



Why Computers Use Binary Instead of Decimal Numbers

KS4 COMPUTER SCIENCE

Ages 11-14 ⌚ 3 min read

What Are Binary and Decimal Numbers?

You use **decimal numbers** every single day. When you count **0, 1, 2, 3, 4, 5, 6, 7, 8, 9**, you're using **10 different digits**. That's why it's called decimal — the word comes from the Latin for "**ten**".

Computers, on the other hand, use **binary numbers**. Binary only has **2 digits: 0 and 1**. That might sound limiting, but computers can represent any number using just these two symbols. For example, the number **5** in decimal is written as **101** in binary.

Why Don't Computers Use Decimal?

The main reason comes down to **electricity**. Inside a computer, information travels through circuits as electrical signals. Each signal is either **ON or OFF** — there's no in-between. When electricity flows, that's a **1**. When it doesn't flow, that's a **0**.

Think of it like light switches. A switch is either ON or OFF. You can't have a switch that's half-on. Computers work the same way — they can only understand ON (1) or OFF (0).

If computers tried to use decimal, they would need **10 different electrical levels** to represent each digit from **0 to 9**. This would be much harder to build and much slower.

Speed and Reliability

Binary is also **faster and more reliable**. Computers process billions of calculations every second. With only two states to check — is this signal ON or OFF? — computers can make decisions incredibly quickly.

Binary is also less likely to make **mistakes**. When a signal is slightly damaged by **electrical noise**, it's still usually clear whether it should be **0 or 1**. With **10 different levels**, a small error could change a **5 into a 6**, causing problems.

Think of it like a game of telephone. If the message is just "yes" or "no," it travels accurately. But if the message contains lots of details, small mistakes build up and change the meaning.

How Do Computers Show Decimal Numbers?

Even though computers use binary internally, they translate it into decimal for us. When you see the number **42 on your screen**, the computer has stored it as **101010 in binary** behind the scenes.

So binary isn't a limitation — it's the **perfect solution** for how electronics work. It lets computers be **faster, more reliable, and more powerful** than they ever could be with decimal.