Coding of Information and MAC Address

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Abstract. *This article considers the importance of competent implementation of pedagogical technologies by a teacher, also gives the concept of pedagogical assessment and describes the importance of its application in the conditions of democratization of the educational process. The difference between an assessment and a mark is highlighted. A brief description is given of the styles of pedagogical communication, where the democratic style appears as the most favorable for teaching. Also, a description of the psychological characteristics of a child during the middle school period is given. This work is supported by research on the impact of the mark on the child and brief results on it.*

Key words: *pedagogical assessment, psychological characteristics, impact of the mark, child results, quality of education, pedagogical communication, communication, management***.**

Effective use of these opportunities, development of new teaching-methodical literature for the educational process, their practical application, high-quality conducting of lessons, using new pedagogical methods and digital technologies to convey the topic to students are among the current issues of today. is one. One of the important tasks is to improve the methodology of developing practical and professional training of students in the teaching of informatics and digital technologies, to teach the basics of logical computer operation.

The ASCII table works on the basis of binary codes with a code length of 8, which means that each character consists of a sequence of eight 0s and 1s based on the ASCII table. Each character is 8 bits long and occupies 1 byte of memory. Using the ASCII coding system, a total of 28 = 256 characters are encoded using numbers from 0 to 255 in the decimal system. Encode the word "Knowledge" in binary using the ASCII table.

Symbol	Ten	Binary
B	66	01000010
i	105	01101001
l	108	01101100
i	105	01101001
m	109	01101101

Result The computer code for the word "Knowledge" takes the following form:

0100001001101001011011000110100101101101

The keyboard has keys for letters, numbers, punctuation marks and other symbols. In a word, they can be considered signs. When a key is pressed, the symbol corresponding to that key is represented in the computer memory in the form of a binary code. In order to display it on the monitor, it is converted back from binary code to the previous view.

Unicode is a standard for encoding almost all characters of written languages. The Unicode encoding table encodes everything from simple characters to Chinese hieroglyphs, mathematical characters, letters of the Greek, Cyrillic and Latin alphabets, music notes and other characters.

The length of the character code encoded in the table is 16 bits, that is, each character occupies 2 bytes of memory. The character encoding of the Unicode table corresponds to the ASCII table, except that it is filled with characters that do not exist in ASCII [4, p. 27]. Let's take a look at the ASCII and UNICODE tables above.

An A5 document is 20 pages long, with 30 lines per page and 40 characters per line. Double-byte Unicode was used to encode characters. When the document was re-encoded using single-byte ASCII, the number of lines on a page was doubled and the number of characters per line was reduced to 15. Several pages were removed from the resulting document, and the size of the document was 31,500 bytes less than the Unicode-encoded document. Determine the number of deleted pages (encoded in ASCII).

The total size of the text generated using the ASCII table:

$$20 * 30 * 40 = 24000\ bytes$$

When this text is encoded in Unicode, each character occupies 2 bytes of space.

$$24000 * 2 = 48000\ bytes$$

When the given document in the problem condition is re-encoded using single-byte ASCII, the number of lines on a page is doubled and the number of characters per line is reduced to 15.

$$30 * 2 = 60\ bayt,$$

$$40 - 15 = 25\ bayt$$

To find the volume on one sheet, we multiply the number of lines and characters.

$$60 * 25 = 1500\ bayt$$

Several pages were removed from the resulting document, and the size of the document was 31,500 bytes less than the Unicode-encoded document. From this sentence we get the following result:

$$48000 - 31500 = 16500\ bayt$$

The total number of remaining characters is 16500 bytes. To find how many sheets are left, divide the total remaining volume by the volume on one sheet.

$$\frac{16500}{1500} = 11\ ta$$

$$20 - 11 = 9\ ta$$

From the last result, it can be seen that the result of the above problem is equal to 9.

In short, all information in a computer is stored in memory on a binary basis, that is, on the basis of 0 and 1 bits. Using the ASCII coding system, each character is 1 byte, i.e. 8 bits, and in the Unicode system, each character is 2 bytes, i.e. 16 bits. When whole numbers are represented in the computer memory by the method of fixed-point numbers, the given number is transferred to the binary number system and expressed in 32-digit form.

From the example above, we can see that each 0 and 1 is a bit. A bit is the amount of information needed to select only one of two equally likely states. For example, by knowing whether it will snow today or not, only one state, i.e. 1 bit of information, is received. It follows that any type of information is stored in the computer memory in the form of 0 and 1. The sum of the numbers 0 and 1 make up these files. That is, the textual, graphic, audio or video information created by the user is stored in the form of a file, and these files occupy a certain amount of space in the computer memory.

A computer network is a system of programs that ensures computers, communication channels between them, information exchange and joint operation [2, p. 129]. Each network interface card has a MAC address, which helps to uniquely identify a computer on the network. The MAC address is a unique value associated with a network interface card, and it is a permanent address engraved during the manufacturing process of the network interface card [2, p. 156]. Each MAC address is a 12-digit hexadecimal number (48 bits long), of which the first six digits (24 bits) contain the manufacturer's identifier, called an OUI (organizationally unique identifier). receives, and the next six digits (24 bits) represent the number assigned to the card by the manufacturer. For example: If the MAC: E985FC79FE42 entry is given on the router device, the first six characters of this entry, i.e. E985FC, determine the unique identifier of the organization. The remaining six characters, i.e. 79FE42, represent the number assigned to the card by the manufacturer.

Each resulting 8-bit number 0 and 1 is transferred to the decimal system. As a result, it will look like 255.255.255.128. This means that it is a netmask. Netmask cannot be any number. We use the following formula to determine the numbers used in the netmask. Each of the four numbers in the netmask is just 256 minus 2^n.

$$256 - 2^n$$

Here it changes in numbers n=0,1,2,3,4,5,6,7,8.

When connecting to the Internet with many devices, a 32-bit IP address is insufficient because it offers less than 4.3(4,294,967,296) billion unique addresses. In such cases, the 128-bit version 6 of the IP address (abbreviated IPV6) is used [2, p. 173]. IPv6 consists of 128 bits. An IPv6 address is represented by eight groups of hexadecimal digits separated by colons: 3010: EFA5: 1245: 0000: 0000: 0000: 5214: 8596.

Addresses are separated by colons. These IP addresses are assigned to popular sites such as facebook.com.

Problem 1: The IP address is 10.10.40.15 and the netmask is 255.255.255.224. Determine the network address and computer number.

Solution: To do this problem, first convert the IP address and netmask from decimal to binary.

10	**10**	**40**	**15**
00001010	00001010	00101000	00001111

The network mask given in the problem is also transferred to the binary number system as above.

255	**255**	**255**	**224**
11111111	11111111	11111111	11100000

The resulting binary numbers are multiplied according to logical multiplication, i.e. conjunction table.

00001010	00001010	00101000	00001111
11111111	11111111	11111111	11100000
00001010	00001010	00101000	00000000

The sequence of 8-bit numbers 0 and 1 resulting from logical multiplication is transferred to the decimal number system.

10. 10. 10. 0

It follows that the network address is 10.10.10.0 and the computer number is 15.

Problem 2: If the network mask is 255.255.254.0, how many computers are connected to the network?

Solution: The following formula can be used to determine the netmask:

$$2^n - 2$$

here, instead of n, the number of zeros in the binary form of the network mask is written.

Each byte of the netmask 255.255.254.0 is represented in binary form.

255	**255**	**254**	**0**
11111111	11111111	11111110	00000000

The network mask always consists of 1's first, followed by 0's. It turned out that the number of zeros in the binary form of the mask is 9. The number 9 is used instead of n in the above formula.

$$2^9 - 2 = 510$$

So, 510 computers can be connected through the given netmask.

In a computer, 8 digits are equal to 1 byte, and this represents one character code. When using right, reverse, and complement codes, the binary representation of the number is written with 0 for positive numbers and 1 for negative numbers. Inversion and complement codes are also used. Arithmetic operations on positive and negative numbers can be performed through the sample examples and problems given above. Through this, it serves to increase the effectiveness of the lesson in teaching students the subject of correct, inverse, and complementary codes and to develop their knowledge, skills, and abilities on the subject of coding.

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