Data Structure and Algorithm

First Graded Lab

SESSION: Spring 2025

Faculty of Information Technology

UCP Lahore, Pakistan

Graded Lab – 1

Lab Topic:

Array Lists, Linked List, JCF, Basic standard operations, performance comparison, built-in methods

Lab Objective:

- Understand the use of ArrayList and LinkedList from JCF
- Perform standard operations: add, remove, update, search
- Compare performance and functionality between the two list types
- Use iterators and built-in methods for traversal and modification

Instructions:

- Indent your code
- Comment your code
- Use meaningful variable names
- Plan your code carefully on a piece of paper before you implement it.

Graded Lab 1

Lab Scenario:

You are a software trainee at University of Central Punjab. Your job is to develop tools to manage student enrollment data using the Java Collections Framework. Your supervisor wants you to demonstrate how to use built-in data structures to efficiently add, remove, update, and retrieve student information.

Task 1: Manage Student Data Using ArrayList [20]

Requirements:

• Create a Student class with fields: String rollNo, String name, String course, double GPA

• Use an ArrayList<Student> to:

- Add new students
- Remove a student by roll number
- Update a student's GPA by roll number
- Search for a student by roll number
- Print all student details

Task 2: Manage Students Using LinkedList [20]

Requirements:

- Use a LinkedList<Student> to:
  - Add students at the beginning and end
  - Remove students from the beginning, end, or by roll number
  - Update GPA and search students
  - Traverse forward and backward using ListIterator

Task 3: Comparative Analysis [10]

Requirements:

- 1 or half page explaining:
  - When to use ArrayList vs LinkedList
  - Pros and cons in terms of insertion, deletion, and traversal
  - Examples from the tasks above
  - Time complexity comparisons