COMP90025 Parallel and Multicore Computing

Project 1A - Diameter of Graph

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Summary

- The first project is individual and is divided into small parts, this is Part A.
- A sequential algorithm for computing the diameter of a graph has been provided on LMS. The program reads a graph from an input file and outputs the diameter.
- The diameter of a graph is defined as the maximum of the shortest path lengths between all pairs of nodes.
- The graph is assumed to be directed and edge weights are always greater than 0.
- The first line of the file is a single integer giving the number of vertices in the graph, N. Each subsequent line of the input file provides a tuple of positive integers:

fromVertex toVertex weight

Example Input

```
5
1 2 5
1 3 2
1 5 15
2 3 6
2 4 1
4 2 4
4 1 9
4 5 2
5 2 6
3 5 1
```

Example Graph

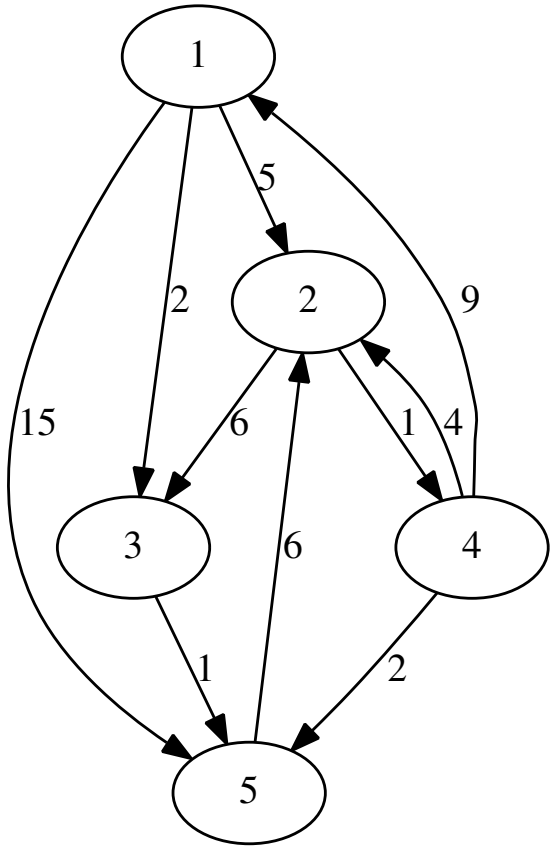

Figure: Example Graph

Diameter 17, given by the shortest path from vertex 3 to vertex 1.

Tasks

- You are required to write an OpenMP program that computes and outputs, in the same way, the diameter of a given graph as done by the sequential program.
- You should aim to have your program run as fast as possible. In doing so, you may alter the calculations of the program, so long as the final output is correct.
- Write at most 750 words that outlines how you achieved parallelism/high performance. Include tables and/or charts of your own measurements that support your discussion.

Assessment

- Project 1 A is worth **7%** of your total assessment. It is individual work.
- Assessment of the report (3/7) is based on the level of details and presentation.
- Assessment of the program (4/7) is based on correctness and performance. Incorrect programs (i.e. that give incorrect outputs or that fail to compile/run) will attract few if any marks. The top 10 fastest running programs, when given a mystery work load (you will not be told the work load in advance, however the program will be tested on a 32 core machine), will be given a bonus mark; i.e. the maximum mark for this project part is 8/7.
- Low end tie-breakers in the top 10 will not receive bonus marks. E.g. if everyone in the top 10 has the same run time then no bonus marks will be awarded. And e.g. if the last 5 in the top 10 (i.e. 6 to 10) have the same run time then they will not receive bonus marks.

Submission

- Submit a PDF of your report (use PDF only, no other format will be assed) via LMS on or before **Saturday 26th August**. As well you will need to submit your program via LMS. Instructions for doing this will be given closer to the deadline.
- Use 10pt font, single line spacing, 1 inch margins all around and double column. Use appropriate headings and clearly label and refer to tables/figures. Clearly put your name and login name at the top of the report.