Software Programming for Performance Assignment-1

Question 0) Getting Started
Get yourself acquainted with **perf, cache grind, gprof and clock_gettime** and include your understanding in report. Also evaluate the performance of following questions using these.

Question 1) Mr. Churu and his beliefs.
Mr. Churu is an Idealist. Though he is helpful and prompt, he doesn't like people copying assignments. He finds it against his principles. He feels that everyone copies the assignments from their group's Bond. Kids want to change his beliefs. They came to know that he is quite fascinated by matrices and is having difficulty with one related problem. Kids want to help him solve the problem but, kids don't have much expertise over programming and therefore, came to you for help. Now, you need to help the kids solve the problem.

You need to calculate the matrix product for the 2 input matrices.

INPUT :
Three integers p,q,r
Next p lines have q entries each for the first matrix (size p*q)
Next q lines have r entries each for the second matrix (size q*r)

OUTPUT :
A matrix of size of p*r which is the matrix product of the two matrices.

Mr. Churu is also a good programmer but not quite good in optimizations, so he is able to solve this relatively simple problem but his code has high runtime. Therefore, for students to be helpful to Mr. Churu, you need to have a better runtime then Mr. Churu. Since you are attending Software Programming for Performance classes use all your knowledge to get the best runtime for the problem (It is an open-ended problem so bring in some innovation). Mr. Churu will forgive the copy cases of the person with best runtime. You may not want to miss this chance 😉

Question 2) Mr. Darth and Hellicity
Mr.Darth is the overall co-ordinator of Hellicity. His dream is to make Hellicity as great as Rood I. However as we all know no one turns up for Mr. Darth's work. So to boost morale Mr. Darth decided to give free Dreamstone treat to people who does work. However the number of treats depends upon the hard work one does. Since you want a Dreamstone treat, help Mr. Darth to sort people's hard work using merge sort. A person's hard work is measured by numbers of hours he/she invested in Hellicity's work. Since Hellicity is near, you want to optimize the sorting as much as possible. Best solution gets a Dreamstone treat from Mr. Darth.

More formally - Use your knowledge of the course teachings to optimize the **mergesort** runtime. **Use only mergesort**.

INPUT :
Integer N
N space-separated integers.

OUTPUT :
N integers in sorted order.

Submission Format:

rollnumber1_rollnumber2.zip/
```
├── q1.c
├── q2.c
└── Report.pdf
```

Grading:

- 70 % weightage to the runtime of your code (You will be graded relative to the best runtime which we get) and output it produces. If output is incorrect you will be awarded zero.
- 30 % to the report.

Deadline:

11:55 pm - 21 January, 2020

Instructions:

1. This assignment can be done in teams of two. You can choose your teammate yourself. Only one submission per team is sufficient.
2. Your code will be run with -O0 flag i.e. zero compiler optimization.
3. Submission format should be strictly followed. Final submission should be in **zip format**. Report should be a pdf file. There is no fixed way of writing a report. It should be concise and self-explanatory.
4. Evaluations will be automated. In case of wrong submission format, you will get straight zero.
5. Deadline will not be extended in any case so start early.
6. For any query use **Moodle only,** do not personally message the TAs.
7. **Plagiarism will be seriously dealt with. DO NOT COPY (EVEN THE REPORTS).**

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