UNIVERSITY OF VIRGINIA, DEPARTMENT OF COMPUTER SCIENCE

Priority Queues - Heap Analysis

Dr. Mark R. Floryan

August 20, 2019

1 SUMMARY

The goal of this homework is to produce a report analyzing the performance of a min-heap.

You will perform some experiment(s) by doing the following:

1. Implement a priority queue naively by using one of our other data structures (e.g., list, tree, or hash table). You may use Java's built in data structures to make this easier if you'd like.

2. Run an experiment where you test the performance of your MinHeap to the naive implementation of the priority queue. Make sure you test the methods push(), poll(), and peek(). Which operations are slower? Which are faster? Do the results you see match the theoretical (i.e., big-theta runtimes) for the respective methods? Why or why not?

3. **FILES TO DOWNLOAD:** None

4. **FILES TO SUBMIT:** HeapAnalysis.pdf

1.1 Report

Summarize your experiment and your findings in a report. Make sure to adhere to these general guidelines:

- Your submission MUST BE a pdf document. You will receive a zero if it is not.
- Your document MUST be presented as if submitted to a professional publication outlet. You can use the template posted in the course repository or follow Springer's guidelines for conference proceedings.
- You should write your report as if it is original novel research.
- The grammar / spelling / professionalism of this document should be sound.
- When possible, do not use the first person. Instead of "I ran the code 60 times", use "The code was executed 60 times...".

In addition to the general guidelines above, please follow the following rough outline for your paper:

- **Abstract**: Summarize the entire document in a single paragraph
- **Introduction**: Present the problem, and provide details regarding the data structues you implemented.
- **Methods**: Describe your methodology for collecting data. How many executions, which inputs, when did the timer start/stop, etc.
- **Results**: Describe your results from your execution runs.
- **Conclusion**: Interpret your results. Which algorithm/data structure was fastest in each situation? If so, why? Does the performance you see match the theoretical runtimes of the algorithms? Why or why not?

Lastly, your paper MUST contain the following things:

- A table (methods section) summarizing the experiments and how many execution runs were done in each group.
- At least one table (results section) summarizing the results of all of your experiments.

- Some kind of graph visualizing the results of the table from the previous bullet.