CORE JAVA

MANUAL V8.3

MODULE CODE:

ANUDIP FOUNDATION


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Module 4: Array, Enumeration and Collections

Chapter 4

Objective: After completing this lesson you will be able to : * Learn about the concepts of data structure and collection framework in Java	**Materials Required:** 1. Computer 2. Internet access
Theory Duration: 120 minutes	**Practical Duration:** 0 minute
Total Duration: 120 minutes	

Chapter 4

Concept of Data Structure and Collection Framework

4.1 Data Structure

In Java, a data structure is a method for storing and organizing data. It is used for accessing and utilizing data in an efficient manner. A data structure also helps to enhance the performance of Java programs.

A data structure can be defined as a data element group to keep data organized for convenience of use. Some widely-used data structures are - array, linked list, queue, stack, graph and tree.

Advantages of data structure

Reusability - Data structures can be reused. It means that a data structure already used can be used again in another place.

Raised efficiency - Using suitable data structures can result in improved efficiency of systems and programs. If the data being fetched exists in an organized manner, searching becomes easier and faster.

Data Structure Types in Java

i) **Linear Data Structures** - This data structure type has all elements arranged in a linear manner. Elements are arranged in a non-hierarchical manner. Their types are -

Arrays -

* Collection of similar data type items
* Can be single dimensional and multidimensional
* They contain primitive data types

Linked list –

* Linear data structure used for preserving data lists
* Are node collections stored in non-contiguous memory

Queue –

* Linear list where elements can only be inserted through a 'rear' end
* Follows a method named First-in First-out to store data items

Stack –

* Linear list where elements can only be inserted and deleted through a 'top' end
* Named a stack as it is similar in functionality as a real-world stack

ii) Non Linear Data Structures – Non linear data structures do not create a sequence, and they are not arranged in a sequential order. Their types are –

Graphs –

* Graphs can be considered as the picture representations of element sets
* They are connected through links called 'edges'

Trees –

* Multiple-level data structures where the relation between elements are known as nodes
* The top node is called a root node and lowermost nodes are known as leaf nodes

4.2 Collection Framework

A Java collection framework provides a structure for storing, controlling and manipulating object groups. A framework includes these following elements –

i) Classes
ii) Interfaces
iii) Algorithm

A Java collection framework helps to stock data and perform efficient data processing. Collections can be used to perform functions like sorting, insertion, searching, deletion, and manipulation. A collection is representative of a single unit of objects. Collection framework interfaces and classes are stored within the java.util package.

Using a connection framework enables the swift implementation of widely used Java data structures. They hold object references, but are incapable of storing primitive data types.

A collection can be divided into three segments –

* Set
* Queue
* List

* **Difference between collections and collection framework –**

Collections	Collection
Collections is a java.util package utility class.	Collection refers to a Java Collection Framework root level interface.
Collections refers to methods that are used for operations conducted on a Collection.	Collection defines methods used for data structures containing objects.

Instructions: The progress of students will be assessed with the exercises mentioned below.

MCQ (10 minutes)

1. A Java data structure can be used for _____ data.

a) unloading

b) storing

c) organizing

d) both b and c

2. Which of these help to enhance Java program performance?

a) object framework

b) data structure

c) data list

d) None of the mentioned

3. A data structure can be defined as a _____ element group.

a) interpreter

b) command

c) data

d) None of the mentioned

4. Is it possible to reuse a data structure in another place?

a) no

b) yes

c) only in some cases

d) None of the mentioned

5. Efficiency of programs can be raised with the suitable data _____.

a) protocols

b) management

c) structures

d) None of the mentioned

6. Linear data structure elements are arranged in a _____ way.

a) hierarchical

b) non hierarchical

c) chronological

d) None of the mentioned

7. Searching for data can be made easier by using a _____ structure.

a) data

b) Java

c) array

d) None of the mentioned

8. A linked list is an example of a _____ data structure.

a) tabular

b) modular

c) linear

d) None of the mentioned

9. Queue is a linear list where elements can be inserted through a _____ _____.

a) front end

b) rear end

c) middle

d) None of the mentioned

10. Non linear data structures are not arranged in a _____ manner.

a) dynamic

b) sequential

c) random

d) None of the mentioned