Data Structures I

Week # 1: Overview & Review

Presented

by

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Course Objectives

- Be familiar with problem solving
- Be able to develop (and implement) algorithms
- Be able to trace algorithms
- Be able to select appropriate data structures and algorithms for given problems

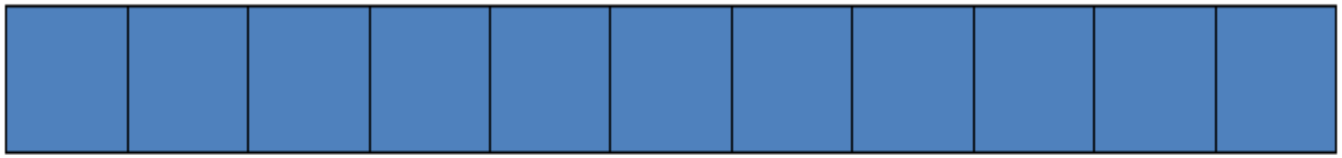
What is Data?

- Data
- A collection of facts from which conclusion may be drawn
- e.g. Data: Temperature 35°C; Conclusion: It is hot.
- Types of data
  - Textual: For example, your name (may)
  - Numeric: For example, your ID (090254)
  - Audio: For example, your voice
  - Video: For example, your voice and picture

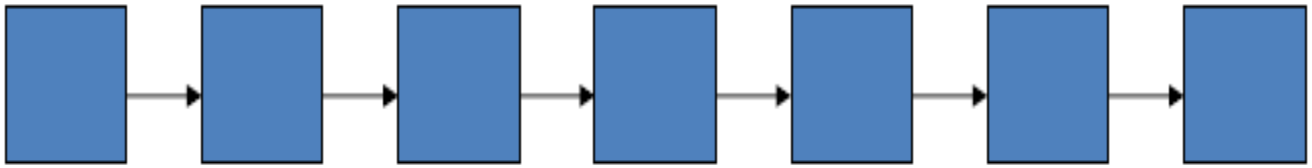
What is Data Structure?

- A particular way of storing and organizing data in a computer so that it can be used efficiently and effectively.
- A group of data elements grouped together under one name.
- For example, an array of integers

Types of Data Structures

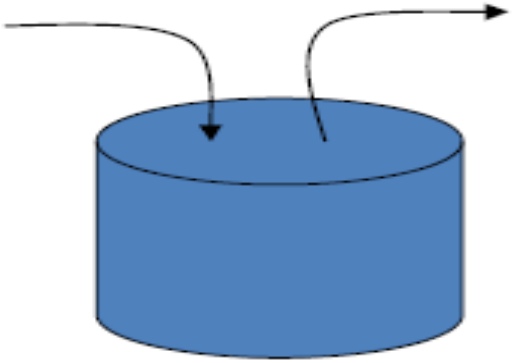


Array



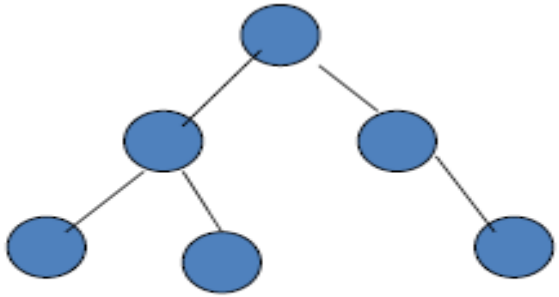
Linked List

Types of Data Structures (cont.)



Stack

Queue



Tree

The Need for Data Structures

- Goal: to organize data
- Criteria: to facilitate efficient
  - storage of data
  - retrieval of data
  - manipulation of data
- Design Issue:
  - select and design appropriate data types (This is the main motivation to learn and understand data structures)

Data Structure Operations

- Traversing

  Accessing each data element exactly once so that certain items in the data may be processed
- Searching

  Finding the location of the data element (key) in the structure
- Insertion

  Adding a new data element to the structure

Data Structure Operations (cont.)

- Deletion

  Removing a data element from the structure

- Sorting

  Arrange the data elements in a logical order (ascending/descending)

- Merging

  Combining data elements from two or more data structures into one