A NUMERAL SYSTEM
BASICS OF NUMBER SYSTEMS

Lecture 5

EVERYTHING IS A NUMBER IN A DIGITAL DEVICE!

- How to code a text in digital view?
  - a picture?
  - a video?
  - a sound?
  - something else?

- **To remember: we can code any kind of information into a digital view! It's only a question about algorithm and our ideas!**

Do you agree?

A NUMBER

- A computer can understand positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.

- A value of each digit in a number can be determined using
  - The digit
  - The position of the digit in the number
  - The base of the number system (where base is defined as the total number of digits available in the number system).

A NUMERAL SYSTEM

- **A numeral system** (or system of numeration) is a writing system for expressing numbers; that is a mathematical notation for representing numbers of a given set, using digits or other symbols in a consistent manner.
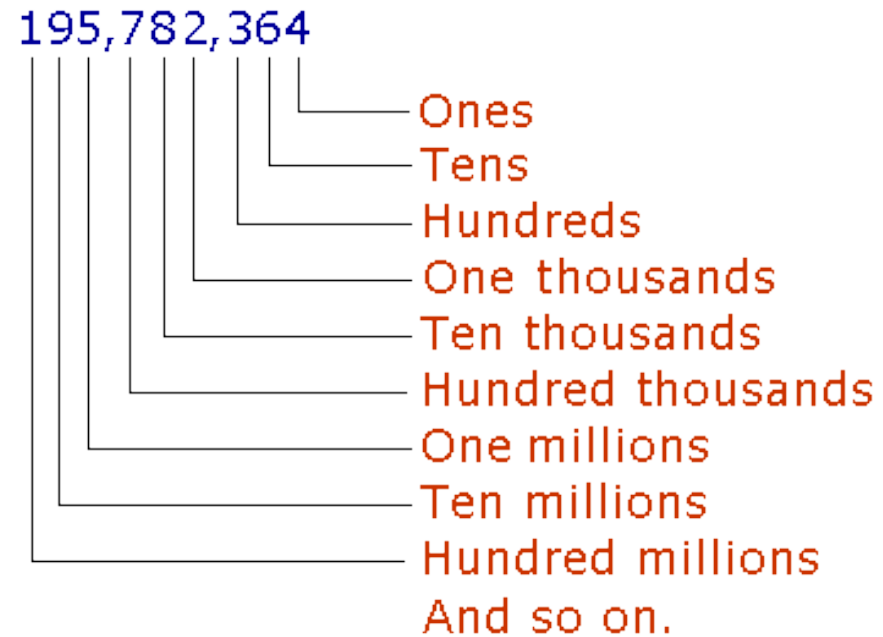
UNARY NUMERAL SYSTEM (JUST STICKS)

| | one

|| two

||| three

|||| four

卌 five

卌 | six

卌 || seven

卌 ||| eight

卌 + || = 卌 ||

POSITIONAL NOTATION PLACE-VALUE NOTATION

195,782,364

- Ones
- Tens
- Hundreds
- One thousands
- Ten thousands
- Hundred thousands
- One millions
- Ten millions
- Hundred millions
- And so on.

RADIX

- In mathematical numeral systems the base or radix is usually the number of unique digits, including zero, that a positional numeral system uses to represent numbers.

- For example, for the decimal system the radix is 10, because it uses the 10 digits from 0 through 9.

- What's the radix for binary system?

NUMBER SYSTEMS

Number System	Base	Symbols
Binary	2	0,1
Septenuary	7	0,1,2,3,4,5,6
Octal	8	0,1,2,3,4,5,6,7
Decimal	10	0,1,2,3,4,5,6,7,8,9

what if a radix greater than 10?

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Duo-decimal	12	0,1,2,3,4,5,6,7,8,9,A,B
Hexa decimal	16	0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

HOME TASKS

1. What is a number system?

2. Which number systems do you know?

3. What is a radix (base of number system)? What does it mean?

4. What is an alphabet (or set of symbols) of a number system? What's the alphabet of decimal number system?