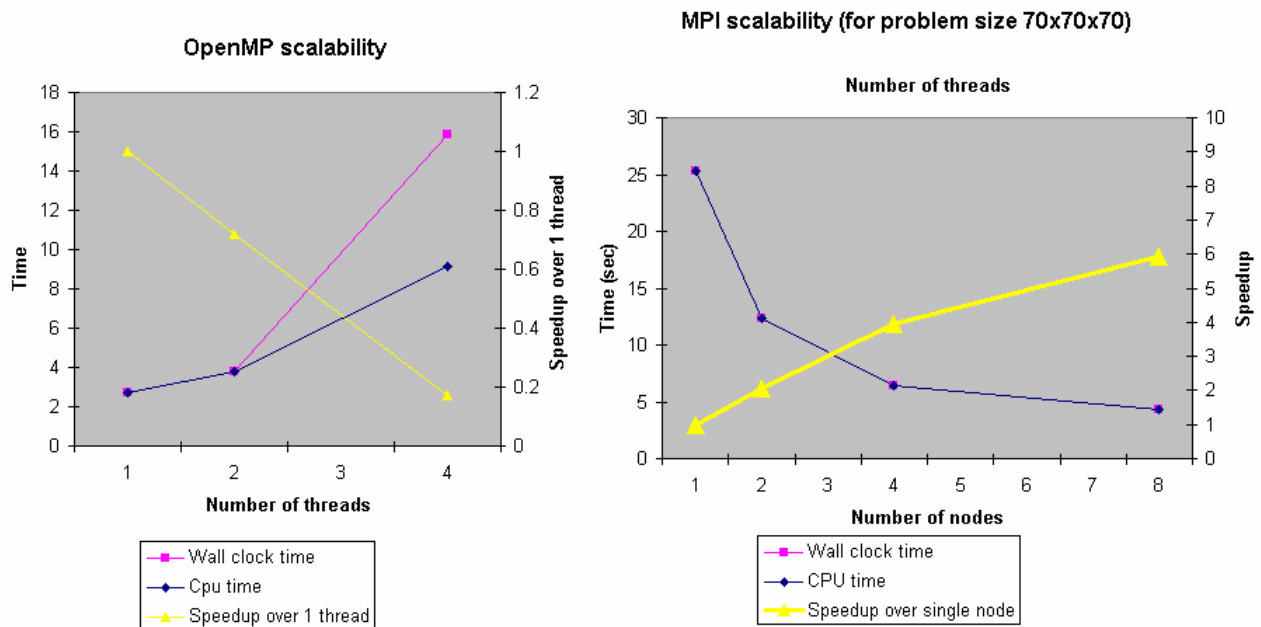# HW5 (Intermediate report) continued
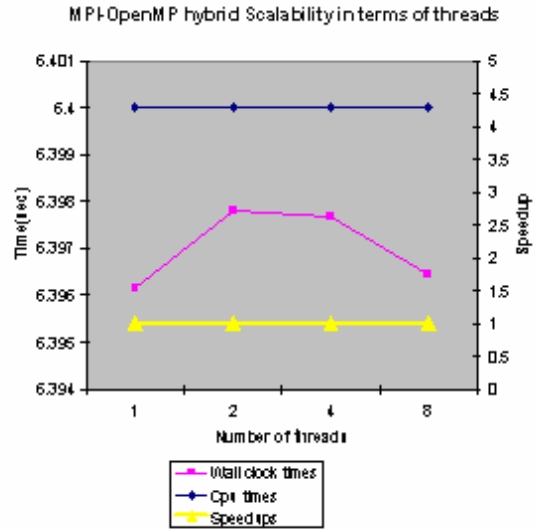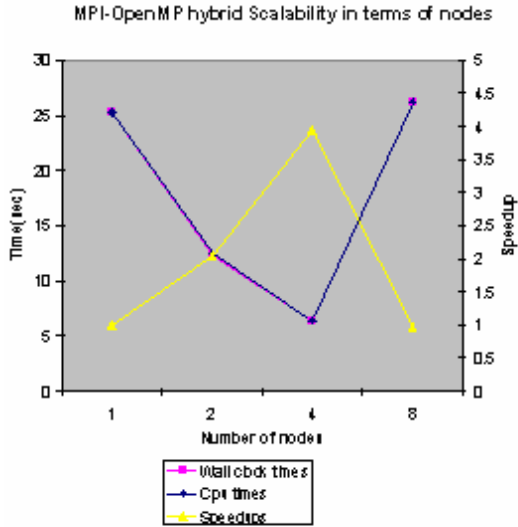
Kunal Shah: unity id kdshah
Anubhav Dhoot: unity id avdhoot

SCALABILITY EXPERIMENTS

The scalability curves show that OpenMP is not scalable in terms of speedup when the number of threads is increased from 1 to 4. The time taken almost doubles when the number of threads is doubled. Note that the problem size on the single node was kept at 70x70x70 and the number of threads was increased each time.

On the other hand MPI is highly scalable in terms of number of nodes. The speedup increases with increase in number of nodes form 1 to 2 to 4 to 8 nodes. Note that in above two cases the by changing the problem size per node, the resultant problem sizes were kept at 70x70x70.

MPI-OpenMP hybrid Scalability in terms of nodes

Time(sec)

Speedup

Number of nodes

- Wall clock times
- Cpu times
- Speedups

MPI-OpenMP hybrid Scalability in terms of threads

Time(sec)

Speedup

Number of threads

- Wall clock times
- Cpu times
- Speedups

On the other hand MPI-OpenMP scalability curves are as shown above. In both cases the problem size was kept at 70x70x70 by changing the problem size per node, while comparing the effect of different number of nodes and by changing the number of threads on a single node. Note that for the nodes scalability curve the number of threads were kept at 2 and for the threads scalability the number of nodes was kept at 4. The curves show that increasing the threads has almost no effect while changing the number of nodes show considerable difference. When the nodes are increased from 1 to 2 the time taken is almost halved, so that a speedup of almost 2 is obtained. While doubling it again to 4 nodes, doubles the speedup to 4. But now if the nodes arte doubled again the speedup drops back to below 1 i.e. there is a slight decrease in performance.

(Note speedups in all experiments are calculated by dividing the time taken in the base case, by the new time taken. The base case for threads is 1 thread and for nodes is 1 node).