Theres Scams not only cost you money but they also doveet much needed donations away from legitimate Charities and Causes.

The charity proposed system

The proposed system builds such a platform Where all the people who genuinely wants to donate for a good cause and wants to help the needy. they able to do here through its website with all their trust. And they able to get or seet the track record of transication. And also, the people who need help should be able to till the information on the form provided by charity organization for areview.

Applications

1. With the addition of blockchain into charities, donors would no longer be unaware of what's being done with their money. Donation information would be stored in blocks along with donor information

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2) Since blockchain is a public ledger that is viewable by anyone. Charity fraud would be very difficult to commit; donors are able to carefully monitor their funds and ensure that no data is tampered with.

3) Blockchain technology can help charities manage their funds more closely and serve as a marketing strategy, removing the need for there middle men

4) Smart contracts are applications that run on blockchain technology that have rules and conditions programmed into them and initiate certain events when these conditions are met. In the cases of philanthropy. These contracts can present agreements between the giver and the charitable organizatn. This brings a lot of opportunities for all the parties involved in the donation process and can make it fully automated and uncompromising.

5) Charities can accept payments securely, transparently and globaly without the need to pay currency exchange fees.

Future scope :-

Block chain technology has a great future worldwide. An incredible scope of blockchain technology has been observed in the financial field. Blockchain technology helps charities to become more transparent In the future. We may see accountability for the spending of donations fixed to smart contracts, Enabling donors to donate directly to those best In a position to help

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