

WHAT ARE NUMBER SYSTEMS?

A NUMBER SYSTEM, OR NUMERAL SYSTEM, IS A METHOD FOR REPRESENTING NUMBERS USING SYMBOLS, CRUCIAL IN MATHEMATICS AND PROGRAMMING FOR DATA REPRESENTATION. IT INVOLVES USING DIGITS TO CONSTRUCT NUMBERS, WHERE EACH DIGIT'S VALUE IS DETERMINED BY ITS POSITION AND THE BASE VALUE OF THE SYSTEM. WHILE COMPUTERS PRIMARILY USE THE BINARY SYSTEM OF 0S AND 1S, NUMBER SYSTEMS ARE BROADLY APPLIED IN VARIOUS FIELDS FOR CALCULATIONS, MEASUREMENTS, AND LABELING, AMONG OTHER USES. THERE ARE SEVERAL TYPES OF NUMBER SYSTEMS, EACH SUITED TO DIFFERENT APPLICATIONS. GAURAU, S. (2024)

TYPES OF NUMBER SYSTEMS

01

BINARY

03

DECIMAL

05

ROMAN
NUMERAL

02

OCTAL

04

HEXADECIMAL

BINARY NUMBER SYSTEM

A binary number system is a number system that is used to represent various numbers using only two symbols "0" and "1". The word binary is derived from the word "bi" which means two. Hence, this number system is called the Binary Number System. Thus, the binary number system is a system that has only two symbols.

2^3	2^2	2^1	2^0
1	1	1	1

8 + 4 + 2 + 1

<i>Decimal Number</i>	<i>Equivalent Binary Number</i>	<i>Decimal Number</i>	<i>Equivalent Binary Number</i>
0	0000	8	1000
1	0001	9	1001
2	0010	10	1010
3	0011	11	1011
4	0100	12	1100
5	0101	13	1101
6	0110	14	1110
7	0111	15	1111

OCTAL NUMBER SYSTEM

Octal Number System is a number system with base 8 as it uses eight symbols (or digits) namely 0, 1, 2, 3, 4, 5, 6, and 7. For example, 228, 138, 178, etc. are octal numbers. This number system is mainly used in computer programming as it is a compact way of representing binary numbers with each octal number corresponding to three binary digits.

Octal Number System

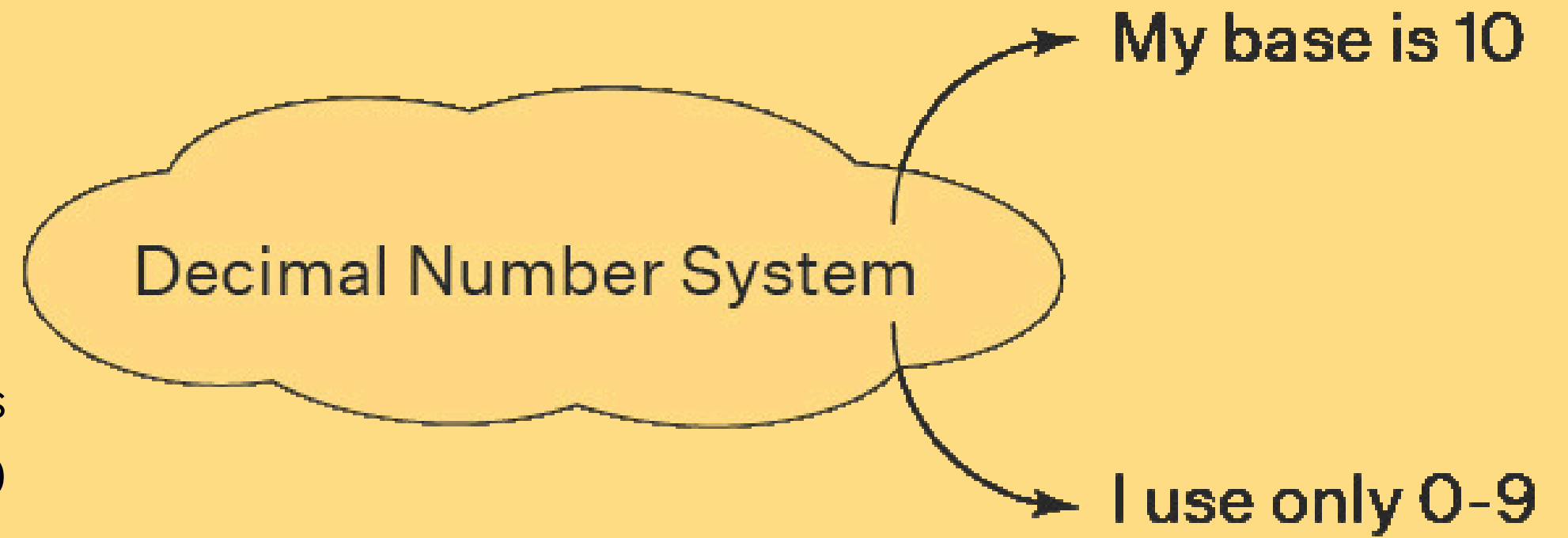
Octal Number	Binary Equivalent
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

7	1	2	6	3	
8^4	8^3	8^2	8^1	8^0	decimal:
				$3 \times 8^0 =$	3
			$6 \times 8^1 =$	48	
		$2 \times 8^2 =$	128		
	$1 \times 8^3 =$	512			
$7 \times 8^4 =$	28672				
					<hr/>
					29363

DECIMAL NUMBER SYSTEM

Decimal Number System

If the Base value of a number system is 10. This is also known as base-10 number system which has 10 symbols, these are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Position of every digit has a weight which is a power of 10. then it is called the Decimal number system which has the most important role in the development of science and technology. This is the weighted (or positional) number representation, where value of each digit is determined by its position (or their weight) in a number.



Most Significant Bit (MSB)			Decimal Point			Least Significant Bit (LSB)
10^2	10^1	10^0		10^{-1}	10^{-2}	10^{-3}
100	10	1	.	0.1	0.01	0.001

HEXADECIMAL NUMBER SYSTEM

Hexadecimal Number System is a base-16 numeral system used in diverse fields, especially in computing and digital electronics. It consists of 16 symbols, including numbers 0 to 9 and letters A to F, offering a compact way to represent binary-coded values. The hexadecimal number system is sometimes also represented as, 'hex'.

Hexadecimal Number System Table

Decimal	Binary	Hexa-Decimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

ROMAN NUMERAL SYSTEM

Roman numerals are a numeric system that was used in the Roman Empire. They were used in Europe for nearly 2000 years. The seven symbols that represent the Roman numbers are letters from the Latin Alphabet. The letters I, V, X, L, C, D and M are used with assigned values in order to write numbers. The Roman letters were used for the purpose of counting and performing other day-to-day transactions.

1	I	6	VI	10	X
2	II	7	VII	50	L
3	III	8	VIII	100	C
4	IV	9	IX	500	D
5	V	10	X	1000	M

ANALYSIS

A number system is a way of representing numbers using a set of digits or symbols, providing a basis for performing arithmetic operations, storing data, and communicating information. There are several types of number systems, each with its own unique characteristics and applications. The most common types of number systems are the decimal number system (base 10), binary number system (base 2), octal number system (base 8), hexadecimal number system (base 16), and Roman numeral system. The decimal number system is widely used in everyday life, such as in finance, commerce, and science, and is easy to understand and perform arithmetic operations with. The binary number system is the basis for computer programming and electronic devices, used to write machine code, which is the lowest-level programming language that computers can understand. The octal number system is often used in computer programming and data storage, providing a compact way of representing binary data. The hexadecimal number system is widely used in computer programming, web development, and data storage, providing a compact way of representing binary data and is easy to read and write. The Roman numeral system is often used for numbering pages, chapters, and sections in books, providing a unique and elegant way of representing numbers. The binary number system, the basis for computer programming and electronic devices, uses only two digits, 0 and 1, to represent numbers, making it a positional notation system where each digit has a place value that is 2 times the place value of the digit to its right, but is difficult for humans to read and write, and requires a large number of digits to represent decimal numbers. The octal number system, often used in computer programming and data storage, uses 8 digits from 0 to 7 to represent numbers, providing a compact way of representing binary data, but is not as widely used as the decimal or binary number systems, and can be difficult for humans to read and write. The decimal number system, widely used in everyday life, employs 10 digits from 0 to 9 to represent numbers, and is based on the Hindu-Arabic numeral system, making it easy to understand and perform arithmetic operations with, but is not well-suited for computer programming and electronic devices, requiring a large number of digits to represent binary data. The hexadecimal number system, widely used in computer programming, web development, and data storage, uses 16 digits from 0 to 9 and A to F to represent numbers, providing a compact way of representing binary data, and is easy to read and write, but can be difficult for humans to understand and perform arithmetic operations with. Lastly, the Roman numeral system, often used for numbering pages, chapters, and sections in books, uses a combination of letters and symbols to represent numbers, providing a unique and elegant way of representing numbers, but is not well-suited for arithmetic operations or data storage, and can be difficult for humans to read and write.

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