**Department of Electrical & Computer Engineering (ECE)**

**Concordia University**

**Data Structure**

**COEN 352: Summer ‘24**

**Assignment 2: (due date: June 6th @ 23hr55, via Moodle)**

# Questions

1. Shell sort question:
   * Generate a set of lists, each contains N = 500, 1000, 2000, 4000 and 8000 random order integers.
   * Use two gaps to implement Shell sort: Gap 1: h = 4x + 2.

Gap 2: find your favorite one from literature.

* + Time two programs with different gaps and fill out the table 1.

1. Merge sort question:
   * Generate 3 sets of lists (best, worst, average), each set contains 500, 1000, 2000, 4000 and 8000 integers – with distribution of elements representing **best**, **worst**, and **average** case for merge sort.
   * Implement Merge sort.
   * Time each case and fill out the table 1.

# Table 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm Name** | **Chosen gap (h)** |  |  | **Run time for every N value 0.5K 1K 2K 4K 8K Nano Seconds** | | |
| Shell sort\_gap1 | 4x+2 | **1342654** | **1664766** | **1239789** | **2837257** | **3617725** |
| Shell sort\_gap2 | 2^k+1 | **418985** | **631896** | **1604246** | **1171971** | **2392317** |
| Merge sort (best) | --- | **398136** | **169581** | **356135** | **762073** | **55832669** |
| Merge sort (worst) | --- | **54428** | **159238** | **350522** | **734726** | **1609038** |
| Merge sort (average) | --- | **102328** | **250575** | **478707** | **1022284** | **1464263** |

# Submission

You must submit a ZIP file that includes all your programs and related files. Name you ZIP file exactly “Assignment2”. ONLY SUBMIT ONE ZIP FILE PER TEAM.

The programs must be in Java (.java file), any other type of file will not be marked. The programs need to be titled exactly as “Ass2\_Q1” and “Ass2\_Q2”. I will open your

Assignment2 folder as a project, so name your main class differently for two questions (avoid duplicate main.java). I will test your code using a random list containing 10000 integers. Also, place the **names and IDs** of all team members (maximum 2 people per team) on the first line of each file (commented). A team only needs one submission and team members will share the same grades. If you want to be marked separately, put only your name and ID in your program and submit separately. Comment your code.

For the table 1, fill that out in Assignment2.pdf and include the pdf in your ZIP file.

Include all your .java files in a folder called “Ass2Java”.