Assignment 1: Linked list in C

Due by Sep 1st

1 Purpose

- Assessing competency level in sequential C or C++.
- Making accurate timing.
- Learning how to deploy code on Mamba.

2 Work to do

This programming assignment is to be performed either in C or in C++.

- Implement your own linked list of integer. (That is do not use a pre-made linked list.)
- Write a sequential program that :
  - inserts random integers in a linked list. (Take the number of integers to add as the command line parameter `argv[1]`.)
  - search for some integers the one after the other in he linked list. (Take the number of integers to search for as `argv[2]`.)
  - measure and report the time it took to search for the integers, not for generating them.
- Run the program on a node of Mamba on different linked list size ranging from 10^4 to 10^9 by multiples of 10.
- Plot on a chart the time in took to perform the search per searched element for different length of the list.
- Submit on Canvas an archive (`zip`, `tar.gz`, `tar.bz2`) that contains the code and the plot.

3 Notes

- You can generate the integers with `rand()`.
- You can obtain time using `gettimeofday()`.
- Make sure you compile the code with full on optimization (`-O3 -march=native`)
- Use the number of search item to make sure the job does not take too long. (I usually aim for about 30 seconds to a few minutes of total query time.)
- On the cluster, I recommend you write a script that start the different execution of your program one at a time. That way you can run all of it in a single job.
- You can run a script on a node of the cluster by executing on the head node of Mamba the following command: `qsub -d `pwd` -l nodes=1:ppn=16 ./script.sh`
- Remember to label your axis. May I suggest you plot by using logscale for both axis.