Short report about Time Complexity

Abstract

This report presents the result of two experiments regarding algorithms, one of them deals with sorting between Merge Sort and Insertion Sort, and another one compares the differences in String Builder and String Concatenation.

Introduction

Time complexity is an important topic of discussion in computer science. Although the processors’ power has grown exponentially since the introduction of Intel 386, timesaving remains one of the most important aspects in software development as well as engineering since available time and resource is not unlimited as we might think. Hence, we need to put more effort in saving the computer resource by design more efficient algorithms.

A string is a sequence of characters. In Java however, String data type is constant and immutable, which means its value and length is fixed, as defined in the Java official documentation. This led to the following two method to generate a new string, string concatenation (SC) and string builder (SB).

Hypothesis

It is expected that the SB perform better in than SC as String Builder does not recreate the whole string when a call is trigger. As such, time complexity of SB is and of SC is . Thus, SB is expected to be faster than SC by the factor of n elements.

Methodology

It is extremely difficult to remove all the background interferences and processes during the test due to the nature of itself. However, we tried our best to minimize all of those factors by following this procedure:

* Quit all the unnecessary processes and the IDE itself.
* Compile the code using javac in Command Prompt
* Run it in the command line interface using JVM
* Write the result in the CSV (Comma-separated value) file

To optimize the test, the result is export directly on the screen using System.out.println(result\_here) and it is directly written to the CSV file using redirection operator (“>” or “>>”). This does not waste any more time since no File class nor other classes are invoked which can cause great amount of delay during the test.

The test is run using

Equipment

For the performing of the

Result

Discussion

String Builder and String Concatenation

We can see the clear