CO322: Data Structure and Algorithms

Lab1: Run time an algorithm

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

Objective:

- Compare the run-time of two different implementation in two different languages
- Introducing a bit of Python is (you can refer to the links in Moodle to improve your knowledge)

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.

Your task is to measure the run-time 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 run-time vs the problem size.

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

1. Is there a difference in the run-time between the two implementations when the problem is small?
2. Is there a difference in the run-time between the two languages?
3. Is there a difference between the way the run-time changes in the two languages?
4. "If the problem is small both algorithms are useful". Do you agree with this statement? Justify your answer.
5. "If the problem is large fib_r is not useful". Do you agree with this statement? Justify your answer.

Submission: Submit the answers to the above questions together with the plot as a single PDF on or before 21st June 2019.