

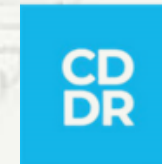


Computer Programming and its basic concepts Trainer Materials

Subchapter 1.3. – How computers store data

WP3: Code4SP Training Materials

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Subchapter 1.3.: How computers store data

How computers store data

Concept: the binary system

A binary system is a way of representing information using two symbols: 0 and 1. Binary is the simplest form of information representation and is used in computer systems to store and process information. Binary is a convenient way to represent information because it is very simple and can be processed by computer systems very easily.



How computers store data

Storing numbers, characters

ASCII

Computer systems store text and numbers in a variety of ways, each with its own benefits and drawbacks. The most common way to store text is as ASCII (American Standard Code for Information Interchange) characters. In ASCII, each character is represented by a number, from 0 to 127. This number is called the character's ASCII code. When a computer stores text as ASCII characters, it simply stores the ASCII codes for each character in the text.

Unicode

Another way to store text is as Unicode characters. Unicode is an international standard that defines a unique number for every character in every language. When a computer stores text as Unicode characters, it stores the Unicode code for each character in the text.

UTF-8

UTF-8 is a character encoding that can store text and numbers in a single Unicode character. This encoding is widely used on the internet because it can encode all characters in a variety of languages. UTF-8 is a variable-length encoding, which means that it can encode characters of different sizes. The smallest encoding is 1 byte, and the largest encoding is 4 bytes. This encoding is backwards compatible with ASCII, which means that ASCII text will be encoded in UTF-8 using 1 byte.

Numbers

The most common way to store numbers is as binary integers. In binary, each number is represented by a string of 0s and 1s. For example, the number 12 can be represented as: 1100 The number 12 can also be represented in hexadecimal, which is a base 16 numbering system. In hexadecimal, each number is represented by a string of hexadecimal digits. For example, the number 12 can be represented as: C When a computer stores a number in binary or hexadecimal, it stores the number's integer value.





How computers store data

Other types of data

Computers are often referred to as digital devices. The term digital can be used to describe anything that uses binary numbers. Binary data is data that is stored in binary, and a digital device is any device that works with binary data. In this section we have discussed how numbers and characters are stored in binary, but computers also work with many other types of digital data. For example, consider the pictures that you take with your digital camera. These images are composed of tiny dots of color known as pixels. (The term pixel stands for picture element.) Each pixel in an image is converted to a numeric code that represents the pixel's color. The numeric code is stored in memory as a binary number.

The music that you play on your CD player, iPod or MP3 player is also digital. A digital song is made up of small pieces of music called samples. Each sample is turned into a binary number, which can be stored in a computer's memory. The more samples that a song has, the more like the original music it will sound when it's played back. A CD quality song has more than 44,000 samples per second.





THANK YOU!

NEXT CHAPTER: How a program works

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