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BLOCKCHAIN · BEGINNER · LESSON 5 OF 13

# What a Blockchain Actually Is

A plain definition, the three parts every blockchain has, and the popular claims that are not true

7 min read  6 quiz questions with answer key

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# What a Blockchain Actually Is

IN ONE SENTENCE

A blockchain is a record of transactions that many independent computers keep together. New entries are added in linked batches, old entries cannot be quietly changed, and shared rules, not a company, decide what gets in.

## A definition you can actually use

Over the last four lessons we followed a problem and the long search for a solution. Now we can name the solution properly. Strip away the hype, and a blockchain is this:

**A record of transactions that many independent computers keep together, where new entries are added in linked batches, old entries cannot be quietly changed, and shared rules decide what gets added.**

Every part of that sentence matters. "Many independent computers" is what removes the middleman from Lesson 1. "Linked batches" is the chain of blocks that grew out of the time-stamping work in Lesson 3. "Shared rules" is the agreement method from Lesson 4. Take any one of them away and you no longer have a blockchain in the sense that Bitcoin introduced.

The word for this kind of record is a **ledger**: a list of who sent what to whom, and when. A blockchain is one particular way to keep a ledger, built for situations where the people involved do not fully trust each other.

## Three parts working together

It helps to think of every public blockchain as three layers stacked on top of each other:

- **The record.** Transactions are grouped into blocks, and each block points back to the one before it, all the way to the first block. Lesson 6 shows exactly how that link is made.
- **The network.** Thousands of computers, called **nodes**, each keep a full copy of the record and pass new transactions and blocks to each other. Lesson 7 looks at them in detail.
- **The rules.** Every node checks every new block against the same rules before accepting it. A block that breaks a rule is rejected, no matter who sent it. The method for choosing who adds the next block is called **consensus**, and Bitcoin's version is the proof of work you met in Lesson 4.

None of these parts is new on its own. Databases, networks and rule checks existed long before 2008. What makes a blockchain different is the combination, and the fact that no single party controls any of the three.

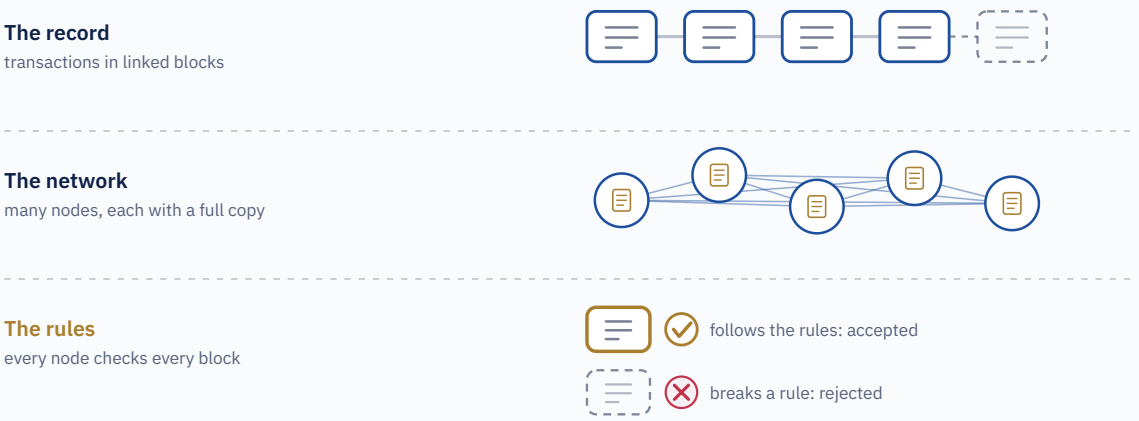



Figure 1. A blockchain combines three parts: a record of linked blocks, a network of independent copies, and shared rules that every node uses to accept or reject new blocks.

## What is actually inside

A common picture is a giant vault full of coins. The real thing is closer to a very long list of transfers. A Bitcoin block mostly contains transactions, each saying, in effect, "these coins move from here to here", plus a small header that links it to the previous block.

There is no line anywhere that says "Alice owns 2 bitcoins". Your wallet works out your balance by looking at every past transaction involving your addresses. Your balance is a result of the history, not a separate number someone stores and could edit.

Names are not stored either. Transactions point to **addresses**, long strings of letters and numbers. This makes Bitcoin **pseudonymous**, not anonymous: anyone can see what every address has done, they just do not automatically know who is behind it. Lesson 8 explains where addresses come from.

CHECK IT YOURSELF

The first payment from one person to another, Satoshi's 10 bitcoins to Hal Finney in January 2009, is in block 170. Open any free block explorer website, search for block 170, and you will find it, unchanged after more than 17 years. Every full node in the world still stores that same transaction.

## Four properties that matter

Public blockchains like Bitcoin share four properties that ordinary systems usually do not:

- **Append-only.** New entries can be added at the end. Old ones are never edited or deleted. A mistake is fixed with a new transaction, not by erasing the old one.
- **Replicated.** The same full record exists on thousands of machines in many countries. Losing some of them changes nothing.
- **Transparent.** Anyone can download the record and read every transaction ever made, without asking permission.
- **Permissionless.** Anyone can send a transaction or run a node, without signing up or being approved. Lesson 12 covers private blockchains, where this is not the case.

**ANALOGY: THE GROUP CHAT NOBODY CAN EDIT**

Imagine a group chat where every member's phone keeps the full history, messages can never be edited or deleted, and a new message only appears once most phones have checked that it follows the group's rules. You could delete the app from your own phone, but the conversation would carry on everywhere else. To change what was said last year, you would have to change it on thousands of phones at once.

## What a blockchain is not

Blockchains attract big claims. A few of them are worth correcting early:

- **It is not a faster or cheaper database.** Keeping thousands of copies in agreement is slow and costly on purpose. For most everyday software, an ordinary database is the better choice.
- **It is not unhackable.** The Bitcoin record itself has proven very hard to attack, but exchanges, wallets and apps built around blockchains are hacked regularly. Most losses happen there, not on the chain.
- **It is not a truth machine.** A blockchain proves that an entry was made and has not been changed. It cannot prove that the entry was true in the first place. If false information goes in, the chain will faithfully keep a false record.

| | Ordinary database | Public blockchain |
|---|---|---|
| **Who can add records** | The owner and the people it approves | Anyone who follows the rules |
| **Editing old records** | Possible, often invisible | Not possible without everyone seeing |
| **Who holds copies** | The owner | Thousands of independent nodes |
| **Who can read it** | Whoever the owner allows | Anyone |
| **Speed and cost** | Fast and cheap | Slower and more expensive |
| **If the operator disappears** | The system stops | The network keeps running |

## Why this matters for traders

- **Exchange balances are not on the blockchain.** When you buy bitcoin on an exchange, the trade is recorded in the exchange's own database. The blockchain only sees deposits and withdrawals. When FTX collapsed in November 2022, customers' screens showed balances that the company could not pay out. Lesson 10 covers how to think about this risk.
- **Public data is trading data.** Because the record is transparent, anyone can watch large transfers, coins moving onto or off exchanges, and wallets that have been dormant for years. Many traders use this on-chain data, and the Advanced level has a full lesson on it.
- **The word itself can move markets.** In December 2017, Long Island Iced Tea Corp. renamed itself Long Blockchain, and its share price shot up several times over within hours, with no real blockchain business behind it. The SEC later deregistered the stock and charged three people with insider trading. Understanding what a blockchain is helps you spot hype when you see it.

## Key terms

| | |
|---|---|
| **Ledger** | A record of who sent what to whom, and when. A blockchain is one way of keeping a ledger. |
| **Node** | A computer that keeps a copy of the blockchain, checks new blocks against the rules and shares them with others. |

| | |
|---|---|
| **Consensus** | The method a blockchain network uses to agree on which block is added next. Bitcoin uses proof of work. |
| **Append-only** | A record where new entries can be added but old ones can never be edited or deleted. |
| **Pseudonymous** | Linked to an address rather than a real name. Activity is public, but the person behind it is not automatically known. |
| **Permissionless** | Open to anyone, with no sign-up or approval needed to send transactions or run a node. |

## Key takeaways

1. A blockchain is a record of transactions kept together by many independent computers, added in linked batches and governed by shared rules.
2. Every public blockchain has three parts: the record, the network of nodes, and the rules that decide what gets added.
3. Blocks contain transactions, not balances or names. Your balance is worked out from the full history of your addresses.
4. Public blockchains are append-only, replicated, transparent and permissionless.
5. A blockchain is not a faster database, not unhackable and not a truth machine. It proves an entry was not changed, not that it was true.

# Test yourself

Circle one answer for each question. The answer key with explanations is on the next page. You can also take this quiz online at markettalks.info and see your score instantly.

**1. Which description of a blockchain is the most accurate?**

- (A) A secure vault that stores digital coins
- (B) A record of transactions kept together by many independent computers under shared rules
- (C) A faster type of database run by a tech company
- (D) A website where people trade cryptocurrency

**2. What are the three parts that every public blockchain combines?**

A Coins, wallets and exchanges
B Miners, banks and regulators
C The record, the network of nodes and the rules
D Passwords, servers and backups

**3. How does your wallet know your bitcoin balance?**

A It adds up all past transactions involving your addresses
B It reads a balance line stored in each block
C It asks the company that runs Bitcoin
D It checks your name in the blockchain

**4. What does "append-only" mean?**

A Only approved users can add records
B Records are deleted after a set time
C Only the newest block can be read
D New entries can be added, but old ones are never edited or deleted

**5. Why is Bitcoin described as pseudonymous rather than anonymous?**

A Because transactions are hidden from the public
B Because activity is public and linked to addresses, but not automatically to real names
C Because users must register with their real name
D Because only miners can see transactions

**6. Which claim about blockchains is true?**

A A blockchain proves that the information inside it is true
B Blockchains are faster and cheaper than ordinary databases
C A blockchain proves an entry has not been changed, but not that it was true when entered
D Nothing built around a blockchain can be hacked

# Answer key

1 B

**A record of transactions kept together by many independent computers under shared rules**

A blockchain is a shared ledger. Many independent computers keep copies, new entries are added in linked blocks, and shared rules decide what gets in.

2 C

**The record, the network of nodes and the rules**

The record holds the linked blocks, the network of nodes keeps and shares copies, and the rules decide which blocks are accepted.

3 A

**It adds up all past transactions involving your addresses**

Blocks store transfers, not balances. Your balance is calculated from the history of every transaction to and from your addresses.

4 D

**New entries can be added, but old ones are never edited or deleted**

On an append-only record, history only grows. A mistake is corrected with a new transaction, not by changing an old one.

5 B

**Because activity is public and linked to addresses, but not automatically to real names**

Anyone can see every transaction an address makes. What they do not automatically know is the real person behind that address.

6 C

**A blockchain proves an entry has not been changed, but not that it was true when entered**

A blockchain protects a record from being changed. If false information is entered, it will keep that false record just as faithfully.

SOURCES


- Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System (2008): https://bitcoin.org/bitcoin.pdf
- Guinness World Records, First Bitcoin transaction: https://guinnessworldrecords.com/world-records/696243-first-bitcoin-transaction
- Fortune, SEC charges insider trading over Long Blockchain rebrand (July 2021): https://fortune.com/2021/07/09/sec-insider-trading-long-blockchain
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# Up next: Lesson 6 Blocks and Hashing, Explained Simply

This lesson is part of the free Blockchain track at the MARKET TALKS Education Center: Beginner, Intermediate and Advanced lessons, each with a quiz and a downloadable PDF.

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