Aror University of Art, Architecture, Design and Heritage
SUKKUR,Sindh
Department of Multimedia and Gaming
Course: Data Structures CSC-221 (Practical)
Instructor: Engr. Fatima Jaffar

Lab No. 03

Objective: Working with ArrayLists

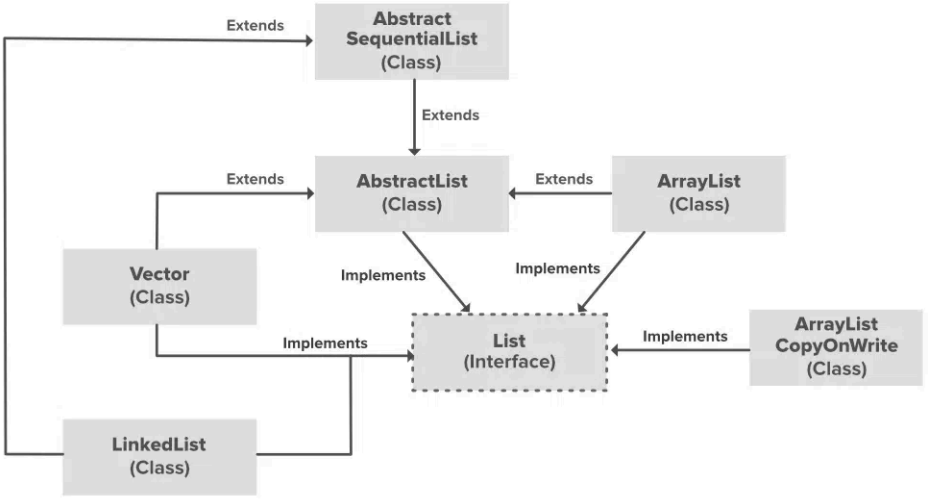
Name: _____ **Roll Number:** _____

Score: **Signature:** **Date:** 04/ 09/ 2023

LAB PERFORMANCE INDICATOR	SUBJECT KNOWLEDGE	DATA ANALYSIS AND INTERPRETATION	ABILITY TO CONDUCT EXPERIMENT	PRESENTATION	CALCULATION AND CODING	OBSERVATION/RESULTS	SCORE

Introduction:

- The ArrayList class in Java is a resizable array that provides dynamic array functionality.
- It is part of the Java Collections Framework and extends the AbstractList class.
- ArrayList is a commonly used data structure as it allows the storage of elements, provides easy access, and supports dynamic resizing.



Advantages of ArrayList:

- Dynamic resizing: ArrayList can dynamically resize itself, making it easy to add or remove elements.
- Random access: Elements can be accessed using an index, providing constant-time access.
- Generic: ArrayList supports generics, allowing the creation of lists with specific types.

1. Creating ArrayLists:

```
//Importing arraylist
import java.util.ArrayList;
//Initializing ArrayList
// Creating an ArrayList of Strings
ArrayList<String> stringList = new ArrayList<>();

// Creating an ArrayList of Integers
ArrayList<Integer> intList = new ArrayList<>();
```

2. Adding Elements

```
stringList.add("Apple");
stringList.add("Banana");
stringList.add("Orange");
intList.add(10);
intList.add(20);
intList.add(30);
```

3. Accessing Elements

```
//Accessing by Index
    String firstElement = stringList.get(0);
    int thirdElement = intList.get(2);
```

4. Iterating through ArrayList

```
    for (String fruit : stringList) {
```

```
        System.out.println(fruit);
    }

    //Using traditional for loop
    for (int i = 0; i < intList.size(); i++) {
        System.out.println(intList.get(i));
    }
```

5. Modifying ArrayList

```
//adding elements
    stringList.add("Grapes"); // Appends at the end
    stringList.add(1, "Kiwi"); // Inserts at index 1
//Removing Elements
stringList.remove("Banana");
stringList.remove(0); // Removes element at index 0
//Updating Elements
stringList.set(1, "Mango"); // Updates element at index 1
```

6. ArrayList Methods

Methods	Descriptions
size()	Returns the length of the arraylist.
sort()	Sort the arraylist elements.
clone()	Creates a new arraylist with the same element, size, and capacity.
contains()	Searches the arraylist for the specified element and returns a boolean result.
ensureCapacity()	Specifies the total element the arraylist can contain.
isEmpty()	Checks if the arraylist is empty.
indexOf()	Searches a specified element in an arraylist and returns the index of the element.

LAB TASKS

1. Declare an ArrayList of integers named numbers.Initialize numbers with values 1, 2, 3, 4, and 5.Print the elements of numbers using a for-each loop.
2. Perform basic operations on the arraylist created in task 1.
    - Add the number 6 to the numbers ArrayList.
    - Insert the number 10 at index 2.
    - Remove the element at index 4.
    - Print the modified numbers ArrayList.
3. Check if the number 3 is present in the numbers ArrayList. Find the index of the number .Update the element at index 1 to 20. Print the modified numbers ArrayList.
4. Create the functions of array list like add(), remove() using array.
5. Understand how to create an ArrayList of custom objects.
    - Create a class ‘Student’ with attributes name and age.
    - Create an ArrayList of Student objects.
    - Add three instances of Student to the ArrayList.
    - Print the details of all students in the ArrayList.
6. Write a program that lets the user type in names. Each name that is entered should be stored in an ArrayList of type String. When the word "quit" is entered then the program should stop inputting names.
7. Print a list of all contestants using a “for each” loop to display the contents of your ArrayList
   .
8. Write a program that removes all the names that are duplicate in an arraylist.
9. Explore arraylist builtin methods.Write a program that uses atleast 8 arraylist methods.