Data structures

Data: Raw fact, figures, sound, wave.
collected from various sources, which can be processed to get meaningful insights.

- text, numbers, images, audio, video.
- Raw form before interpretation.

Two categories of data.

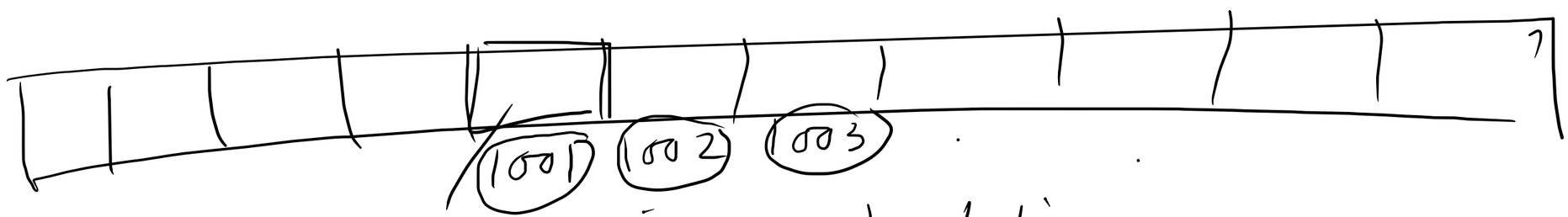
- Quantative — numerical.
- Qualatative — Descriptive.

Data

- Structured — tables, databases
- unstructured. — No preferred format.
  text, images.

Data representation in a computer.

- All data are stored in binary (0, 1)
- 1 byte = 8 bit.
  - character. 'A' = 1000001
  - Numbers 00100011 = 35
- Multimedia stored on a binary format.



access in constant time.

Data is stored in units.

word.

(16, 32, 64 bit)

5 = 101

0 0 0 0 1 0 1

variable

A named memory location that is used to store a value during program execution.

- store data with a specific type.

5 7

5 10.2

Syntax:

data type variable_name = value;

Type of variables:

local variable

global "

const

static.

Data type

A set of values and a set of ~~Specific~~ operations applied on those values.

Ex^n int. - $(-\infty, \ldots, -1, 0, 1, \ldots, +\infty)$

+, -, *, /.

types of data type

1. primitive — int, float, double, char, bool.
2. composite / user defined → group of primitive data types.
   array, struct, class.
   string.
3. Abstract.

Exms
- Linked list
- Stack
- Queue
- Tree
- Graph.

Abstract data type (specification)
ADT

Abstract: considering apart from the detailed specification or implementation.

- act of representing the essential features without including the details.

components:

Data: The values that ADT holds.

Operations: preferred operations on those data.

Data Structures

It is a way of organizing the data so that operations on those data can be performed efficiently.

Data structures

- primitive data structures.
  - int
  - float
- Non-primitive
  - Linear
    - static
      - array
    - Non-static.
      - Dynamic array
      - linked list
      - Stack & queue.
  - non-linear.
    - trees
    - Graphs
    - Hash