

K. J. Somaiya College of Engineering, Mumbai-77
Department of Computer Engineering

Batch: Batch-1 Roll No.: 1811008

Experiment / assignment / tutorial No. 01

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

Title: Block chain demo - [Link-1](#) [Link-2](#)
Block explorer – Bitcoin and Ethereum and Test Networks

Objective:

To explore the blocks of chains, hashing process, peer to peer distribution and transaction data storage. To also explore the Block Explorer to see newly mined blocks and their contents and observe how the chain of process works.

Expected Outcome of Experiment:

CO	Outcome
CO1	Build your own Blockchain businesses with acquired knowledge

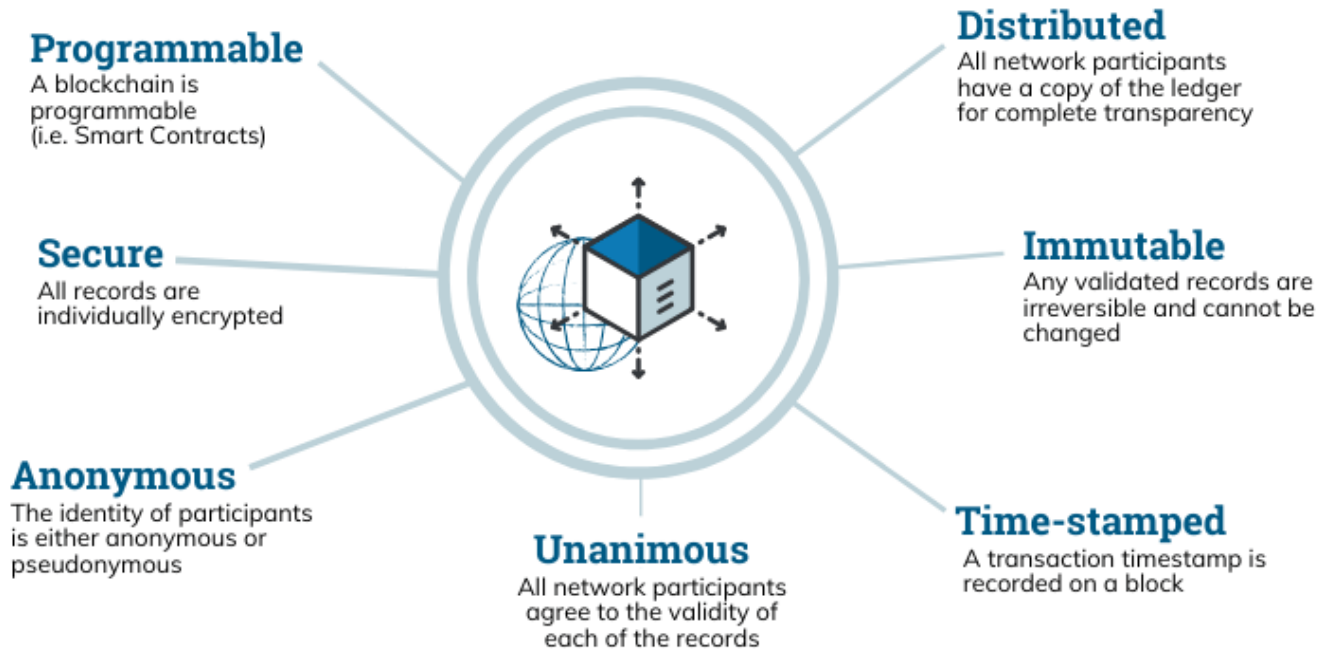
Books/ Journals/ Websites referred:

1. [Introduction to Blockchain technology | Set 1 - GeeksforGeeks](#)
2. [Blockchain Explorer - Search the Blockchain | BTC | ETH | BCH](#)
3. [Blockchain Demo \(andersbrownworth.com\)](#)
4. [Blockchain Demo - A visual demo of blockchain technology](#)

Abstract:-

Blockchain is the backbone Technology of Digital CryptoCurrency BitCoin. The blockchain is a distributed database of records of all transactions or digital event that have been executed and shared among participating parties. Each transaction verified by the majority of participants of the system. It contains every single record of each transaction. BitCoin is the most popular cryptocurrency an example of the blockchain. Blockchain Technology first came to light when a person or Group of individuals name ‘Satoshi Nakamoto’ published a white paper on “BitCoin: A peer to peer electronic cash system” in 2008. Blockchain Technology Records Transaction in Digital Ledger which is distributed over the Network thus making it incorruptible. Anything of value like Land Assets, Cars, etc. can be recorded on Blockchain as a Transaction.

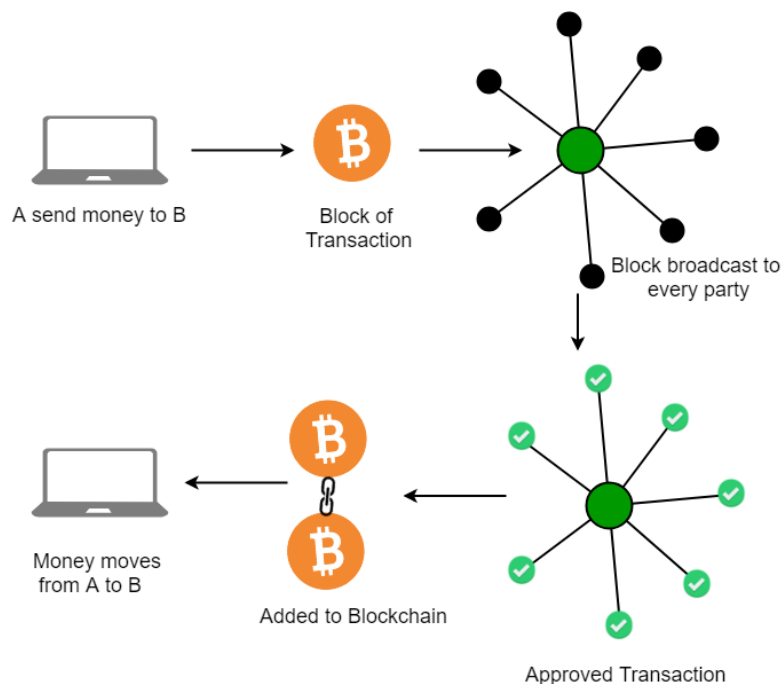
The Properties of Distributed Ledger Technology (DLT)



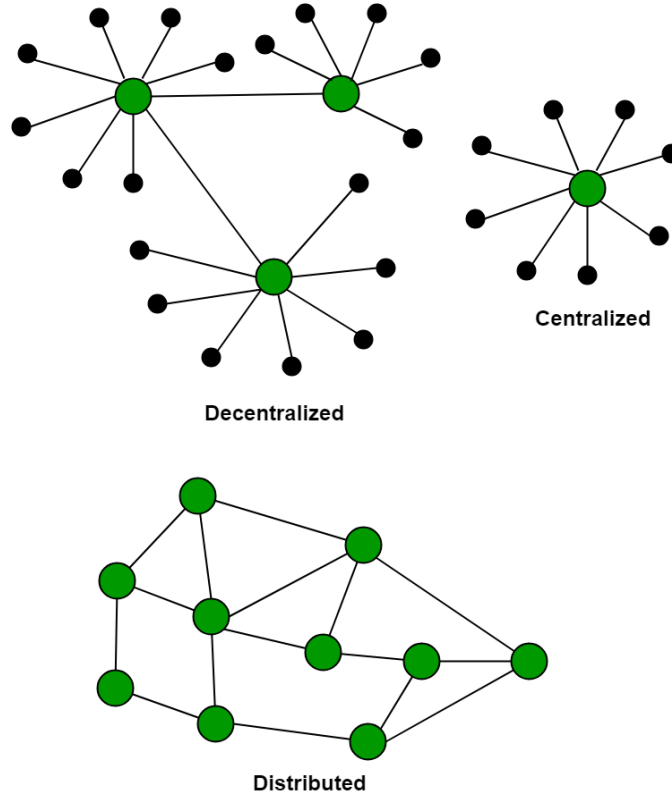
Related Theory: -

How Blockchain Technology works?

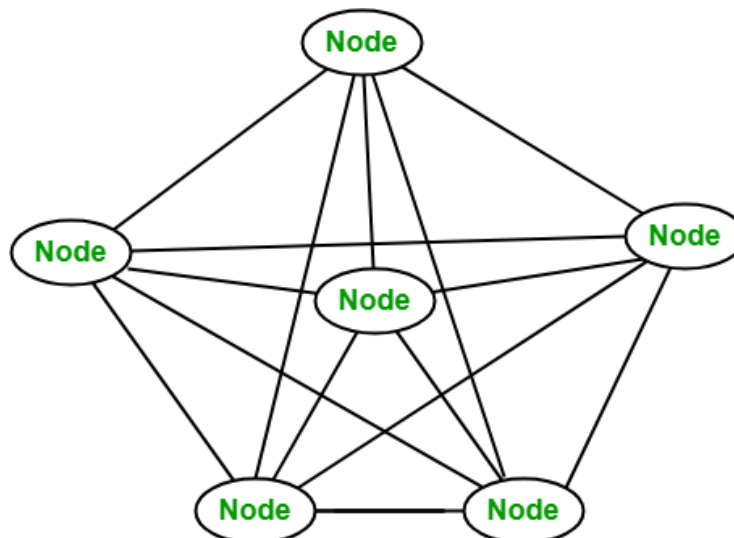
One of the famous use of Blockchain is Bitcoin. The bitcoin is a cryptocurrency and is used to exchange digital assets online. Bitcoin uses cryptographic proof instead of third-party trust for two parties to execute transactions over the internet. Each transaction protects through digital signature.



Distributed Database: There is no Central Server or System which keeps the data of Blockchain. The data is distributed over Millions of Computers around the world which are connected with the Blockchain. This system allows Notarization of Data as it is present on every Node and is publicly verifiable.



A network of nodes: A node is a computer connected to the Blockchain Network. Node gets connected with Blockchain using the client. Client helps in validating and propagates transaction on to the Blockchain. When a computer connects to the Blockchain, a copy of the Blockchain data gets downloaded into the system and the node comes in sync with the latest block of data on Blockchain. The Node connected to the Blockchain which helps in the execution of a Transaction in return for an incentive is called Miners.



Implementation Details:

1. Enlist all the Steps followed and various options explored

ANSWER:

1. Exploring the Hashing methodology of a block in blockchain.

Blockchain Demo

HashBlockBlockchainDistributedTokensCoinbase

SHA256 Hash

Data:Hi... Lets Explore Hashes

Hash:65ee02c857213e7c165009bbf5cf3ff2d934a6e386f3c1b140ad5815f6071edc

Blockchain Demo

HashBlockBlockchainDistributedTokensCoinbase

SHA256 Hash

Data:Hi... Lets Explore Hashes2

Hash:7f7257cb677596bbd629526276257c64e407aeb61cfed6d96295154672cab12f

2. Observing the hash value for a block when mined using nonce and data. Also changing the data to see what happens to the block.

- a. Before Mining the Block and changing the empty data:

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Blockchain DemoHashBlockBlockchainDistributedTokensCoinbase

Block

Block: # 1

Nonce: 72608

Data: [Lets](#) Explore Blocks. This is a new Block

Hash: c517ebb90ab1fc73077b8291fe3110b301b384cc6e2bdad91f9f1d31b0c81c8e

Mine

b. After Mining the Block:

Blockchain DemoHashBlockBlockchainDistributedTokensCoinbase

Block

Block: # 1

Nonce: 11343

Data: [Lets](#) Explore Blocks. This is a new Block

Hash: 000056ae8137bcf5444d1308b44da5616464ce3440bf53f929cab7be33ac2600

Mine

3. Observing the chain of Blocks place one after other to see what happens when data of one block changes in the system.

a. Initial State:

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Blockchain Demo
Hash Block **Blockchain** Distributed Tokens Coinbase

Blockchain

Block: # 1

Nonce: 11316

Data:

Prev: 00

Hash: 000015783b764259d382017d91a36d206d0600e2cbb3567748f

Mine

Block: # 2

Nonce: 39073

Data: Block-2

Prev: 000015783b764259d382017d91a36d206d0600e2cbb3567748f

Hash: 00006750a38c363ddf6dd41b488d47ef0238ce00c9302801191

Mine

Block: # 3

Nonce: 177893

Data:

Prev: 00006750a38c363ddf6dd41b488d47ef

Hash: 000080c73da9ede79a7d561d29716ba8

Mine

4. Studying distributed blockchain between peers with data in transaction form.

a. Changing data in transactions in block-2 for Peer-A:

Blockchain Demo
Hash Block Blockchain Distributed **Tokens** Coinbase

Peer A

Block: # 1

Nonce: 139358

Tx:

\$ 25.00	From: Darcy	-> Bingley
\$ 4.27	From: Elizabeth	-> Jane
\$ 19.22	From: Wickham	-> Lydia
\$ 106.44	From: Lady Catherine de B	-> Collins
\$ 6.42	From: Charlotte	-> Elizabeth

Prev: 00

Hash: 00000c52990ee86de55ec4b9b32beef745d71675dc0edd7bc7b88336e2e296b

Mine

Block: # 2

Nonce: 39287

Tx:

\$ 97.67	From: Ripley	-> Lambert
\$ 50.00	From: Kane	-> Ash
\$ 6.15	From: Parker	-> Dallas
\$ 10.44	From: Hicks	-> Newt
\$ 88.32	From: Bishop	-> Burke
\$ 45.00	From: Hudson	-> Gorman
\$ 92.00	From: Vasquez	-> Apone

Prev: 00000c52990ee86de55ec4b9b32beef745d71675dc0edd7bc7b88336e2e296b

Hash: ebc9d327feb3da4565ba389303704f0d3cfd3fad835c33b43702a696caae59

Mine

Block: # 3

Nonce: 13804

Tx:

\$ 10.00	From: Emily	
\$ 5.00	From: Madison	
\$ 20.00	From: Lucas	

Prev: ebc9d327feb3da4565ba389303704f0d3cfd3fad835c33b43702a696caae59

Hash: a2c8615c4c6f80091c110ccee8a2c0bc98d3eaa1799cc0

Mine

Peer B

Block: # 1

Nonce: 139358

Tx:

\$ 25.00	From: Darcy	-> Bingley
\$ 4.27	From: Elizabeth	-> Jane
\$ 19.22	From: Wickham	-> Lydia
\$ 106.44	From: Lady Catherine de B	-> Collins
\$ 6.42	From: Charlotte	-> Elizabeth

Prev: 00

Hash: 00000c52990ee86de55ec4b9b32beef745d71675dc0edd7bc7b88336e2e296b

Mine

Block: # 2

Nonce: 39287

Tx:

\$ 97.67	From: Ripley	-> Lambert
\$ 48.61	From: Kane	-> Ash
\$ 6.15	From: Parker	-> Dallas
\$ 10.44	From: Hicks	-> Newt
\$ 88.32	From: Bishop	-> Burke
\$ 45.00	From: Hudson	-> Gorman
\$ 92.00	From: Vasquez	-> Apone

Prev: 00000c52990ee86de55ec4b9b32beef745d71675dc0edd7bc7b88336e2e296b

Hash: 000078bc1834172844c14a9251ca246c6154df1874019873f5d8

Mine

Block: # 3

Nonce: 13804

Tx:

\$ 10.00	From: Emily	
\$ 5.00	From: Madison	
\$ 20.00	From: Lucas	

Prev: 000078bc1834172844c14a9251ca246c6154df1874019873f5d8

Hash: 0000c2c95f54a4704f2bee7056a7dc3071a408786c848b520

Mine

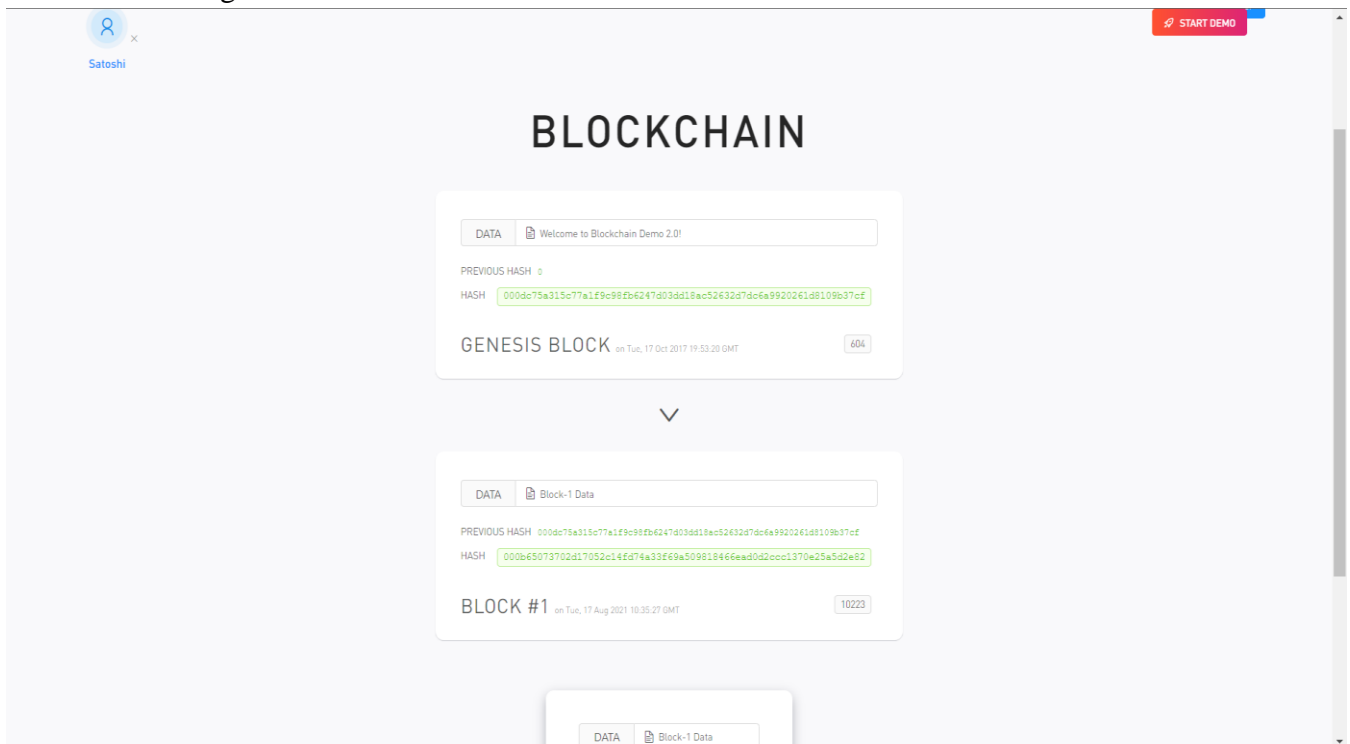
b. Need to mine all blocks including block-2 and its continuations to restore balance in blockchain of Peer A:

[illegible]

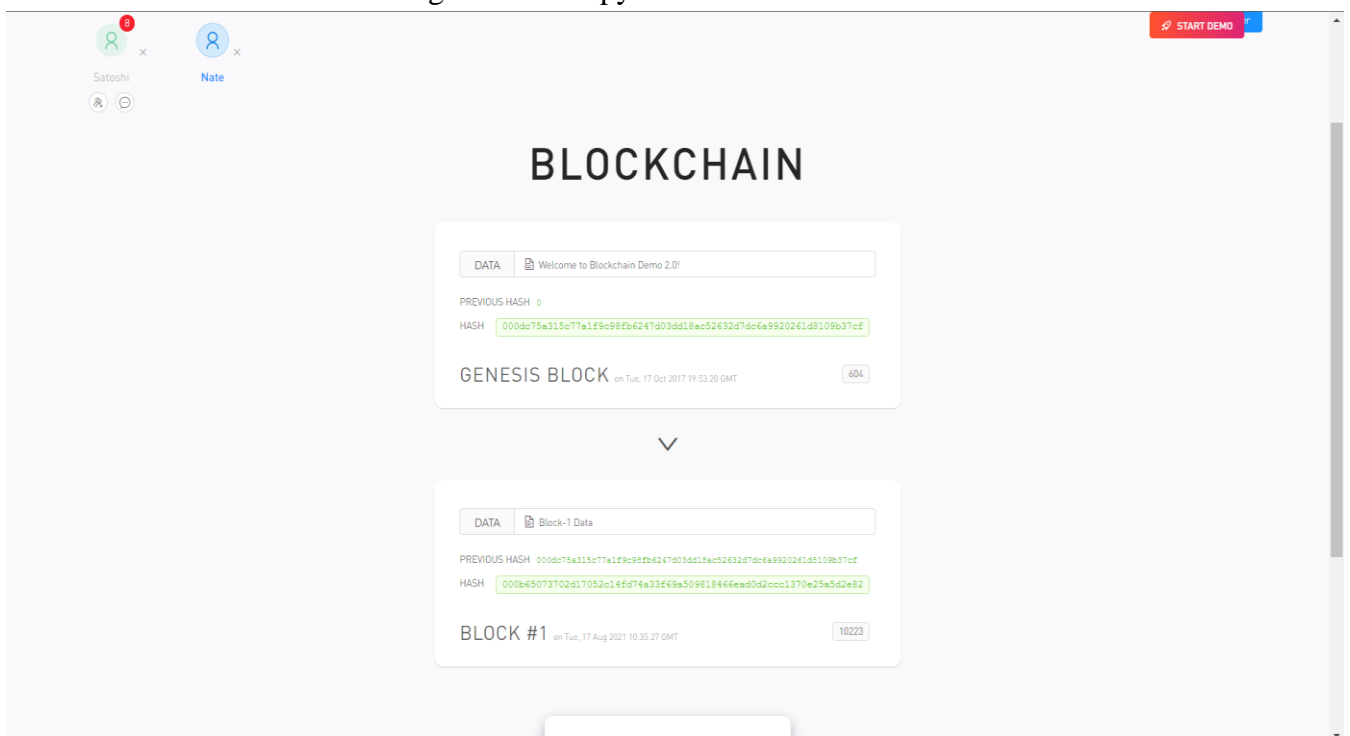
- 5. Trying out a distributed blockchain by creating blocks by different peers and checking all peer's copy of blockchain.**

- The screenshot shows the Bitcoin Blockchain Explorer interface. At the top left, there is a user profile icon with the name 'Satoshi'. The main heading is 'BLOCKCHAIN'. Below this, there is a search bar with the text 'Welcome to Blockchain Demo 2.0!'. The 'PREVIOUS HASH' is displayed as '000dc75a315c77a1f9c98fb6247d03dd18ac52632d7dc6a9920261d8109b37cf'. The 'HASH' is displayed as '000dc75a315c77a1f9c98fb6247d03dd18ac52632d7dc6a9920261d8109b37cf'. The 'GENESIS BLOCK' is highlighted, with the date 'on Tue, 17 Oct 2017 19:53:20 GMT' and a value of '604'. Below the main content, there is a section with a 'DATA' tab and a document icon. A large red button with the text '+ ADD NEW BLOCK' is visible. At the bottom, there is a 'SHARE' button with social media icons (Twitter, Facebook, LinkedIn, Email) and a 'CONNECT' button with a heart icon.

b. Creating Block-1 in Peer-A's blockchain:



c. Creating another Peer named Peer-B(Nate) and connecting it to the Peer-A's blockchain and checking Peer B's copy of blockchain:



d. Let's assume Block-2 was mined by Peer-B and checking Peer A's copy of blockchain to verify the network is distributed.

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DATA

Welcome to Blockchain Demo 2.0!

PREVIOUS HASH 0

HASH 000dc75a315c77a1f9c98fb6247d03dd18ac52632d7dc6a9920261d8109b37cf

GENESIS BLOCK on Tue, 17 Oct 2017 19:53:20 GMT 604

▼

DATA

Block-1 Data

PREVIOUS HASH 000dc75a315c77a1f9c98fb6247d03dd18ac52632d7dc6a9920261d8109b37cf

HASH 000b65073702d17052c14fd74a33f69a509818466ead0d2ccc1370e25a5d2e82

BLOCK #1 on Tue, 17 Aug 2021 10:35:27 GMT 10223

▼

DATA

Block-2 Data

PREVIOUS HASH 000b65073702d17052c14fd74a33f69a509818466ead0d2ccc1370e25a5d2e82

HASH 0009a137924e2e73b8e055485d3779a746976cf0841e2f0687f8cdd091fbcdbd0

BLOCK #2 on Tue, 17 Aug 2021 10:36:46 GMT 1344

Exploring Block-Explorer to check newly mined blocks and their contents. Also observing other intricate details that a block carries and viewing all the new transactions that happened for both ETH and BTC blockchains:

Blockchain.com

Wallet

Exchange

Explorer

Buy Bitcoin

Trade

Ethereum

Blockchain information for Ethereum including historical prices, the most recently mined blocks, and data for the latest transactions.

Price

The price of Ethereum over the last 30 days

30 Days ▾

USD3k
USD2.5k
USD2k

Jul 25 August Aug 08 Aug 15

[View All Prices →](#)

Latest Blocks

The most recently mined blocks

Number	Mined	Miner	Transactions	Size
13042312	1 minute	0x99c85bb64564d9ef9...	312	113,676 bytes
13042311	1 minute	0x01ca8a0ba4a80d12a8...	84	25,796 bytes
13042310	1 minute	0xea674fdde714fd979d...	0	547 bytes

Latest Transactions

The most recently published unconfirmed transactions

Hash	Time	Amount (ETH)	Amount (USD)
0x137afb3720c9e1db5b1741418843b0c4a392f69...	16:33	0.0168069...	\$54.54
0x206e0b0b72a447bc26d26f7d9444480145ea81c...	16:33	0.0000000...	\$0.00
0x45aba87bae994e6933a4bf47f151e21af70595de...	16:33	0.0000000...	\$0.00

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Blockchain.com Wallet Exchange Explorer

Buy Bitcoin

Trade

Bitcoin

Blockchain information for Bitcoin (BTC) including historical prices, the most recently mined blocks, the mempool size of unconfirmed transactions, and data for the latest transactions.

\$46,871.82

[Price →](#)

128.367 EH/s

[Estimated Hash Rate →](#)

263,493

[Transactions \(24hrs\) →](#)

2.494m BTC

[Transaction Volume →](#)

84,156 BTC

[Transaction Volume \(Est\) →](#)

Price

The price of Bitcoin over the last 30 days

30 Days ▾



[View All Prices →](#)

Mempool Size (Bytes)

The aggregate size of unconfirmed transactions in bytes

1 Day ▾



[View All Charts →](#)

Latest Blocks

The most recently mined blocks

Height	Mined	Miner	Size
696219	26 minutes	Poolin	1,347,239 bytes
696218	26 minutes	SlushPool	1,474,311 bytes

Latest Transactions

The most recently published unconfirmed transactions

Hash	Time	Amount (BTC)	Amount (USD)
7f14403144e8c519fcc61a...	16:34	0.00189285 BTC	\$88.72
22e4846a21ad9e30b07e...	16:34	0.03402696 BTC	\$1,594.91

Blockchain.com Wallet Exchange Explorer

Buy Bitcoin

Trade

Explorer > [Ethereum Explorer](#) > Block

USD

Block 13089214 ⓘ

This block was mined on August 24, 2021 at 10:15 PM GMT+5:30 by [0xea674fdde714fd979de3edf0f56aa9716b898ec8](#). It currently has 1 confirmations on the Ethereum blockchain.

The miner(s) of this block earned a total reward of 2.684140976755501291 ETH (\$8,523.11). The reward consisted of a base reward of 2.684140976755501291 ETH (\$8,523.11) with an additional 0.694140976755501291 ETH (\$2,172.39) reward paid as fees of the 67 transactions which were included in the block. The Block rewards, also known as the Coinbase reward, were sent to this [address](#).

A total of 34.11571819138864 ETH (\$108,329.69) were sent in the block with the average transaction being 0.50918982 ETH (\$1,616.86). [Learn more about how blocks work.](#)

Hash	0x062b07113738675e5eb45ccf88640d8bf3d95cfff1a614c97f4e13183769d7b8
Confirmations	1
Timestamp	2021-08-24 22:15
Height	13089214
Miner	0xea674fdde714fd979de3edf0f56aa9716b898ec8
Number of Transactions	67
Number of Internal Transactions	15
Difficulty	8,135,797,996,624,256.00
Total Difficulty	29,462,009,046,285,024,000,000
Size	34,710 bytes
Nonce	0x45b3af8ebd753092
Sha3Uncles	0x1dcc4de8dec75d7aab85b567b6ccdd41ad312451b948a7413f0a142fd40d49347
Number of Uncles	0
Gas Limit	30,000,000
Gas Used	5,091,114 (16.97%)

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Blockchain.com Wallet Exchange **Explorer** Buy Bitcoin Trade

Explorer > Bitcoin Explorer > Block

Search your transaction, an address or a block USD

Block 697399

USD BTC

This block was mined on August 24, 2021 at 10:09 PM GMT+5:30 by [Poolin](#). It currently has 1 confirmations on the Bitcoin blockchain.

The miner(s) of this block earned a total reward of 6.25000000 BTC (\$300,404.88). The reward consisted of a base reward of 6.25000000 BTC (\$300,404.88) with an additional 0.04579025 BTC (\$2,200.90) reward paid as fees of the 1292 transactions which were included in the block. The Block rewards, also known as the Coinbase reward, were sent to this [address](#).

A total of 19,296.56554544 BTC (\$927,485,177.70) were sent in the block with the average transaction being 14.93542225 BTC (\$717,867.78). Learn more about [how blocks work](#).

Hash	000000000000000000000008d165501eac18d36a1ebe303c652b502f9259686dec0
Confirmations	1
Timestamp	2021-08-24 22:09
Height	697399
Miner	Poolin
Number of Transactions	1,292
Difficulty	15,556,093,717,702.55
Merkle root	71445573dc95dff8c107b4541ec1d3d9a554475bee1e96ca771846f140161930
Version	0x20000004
Bits	387061,771

Blockchain.com Wallet Exchange **Explorer** Buy Bitcoin Trade

Explorer > Ethereum Explorer > Transaction

Search your transaction, an address or a block USD ETH

Summary

USD ETH

This transaction was first broadcast to the Ethereum network on August 24, 2021 at 10:16 PM GMT+5:30. The transaction currently has 4 confirmations on the network. At the time of this transaction, 0.06669899 ETH was sent with a value of \$211.83. The current value of this transaction is now \$211.79.

Hash	0x01e307ed68368c7cd44b82b7329f05f56102c22ccd0c5339fc... 0x68a1e07ac7850c3f10c00bf443a1bad6835b4b47	2021-08-24 22:16
Fee	0.00168000 ETH (21000 GAS - 80000000000 WEI)	4 Confirmations 0.06669899 ETH

Details

Status	Confirmed
Received Time	2021-08-24 22:16
Included in Block	13089223
Confirmations	4
From	0x68a1e07ac7850c3f10c00bf443a1bad6835b4b47
To	0x47f66785ab692cbc8325b701327d128e83b2c13c
Amount	0.06669899 ETH
Nonce	994
Gas Price	0.00000008 ETH
Gas Limit	21,000
Gas Used	21,000 (100.00%)

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Explorer >  Bitcoin Explorer > Transaction






 Search your transaction, an address or a block

USD ▼

Summary

USD BTC

This transaction was first broadcast to the Bitcoin network on August 24, 2021 at 10:18 PM GMT+5:30. The transaction is currently unconfirmed by the network. At the time of this transaction, 0.00381554 BTC was sent with a value of \$183.32. The current value of this transaction is now \$183.39. Learn more about [how transactions work](#).

Hash	992fd961c2222e297f5b895a2bed4e29a64d34c20bf6dded4b9... 	2021-08-24 22:18
	bc1qr8j09yxq6vkjea0xrpjc59asjcqznxenyv0yt 0.00381884 BTC  	3FpPuuuQmiLhcATgHkysSwYxW6Azbhwgj4 0.00026212 BTC  bc1qvqvc6yhxx5yest2tteam2dp4j2sp93nrsf9htt 0.00355342 BTC 
Fee	0.00000330 BTC (1.473 sat/B - 0.583 sat/WU - 224 bytes) (2.324 sat/vByte - 142 virtual bytes)	0.00381554 BTC UNCONFIRMED

Details

Hash	992fd961c2222e297f5b895a2bed4e29a64d34c20bf6dded4b93482d76cedc55
Status	Unconfirmed
Received Time	2021-08-24 22:18
Size	224 bytes
Weight	566
Included in Block	Mempool
Confirmations	0
Total Input	0.00381884 BTC
Total Output	0.00381554 BTC

Conclusion:

We have explored almost everythings related to the basics of blockchain technology, its structure, processes involved and how blocks are mined. We have also studied the components of a block in ETH and BTC mainnet blockchain. Moreover, we have also seen the structure of transactions and time span to mine a block in ETH and BTC blockchain.