

# Data Structure and Algorithms

COM221

Lecture 1

Introduction to the Course



# Outlines

- Course Objective
- Course Outcomes
- Course Contents
- Data Structure and Algorithms

# Course Objective

- Learn the basics of data structure and algorithms
- Practice the gained knowledge to solve engineering problem

# Course Outcomes

- Understand the basic Data structure
- Understand the basic data processing Algorithm
- developing advanced analytical skill to solve engineering problem with making use of the Data structure and algorithms.

# Course Contents

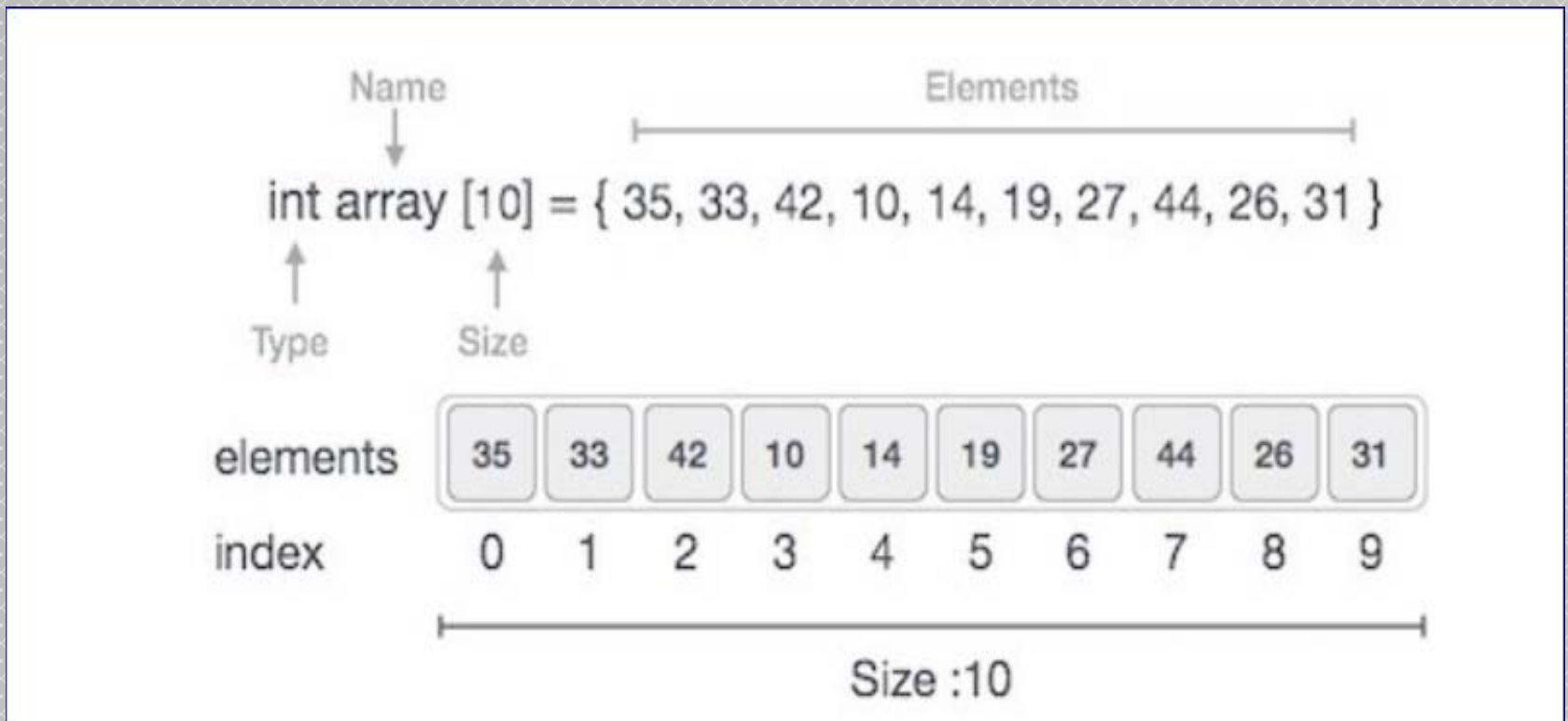
- Sorting Algorithm, Searching Algorithm, Advanced data Structure, Stack and Stack operation, Stack operation, queue operation, Queue and tree operation.

# Data Structure and Algorithms

- Data Structures are the programmatic way of storing data so that data can be used efficiently. Almost every enterprise application uses various types of data structures in one or the other way.

# Data Structure and Algorithms

## Array



# Data Structure and Algorithms

## Linked list



- Linked List contains a link element called first.
- Each link carries a data field(s) and a link field called next.
- Each link is linked with its next link using its next link.
- Last link carries a link as null to mark the end of the list



# Data Structure and Algorithms

## Linked list



**The Following are the basic operations supported by a list.**

**Insertion** – Adds an element at the beginning of the list.

**Deletion** – Deletes an element at the beginning of the list.

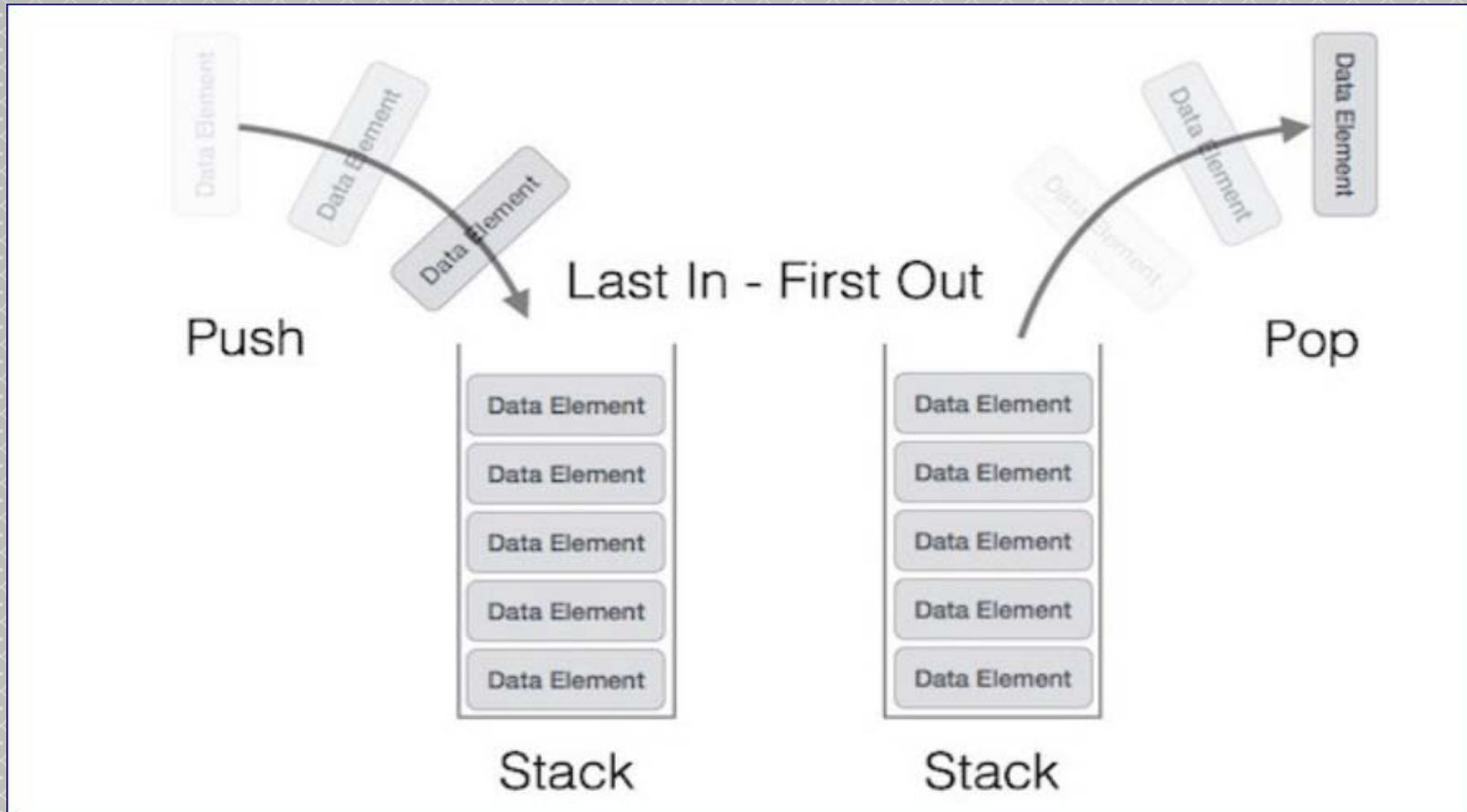
**Display** – Displays the complete list.

**Search** – Searches an element using the given key.

**Delete** – Deletes an element using the given key.

# Data Structure and Algorithms

## Stack



A stack is an Abstract Data Type (ADT), commonly used in most programming languages. It is named stack as it behaves like a real-world stack, for example – a deck of cards or a pile of plates, etc.

# Data Structure and Algorithms

## Queue



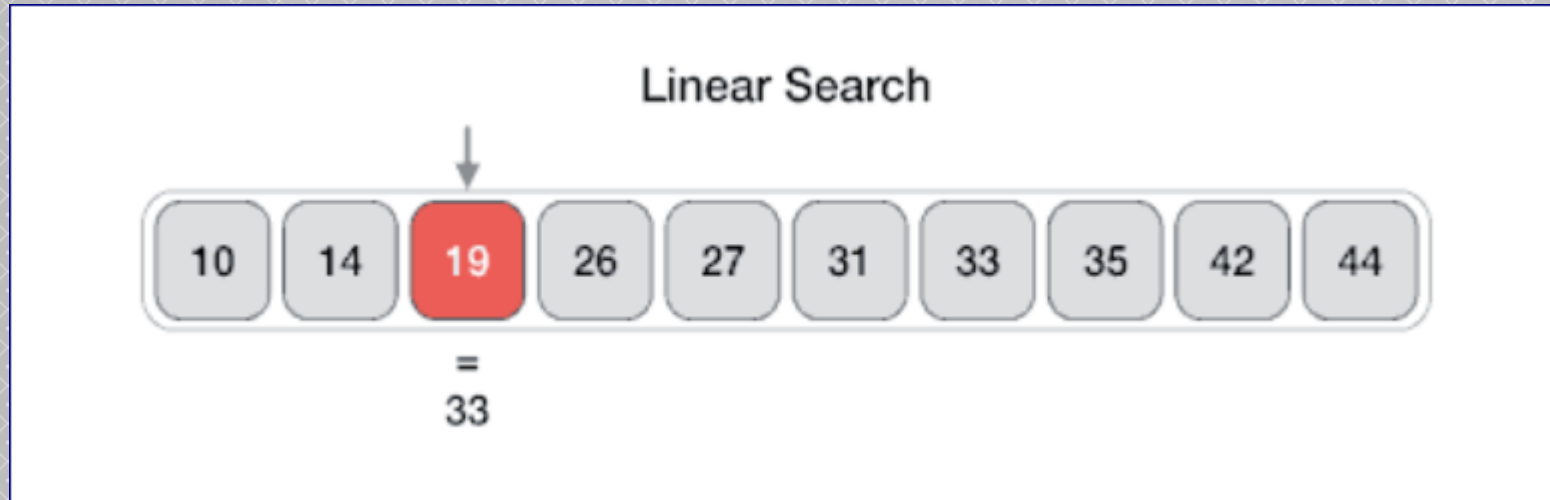
Queue is an abstract data structure, somewhat similar to Stacks. Unlike stacks, a queue is open at both its ends. One end is always used to insert data (enqueue) and the other is used to remove data (dequeue). Queue follows First-In-First-Out methodology, i.e., the data item stored first will be accessed first.

# Data Structure and Algorithms

- Algorithm is a step-by-step procedure, which defines a set of instructions to be executed in a certain order to get the desired output. Algorithms are generally created independent of underlying languages, i.e. an algorithm can be implemented in more than one programming language.
  - > From the data structure point of view, following are some important categories of algorithms –
    - **Search** – Algorithm to search an item in a data structure.
    - **Sort** – Algorithm to sort items in a certain order.
    - **Insert** – Algorithm to insert item in a data structure.
    - **Update** – Algorithm to update an existing item in a data structure.
    - **Delete** – Algorithm to delete an existing item from a data structure.

# Data Structure and Algorithms

## Linear Search



Linear search is a very simple search algorithm. In this type of search, a sequential search is made over all items one by one. Every item is checked and if a match is found then that particular item is returned, otherwise the search continues till the end of the data collection

**End**