

Assignment 3 – Dynamic Loop Scheduler

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Question 1. Write a code for dynamic scheduler.

Answer: Check file “dynamic_sched.cpp” in folder “dynamic”.

Question 2. Plot the graphs from result.

Answer: Check folder “plots” in folder “dynamic”.

Question 3. Compare performance at 16 threads across the different synchronization modes. Why are the speedup this way?

Answer: Three different synchronization modes are chunk, thread and iteration level synchronization. From the plots it can be seen that thread gives relatively more speedup as compared to chunk in most of the cases. Only in cases where granularity is less than 100 and intensity is 1000 thread gives a significant speedup as compared to chunk. The speedup is this way, because the overhead of accessing a global shared variable in thread-level synchronization is less as compared to in both chunk and iteration. As the shared variable is accessed for less times the use of lock is also minimize and thus decreases the locking overhead as well. Whereas in chunk-level for every for loop the shared variable is updated and thus increases overhead. Maximum overhead should be in iteration-level because each time the value is calculated it is stored in shared variable.

When the granularity is less the chunk is less and thus the for loop runs for smaller times, updating the global shared variable every time thus for higher intensities and lower granularity the speedup is more in thread synchronization. But as the granularity increases the for loop calculates more number of chunks and then stores in shared variable so the speedup is almost same as the thread.

Question 4. For thread level synchronization, compare the performance at 16 threads of different n and intensity. Why are the plots this way?

Answer: In thread-level synchronization, at 16 threads as ‘n’ increases the speedup is maximum for most of the cases. As increasing intensity adds the cost for accessing any function, intensity = 1 is the most favorable condition where the speedup should be maximum which is seen in the plotted graphs. For higher intensities the speedup is relatively high as the time required is more for accessing a function. Also, from the graphs it can be seen that for proportional granularity and ‘n’ the speedup is maximum. When granularity is equal or more than ‘n’ it does not give any speedup.