Department of Computer Engineering
University of Peradeniya

CO 322 Data Structures and Algorithms

Lab 01

09^{th} of July 2020

1. Aim

Aim of this laboratory is to get an understanding about the runtime of an algorithm. When you have number of different ways to solve a problem the runtime is a useful measurement to select the best algorithm (or its implementation).

2. Objectives

(a) Compare the runtime of two different implementation in two different languages.

(b) Introducing a bit of Python.(you can refer to the links in FEeLS to improve your knowledge)

3. Work

You are given two different implementations of a function that calculates the given Fibonacci number. One function fib_r uses recursion and the other fib_i uses iterations. The file fib.py contains a Python implementation of the function while the Fib.java contains a Java implementation. our task is to measure the runtime of each of the 4 implementations; fib_r and fib_i in Java and Python. Increase the problem size by increasing the Fibonacci number that you calculate (from 1 to say 40). Make a plot of runtime vs the problem size.

Submit an **essay** which answers the following questions:

(a) Is there a difference in the runtime between the two implementations when the problem is small?

(b) Is there a difference in the runtime between the two languages?

(c) Is there a difference between the way the runtime changes in the two languages?

(d) "If the problem is small both algorithms are useful". Do you agree with this statement? Justify your answer.

(e) "If the problem is large fib_r is not useful". Do you agree with this statement? Justify your answer.

4. Submission

Submit the answers to the above questions together with the plot as a single PDF on or before 23rd July 2020.