PGT Exam Performance Feedback 2018/2019 Semester 1

COMP60611 Parallel Programs and their Performance Graham Riley

Comments COMP60611 January 2019 Exam feedback

There were two compulsory questions.

Question 1:

1a) This question was book work, related to definitions of speedup and efficiency but most students failed to make clear that T_ref could be a sequential time (absolute speedup) or T_1 (relative speedup).

1b) The question asked for a sketch of a performance graph given some features the graph should contain and was generally well answered but some students did not realise that superlinear speedup would result from the cache effect.

1c) Amdahl's law cannot explain any overhead other than non-parallel code. The main two effects to explain were the superlinear speedup and the behaviour at large numbers of cores where “execution time falls slowly” (so performance continues to rise slowly).

1d) Not everyone listed the overheads of non-parallel code (from the sequential initialisation loop) and the memory access costs because the data after the initialisation routine will be in memory related to the core on which the initialisation was performed (by the “master” thread). There will also be some scheduling overhead, but this can be expected to be small.

1d) The (p-1)/p term relates to the non-parallel code overhead, through the Amdahl law equation, but also describes the volume of data that will be communicated from the “master” thread due to the sequential initialisation. Few students spotted the second use.

Question 2:

2a) In the description of the scheduling options, many students described the function of the options well but did not raise the issues of the relative cost trade-offs of static versus dynamic options.

2b) In this question about scheduling options for a code example, most students explained the issues but did not systematically go through each of the scheduling options to explain how they would perform in order to suggest their preferred choice.

2c) This question allowed a discussion of one of the parallel languages that were explored in the directed reading exercise. Many students did not do a systematic comparison of their chosen language with OpenMP and MPI as requested. A brief answer is unlikely to get many marks in such a short-essay-like question.

2d) Some students confused false sharing with general atomicity issues. Several students were imprecise in the definitions they used to explain false sharing. Some students failed to give any mechanism for avoiding the problem.

2e) Was generally well answered, but, again, several students were imprecise in their definitions and use of terms to explain the mechanisms involved. For example, several students simply mentioned “synchronisation” overheads without detailing the two sources of: extras instructions (due to acquiring and releasing a lock, for example) and the wait time threads can be expected to experience due to contention for a critical section.