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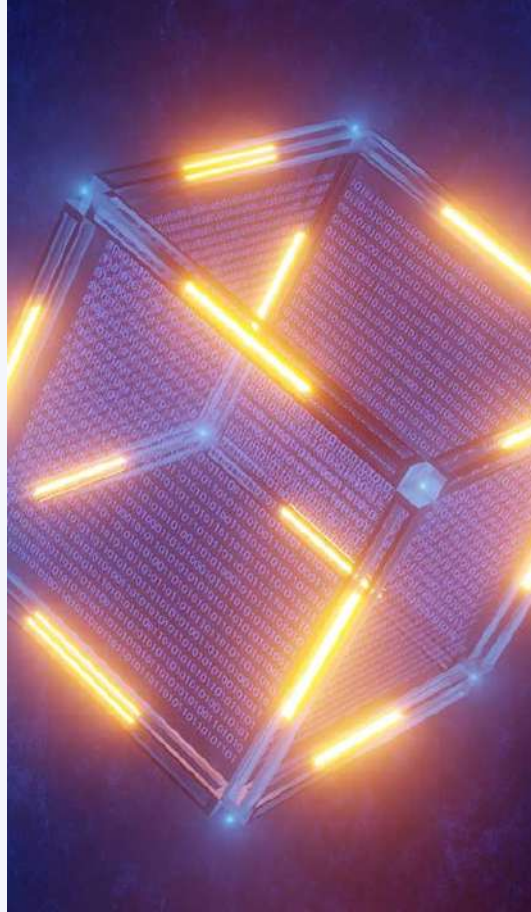
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# INTRODUCTION TO BLOCKCHAIN

Blockchain is a technological breakthrough that can fill in the "trust" factor in our economy, just as the Internet filled in the gap named 'Distance'. As a distributed ledger with characteristics such as decentralisation, immutability, provenance, and consensus, Blockchain will fill the trust gap and make it easier for people to trust.

Blockchain technology is a decentralised and immutable ledger which facilitates the process of recording transactions. The peer-to-peer network that was introduced in the year 2008 as a part of a proposal for Bitcoin. Blockchain technology has the ability to solve the two main problems that the society is facing today: the "trust" gap and intermediaries. The economy we

live in is in a state where people follow the 'trust but verify' principle, which means people need validation for trusting someone.

The reason behind this situation is that the ledger of our transactions is centralised, meaning that it is just as easy to tamper the data to add it. The need of Blockchain is increasing continuously because currently, it is not only humans we are transacting with, but it is also with machines and smart devices. The Blockchain technology has the power to replace intermediaries and can create a peer-to-peer economy where there will only be one universal ledger to record transactions with multiple owners/participant to authenticate it.

## 3 STAGE DEVELOPMENT OF BLOCKCHAIN TECHNOLOGY

The development of Blockchain technology over the years can be understood by dividing it into 3 stages.

The three-stage development of Blockchain are mentioned below:

### Blockchain 1.0: Digital Currency

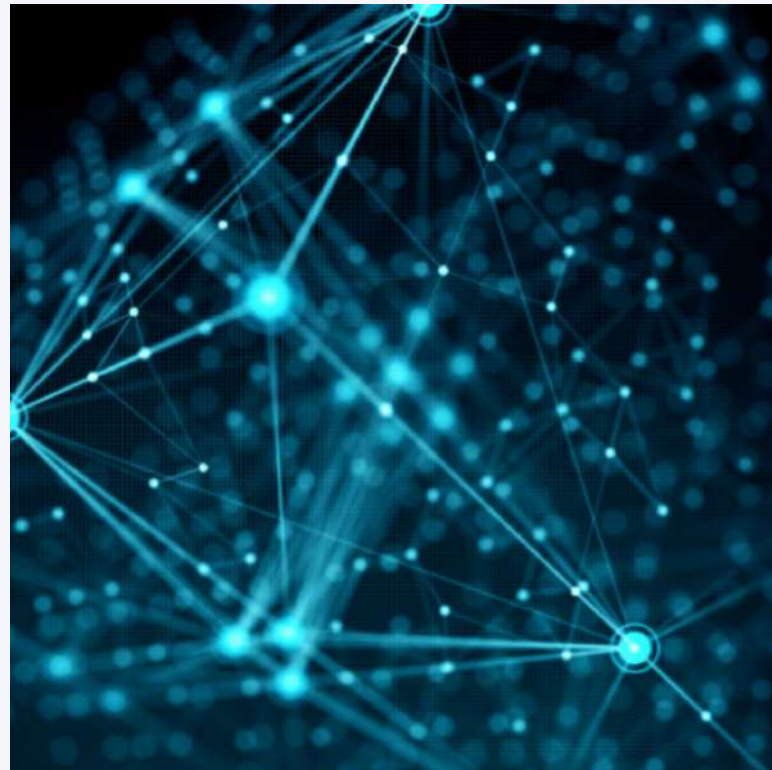
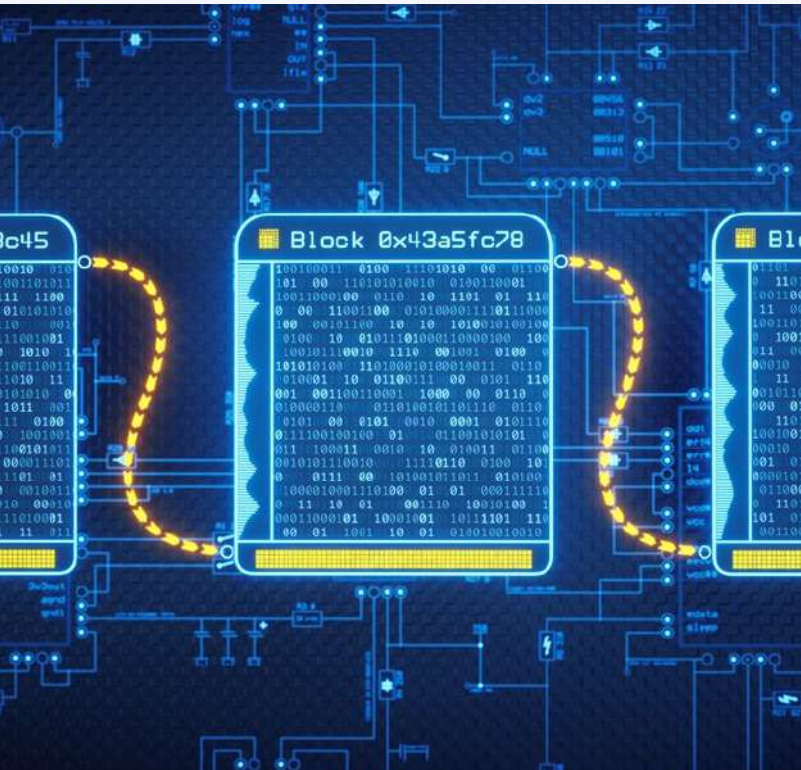
Blockchain 1.0 was introduced in 2009 and used hardcoded special-purpose systems to focus mainly on the digital currencies. The main advantages of Bitcoin were that it provides greater anonymity than credit cards and uses cryptography to guarantee a relatively fixed money supply.

## Blockchain 2.0: Digital Economy

Blockchain 2.0 which commenced in 2014 refers to the wide range of economic and financial applications beyond simple payments, transfers, and transactions. One of the critical emergings uses of Blockchain technology involves intelligent contracts. Smart contracts are basically computer programs that can automatically execute the terms of a contract.

## Blockchain 3.0: Digital Society

Blockchain 3.0 which began in the year 2017 refers to a vast array of applications that do not involve money, currency, commerce, financial markets, or other economic activity. Such applications include art, health, science, identity, governance, education, public goods, and various aspects of culture and communication.



The main components of Blockchain are:

1. Nodes: A node is a computer in the Blockchain architecture. These are authorized network stakeholders that keep track of the distributed ledger and their primary job is to confirm the legality of every block that will be added to the Blockchain. Each node holds an identical version of the transactions. Blockchain is known as distributed and peer-to-peer because nodes are responsible for maintaining the correct database of past transactions in a distributed way, validating each other's dealings on the network.
2. Transactions: An almost immutable record of financial transactions and contracts that are verified by Blockchain participants.
3. Block: it is the place where information regarding different transactions is recorded safely. Each block can be thought of as a page in the ledger. It is not easy to tamper with the data present in the block because every block has its unique identity called hash (which gets created based on the information stored) and also the previous blocks' hash.
4. Chain: a chain of all the blocks (storehouse of all the information) forms a Blockchain.
5. Miners: a group of nodes that verify and add new blocks created by others to the blockchain is called miners. Blockchain miners add bitcoin transaction data to Bitcoin's global public ledger of past transactions.



# BLOCKCHAIN IN HEALTH CARE

BY- ANIKA CHOWFLA  
3BBAFT  
21211415

Days have gone where we have to visit banks, queue for tickets, bills, public phone booths, appointments to doctors, and government offices.

With the revolution of the digital era and constant advancements in the IT industry, each day a new ideology of technology emerges, each day a change is observed and, each day technology reaches a high height making it almost impossible to track and one of the most prominent gifts of technology is BLOCKCHAIN!!

As of 2021, the market size of the Blockchain industry is at \$4.9 billion. It's projected to grow to \$67.4 billion by 2026.

Blockchain is a digital ledger with 'blocks' of digital asset storage which are 'chained' together, forming a chronological single-source-of-truth for the data with utmost security and safety of confidential information.

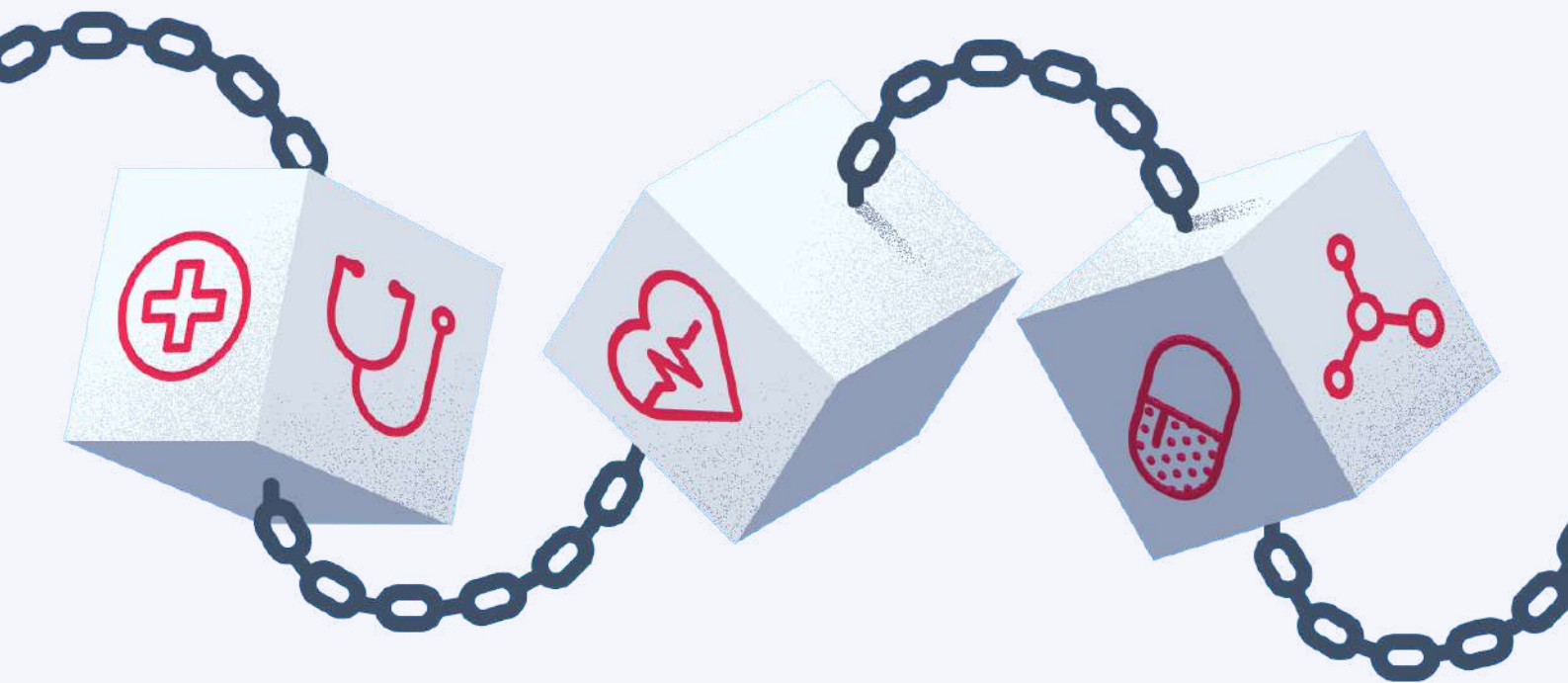


Blockchain is a revolutionary and game changing technology which will impact not only 1 or 2 sectors like; healthcare, money structure, food chain supply, gaming platforms etc., instead the complete landscape of the business world. Blockchain based data structure can be an extremely useful asset in the Healthcare Sector which can provide transparency, safety, accuracy and can safeguard the integrity of data in every aspect possible.

In the field of Healthcare, constant updation of data is an important aspect, which can be easily handled via Blockchain i.e., it will provide an immutable ledger where continuous updation of data is possible without compromising the interest of its users.

Citizens may take part in health study programs and additionally better research and shared data on public wellbeing will enhance treatment for different communities.

With an efficient documentation method via Blockchain, the systematisation of data can be enhanced. Through encrypted fast paced technology the patients can be well informed with all the material information before-hand. Earlier, the anomalies like physical presence of patients, handwritten records, difficulty in data interpretation, missed appointments, data manipulation, integrity of data or security of data etc., can be minimised with the emergence of Blockchain in the mainstream. It will significantly minimise financial failures and also



avoid theft and the illicit transferring of records. It can solve problems of changing results and snooping data. In fact, at times of contingencies when the patient is under the observation of a new doctor then, with just one click the doctor can access the patient's medical records which will save both time of doctors and life of patients

For instance, tracking a drug as it travels from the manufacturer to the patient is made simple by Blockchain technology. This enhances a drug's traceability as it passes through the supply chain and reduces the likelihood of drug fraud. It increases trust and prevents the illicit handling of records, payments, and medication by various people interested in purchasing drugs. The decentralised nature of this technology also allows patients, doctors and healthcare providers to share the same information quickly and safely. The Blockchain makes the entire prescription process transparent, from manufacturing to pharmacy shelves.

Even though Blockchain technology has emerged, there are only a few service providers in the industry like; BurstIQ platform helps healthcare companies safely and securely manage massive amounts of patient data. Its Blockchain technology enables the safekeeping, sale, sharing or licensing of data while maintaining strict - compliance with HIPAA (Health Insurance Portability and Accountability Act) rules; MedicalClaim provides a Blockchain that maintains the integrity of health records while establishing a single point of truth.

Doctors, hospitals and laboratories can all request patient information that has a record of origin and protects the patient's identity from outside sources and ProCredEx (Professional Credential Exchange), has created a distributed ledger of data related to healthcare credentials that boosts complex dataset efficiency by rendering the data immutability and permanent traceability.

Blockchain is indeed a blessing for the Healthcare Industry where there isn't a single gateway for tampering, offers seamless connectivity that is backed by smart contracts and gives access to all electronic health data. This technology would significantly enhance and eventually revolutionise how doctors and physicians treat and use clinical records and improve healthcare services they provide to their patients.



# BLOCKCHAIN IN CROSS-BORDER TRANSACTIONS

BY-SAMAY JOLLY  
1BBAFT  
22211459



Cross-border payments are those made between separate countries. For individuals, companies, merchants, industries, and international development organisations, cross-border payments are essential. However, because of their astronomical costs and protracted processing periods, cross-border transactions are frequently inconvenient. Cross-border payments using Blockchain will streamline the procedure overall. The global economy will get an uplift by using Blockchain technology for cross-border payments. Blockchain technology and distributed ledger technology are revolutionising cross-border money transfers. By using encryption technology, it expedites the payment process. There are currently a large number of Blockchain-based payment platforms, and there will be a large number more in the future.

Businesses and individuals just desire the ability to transmit money internationally with the same ease as sharing an email. The major reason for invading them can be because international payment infrastructures can be ineffective and expensive, requiring many

middlemen and taking days or weeks to complete transactions in different currencies. The removal of current impediments that result in delays and expensive fees is necessary for operational efficiency to be improved to the point where payments can be made similarly to emails.

**1. Industry Primed for Disruption**  
Payments make up a sizable portion of the banking, as one might anticipate. However, difficulties in payment processing persist even as digital payments grow in popularity as a means of exchange. According to custom, each party to a transaction maintains its own records on independent ledgers. Those records must be reconciled

manually, which is a time-consuming, error-prone, and typically paper-intensive operation. Middlemen must be paid at each stage, and in currency corridors with less competition and manually, which

On May 22, 2010, a man in Florida paid 10,000 bitcoins (BTC) for two pizzas. This is generally recognized as the first bitcoin transaction for a commercial purpose.

is a time-consuming, error-prone, and typically paper-intensive operation. Middlemen must be paid at each stage, and



in currency corridors with less competition and regulation, there is a chance of opportunistic pricing. Due to its ability to promote transparency and reduce the need for middlemen through shared, distributed ledgers, consensus, and an indelible history of transactions, Blockchain has gained interest recently. Disruption is impending when long-standing problems can be resolved with new technology.

## 2. An eye on the future-

According to KlickEx Group, the new network is currently processing live financial transactions across 12 currency corridors between a number of Pacific island countries and Australia, New Zealand, and the United Kingdom. This parallel production with its legacy systems is already underway. By the beginning of next year, KlickEx hopes to handle up to 60% of all cross-border payments in these corridors using this new network. Beginning in 2018, commercial banks and financial institutions that participated in the network's initial

development and deployment will be invited to join. Reducing the friction and costs associated with cross-border payments is a major draw for businesses. But if you delve a little deeper, you'll find that digitising payments can speed up financial inclusion in underbanked areas by giving customers in emerging nations with digital connections access to the world's financial system.

Some of the companies using Blockchains for cross-border transactions:

### G-Cash:

A mobile wallet, mobile payment, and branchless banking service from Manila, Philippines are called G-Cash released in 2004 a micropayment service that turns the phone into a virtual wallet for safe, quick, and practical money transfers. G-Cash is a well-known micropayment service that turns a smartphone into a virtual wallet for safe, quick, and practical money transfers. With G-Cash, you may shop online, pay bills, mail money,

make donations, buy prepaid credit, and even buy things without having to use cash.

### Celo:

Celo is a Blockchain designed exclusively for mobile devices and geared for peer-to-peer payments with just a mobile number and it's based in San Francisco, USA . With the help of a multi-asset system that consists of a governance and staking asset (CELO), a family of stablecoins, and an Ethereum compatible technology that can reach millions of users worldwide, Celo is converting cryptocurrencies into useable money (e.g., cUSD, cEUR). Since the Mainnet's introduction in 2020, Celo's network has supported over a thousand projects from builders, developers, and even artists who daily develop new applications and issue virtual currencies from more than a hundred nations worldwide. Numerous businesses and people, including Jack Dorsey, a16z, and Deutsche Telekom, are sponsors of Celo.



# BLOCKCHAIN IN LOGISTICS

BY-AMAN JOSHI  
1BBAFT  
22211415

There are many applications of Blockchain in Logistics. To get a good understanding, let's take a look at the four Blockchain Logistic applications:

## 1) Better Freight Tracking:

Using Blockchain in Logistic systems and Supply chain can help you handle and track down freight more easily. At present, same-day deliveries and on-demand deliveries are increasing. So, it can quickly become a burden for Logistic companies as they don't have the infrastructure to meet up with the needs for these overwhelming demands.



Also, these technologies don't have a secured authentication process. Therefore, cybercriminals or unethical people always take advantage of the network's information. Blockchain can really change the scenario here. As Blockchain offers a proper authentication channel with verification, no one can tamper with the data. Also, as you can keep track of all your deliveries and track the deliveries in real-time. It can ensure a better consumer experience for the Logistics industry.

## 2) Improved Shipping process efficiency

With Blockchain, the first thing that will improve in Logistics is shipping and freight. In short, it can be used to improve the delivery.

Maersk already knows the importance of Blockchain and has already incorporated it into its processes and operations. They are one of the largest shipping container operators. The end goal is to track the shipment in the best possible way by working with other authorities. IBM is also working with Maersk to improve the global trade infrastructure.

## 3) Security for the Internet Of Things (IoT) devices for increasing efficiency

Many companies are already using Internet Of Things devices to track the products or maintain the quality all the time. However, these IoT devices are prone to cyberattacks because they tend to use cloud servers to communicate

There are more than 84.79 million unique users of blockchain wallets as of October 2022.

The average daily value of Blockchain transactions is around \$40 billion.

Many trucking companies are trying to invest in good tracking technology, but these technologies' security is questionable.



with each other, which is a vulnerable process.

So, here, Blockchain in Logistics and supply chain can offer security for these IoT devices and monitor all the data that comes from all of these devices. More so, it can also help analyse and categorise all the data from these devices to make changes in the business strategy.

#### 4) Better transparency

Blockchain's one of key features is transparency. If implemented right, Blockchain for supply chain offers better transparency, which in return affects logistics transparency. It lets companies trust each other more credibly. By having better transparency, there will be fewer invoice disputes, fewer workers exploitation, and better auditing costs.

Apart from the end consumers, the B2B business will implode due to improved credibility and integrity. The trust means that the auditing costs, invoice disputes, and other aspects of conflict will be reduced to a great level or even removed.

New Kids on the Blockchain: 44% of gamers have either purchased or traded game items using Blockchain tech.

There are already companies that are investing in making transparency better. One such company is the Provenance company that has conducted case studies to see how Blockchain can improve logistics aspects, including the supply chain.



# BLOCKCHAIN IN DATA PRIVACY AND SECURITY

BY-ADITYA MITTAL  
3BBAFT  
21211405



Data privacy is protection of personal data from those who should not have access to it and the ability of individuals to determine who can access their personal information.

Keeping private data and sensitive information safe is paramount. If items like financial data, healthcare information, and other personal consumer or user data gets into the wrong hands, it can create a dangerous situation. The lack of access control regarding personal information can put individuals at risk for fraud and identity theft. Additionally, a data breach at the government level may risk the security of the entire country. And if one occurs within your company, it could make your proprietary data accessible to a competitor. As an increasingly large portion of our lives and activities occur online, cybersecurity is an ever-growing concern.

In the age of increasing need for data protection due to above mentioned reasons, Blockchain technology can help achieving it because of its following characteristics:

1. Decentralised & distributed networks: They are dispersed throughout a large network with no central authority to govern them.
2. Immutable Ledger: A block that has been developed in the network cannot be modified after that point. A consensus-based mechanism is one in which network users concur that the data is accurate.
3. Better Data Quality: Since every member verifies the transaction, error is reduced.
4. Increased Verifiability: Its immutability enhances trust.

Public Blockchain: like Bitcoin, anyone can download the software and become a network participant. Example- Ethereum. It is a fully decentralised network system.

Bitmain, a Chinese company that produces integrated circuit chips for crypto mining, is considered the largest Blockchain organization in the world by market valuation of \$40-50 billion in early 2021.

## COMPARISON OF BLOCKCHAIN PRIVACY SYSTEMS

Features:

- Open Environment: It is open for all only a good internet connection is required. One can transact in a safe



environment. Not all public platforms offer mining features.

- **Anonymous Nature:** Here real names are not used, due to this no one can trace who the other participant really is.
- **No Regulation:** It does not have any regulation that nodes have to follow, there is no restriction on how the enterprise uses the platform.

**Private Blockchain:** It decides a certain set of authorised nodes who will participate in a given network and it is not open to the public at large. Only a single user has the authority over a network, it is not open for public people. It is not fully decentralised. In certain cases, companies need to give privacy greatly.

**Features:**

- **High Efficiency:** Since it is accessed by a handful of users it does not take many resources and the platform does not slow down either.
- **Full Privacy:** If an enterprise is looking for a high level of privacy then it is perfect for it.

- **Empowering Enterprises:** Companies do need great technology to back up their process. It is highly capable of offering security.
- **Stability:** There are not any transaction requests, but it does not take time to complete them.

Blockchain Offer the following facilities:

#### 1. Secure Data Storage

The greatest method for protecting the data of the shared community is blockchain. Anyone using the Blockchain's capabilities cannot access or tamper with any sensitive data that has been saved.

Handling data that is dispersed over a network of people is beneficial. Additionally, the technology may help public agencies maintain decentralised and secure public records.

A business model can also store a data's cryptographic signature or a large amount of data on a Blockchain. Users could do this while ensuring the security of their data.

Distributed storage software, which divides up large amounts of data, uses Blockchain technology. This is available in encrypted data across a network in a way that means all data is secure.

#### 2. Unfeasible to Attack

Blockchain offers solid data backing because it is decentralised, encrypted, and cross-checked. As Blockchain has a large number of nodes, it is impossible to simultaneously hack most of them. Data immutability is one of distributed ledger technology's core characteristics. It delivers a completely new standard of security that prevents any action or transaction from being changed or faked. Every transaction is valid because of this technology, which allows various network nodes to confirm it.

Blockchain technology's digital landscape is a package of security and transparency. Blockchain brings techniques to tackle data management issues, mainly related to security, privacy, and verification.



# BLOCKCHAIN IN CRYPTO-TRADING

BY-ABHINAV BOHRA  
3BBAFT  
21211402

The primary function of Blockchain in the present times is Trading. Trading is one of the main reasons why Blockchain gained huge attention. Due to its encrypted, transparent, and well-connected ledger technology, Blockchain has become the backbone for trading crypto-currencies.

Cryptocurrencies are a medium of exchange, created and stored electronically in the Blockchain, using encryption techniques to control the creation of monetary units and to verify the transfer of funds.

An interesting bitcoin fact is that when the protocol for the bitcoin network was set up, the limit was set at 21 million coins.

Various cryptocurrencies such as Bitcoin, Ethereum, Solana, etc are well-known examples. Cryptocurrencies have no intrinsic value, it is not exchangeable for other commodities, such as gold, or stocks in the market. It has no



existing form and exists only in the network. The network for trading cryptocurrencies is completely decentralized and its supply is not determined by the Central bank.

The four major types of crypto tokens traded in the market are utility, payment, security, and stablecoins. There also are DeFi tokens, NFTs, and asset-backed tokens. Of all cryptocurrencies, the most common are utility and payment tokens. These do not have their investment-backed or guaranteed by regulation. So far, trading, whether it is a Non-Fungible token or Fungible tokens, is by far the biggest use case of public Crypto Blockchains. Ethereum, Binance Smart Chain, Polygon, Solana and Polkadot stand to be the most smart-contract based Blockchains in Crypto and

they have plenty of trading decentralised applications hosted on them.

Uniswap and Pancakeswap are the largest liquidity-pool based decentralized exchanges, that have a combined daily volumes averaging \$500 million of different tokens existing on the blockchain. The new emerging orderbook-style decentralised exchanges include dYdX, Serum and GMX. Bitcoin has the largest market share of over 40 percent as of November 2021, according to CoinMarketCap data. That makes a total market cap of \$1.16 trillion. Ethereum has a market cap of over \$514 billion.

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## FACULTY COORDINATORS

Dr. Ruchi Payal

Dr. Mayank Kumar

## STUDENT COORDINATORS

Pranjal Singh

5BBAFT | 20212644

Bhuvaneswari Chithirala

3BBAFT | 21211424

## EDITOR

Abhinav Bohra

3BBAFT | 21211402