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| **Computer Engineering Department - ITU** |
| **CE101L: Object Oriented Programming Lab** |

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| **Course Instructor: Usama Bin Shakeel** | **Dated: 15/06/2022** |
| **Teaching Assistant: Aqsa Khalid** | **Semester: Spring 2022** |
| **Lab Engineer: Nadir Abbas** | **Batch: BSCE2021** |

# **Lab 14A. Problem Based Learning in Java CFP**

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| **Name** | **Roll number** | **Report**  **(out of 100)** | **Scaled to 10** | **Total**  **(out of 10)** |
| NIMRA MAQBOOL | BSCE21012 |  |  |  |

Checked on: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## **Objective**

The objective of this lab is to observe the basic knowledge of programming classes in C++.

## **Equipment and Component**

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| **Component Description** | **Value** | **Quantity** |
| Computer | Available in lab | 1 |

## **Conduct of Lab**

1. Students are required to perform this experiment individually.
2. In case the lab experiment is not understood, the students are advised to seek help from the course instructor, lab engineers, assigned teaching assistants (TA) and lab attendants.

## **Theory and Background**

**Java** is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. Java is a popular programming language. Java is used to develop mobile apps, web apps, desktop apps, games and much more.

**Lab Task**

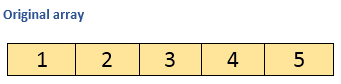
**Task A: [Marks: 20]**

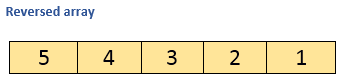
Write a program to find the factorial of a number using loop & recursion in java.

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| // Online Java Compiler  // Use this editor to write, compile and run your Java code online  import java.util.Scanner;  class LabTask {  static int factorial(int n){  if (n == 0)  return 1;  else  return(n \* factorial(n-1));  }  public static void main(String[] args) {  int opt1=0;  Scanner opt= new Scanner(System.in);  do{  System.out.println("1.FACTORIAL BY LOOP.");  System.out.println("2.FACTORIAL BY RECURSION.");  System.out.println("3.REVERSE ARRAY");  System.out.println("4.exit.");  //System.in is a standard input stream.  System.out.print("Enter YOUR CHOICE = ");  opt1= opt.nextInt();  if(opt1==1){  int i;  int num=1;  Scanner sc= new Scanner(System.in); //System.in is a standard input stream.  System.out.print("Enter Number To Get Factorial = ");  int numberToGetFactorial= sc.nextInt();  //It is the number to calculate factorial  for(i=1;i<=numberToGetFactorial;i++){  num=num\*i;  }  System.out.println("Factorial of "+numberToGetFactorial+" is: "+num);  }  if(opt1==2){  int i1,fact1=1;  Scanner idk= new Scanner(System.in); //System.in is a standard input stream.  System.out.print("Enter Number To Get Factorial = ");  int number= idk.nextInt();  fact1 = factorial(number);  System.out.println("Factorial of "+number+" is: "+fact1);  } |

**Task B: [Marks: 20]**

Write a program to reverse the elements of the array in java.





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| if(opt1==3){  int [] array = {1, 2, 3, 4, 5};  System.out.println("Initial array: ");  for (int i = 0; i < array.length; i++) {  System.out.print(array[i] + " ");  }  System.out.println();  System.out.println("Reverse Array: ");  //Loop through the array in reverse order  for (int i = array.length-1; i >= 0; i--) {  System.out.print(array[i] + " ");  }  }  if(opt1==4){  System.out.println("YOU CHOOSE TO EXIT...");  System.exit(0);  } |

#### **Assessment Rubric for Lab**

**Method for assessment:**

Lab reports and instructor observation during lab sessions. Outcome assessed:

a. Ability to conduct experiments, as well as to analyze and interpret data (P) b. Ability to function on multi-disciplinary teams (A)

c. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (P)

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| **Performance metric** | **Task** | **CLO** | **Description** | **Max marks** | **Exceeds expectation** | **Meets expectation** | **Does not meet expectation** | **Obtained marks** |
| 1. Realization of experiment (a) | 1 | 1 | Functionality | 40 | Executes without errors excellent user prompts, good use of symbols, spacing in output. Through testing has been completed (35-40) | Executes without errors, user prompts are understandable, minimum use of symbols or spacing in output. Some testing has been completed (20-34) | Does not execute due to syntax errors, runtime errors, user prompts are misleading or non-existent. No testing has been completed (0-19) |  |
| 2. Teamwork (b) | 1 | 3 | Group Performance | 5 | Actively engages and cooperates with other group member(s) in effective manner (4-5) | Cooperates with other group member(s) in a reasonable manner but conduct can be improved (2-3) | Distracts or discourages other group members from conducting the experiment (0-1) |  |
| 3. Conducting experiment (a, c) | 1 | 1 | On Spot Changes | 10 | Able to make changes (8-10) | Partially able to make changes (5-7) | Unable to make changes (0-4) |  |
| 1 | 1 | Viva | 10 | Answered all questions (8-10) | Few incorrect answers (5-7) | Unable to answer all questions (0-4) |  |
| 4. Laboratory safety and disciplinary rules (a) | 1 | 3 | Code commenting | 5 | Comments are added and does help the reader to understand the code (4-5) | Comments are added and does not help the reader to understand the code (2-3) | Comments are not added (0-1) |  |
| 5. Data collection (c) | 1 | 3 | Code Structure | 5 | Excellent use of white space, creatively organized work, excellent use of variables and constants, correct identifiers for constants, No line-wrap (4-5) | Includes name, and assignment, white space makes the program fairly easy to read. Title, organized work, good use of variables (2-3) | Poor use of white space (indentation, blank lines) making code hard to read, disorganized and messy (0-1) |  |
| 6. Data analysis (a, c) | 1 | 4 | Algorithm | 20 | Solution is efficient, easy to understand, and maintain (15-20) | A logical solution that is easy to follow but it is not the most efficient (6-14) | A difficult and inefficient solution (0-5) |  |
| 7. Computer use (c) | 1 | 2 | Documentation & GitHub Submissions | 5 | Timely (4-5) | Late (2-3) | Not done (0-1) |  |
|  | Max Marks (total): | | | 100 | Obtained Marks (total): | | |  |

Lab Engineer Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_