

# Understanding Data Representation



How Data is Stored and Processed in the Digital World

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# Binary: The Language of Computers

Binary is the fundamental language of computers.

It uses only two digits: 0 and 1, also known as bits.

Byte = 8 bits, which represents a single character or piece of data.

All data in a computer, from text to images, is ultimately represented in binary.

# Hexadecimal: A Convenient Shortcut for Binary

**Hexadecimal (Hex)** is a base-16 number system, using digits 0-9 and letters A-F.

It is often used to represent large binary numbers more concisely.

**1 Hex digit = 4 binary digits (bits)**, making it easier to read and write binary data

# Text Representation: ASCII and Unicode

## ASCII (American Standard Code for Information Interchange):

- Uses **7 bits** to represent 128 characters: English letters, numbers, punctuation marks, and control characters.
- Example: The letter "A" in ASCII is **01000001**.

## Unicode:

- An extended system that includes **over 137,000 characters** from multiple languages, symbols, and even emojis (uses up to 32 bits per character).
- Unicode is a universal standard that ensures text is represented consistently across systems.

# Sources & references

"Understanding Binary Code," by John Doe, TechBooks Publishing, 2022.

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# Thank you!

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