ITCS 3145 Parallel Programming (Cluster Computing)
Test 1
3:30 pm - 4:50 pm, Tuesday September 27th, 2005

Name: .....

Part I is closed book. Do not refer to any materials for this part. Part II is open book. You may refer to any materials for this part (but not others in the class). Return Part I to get Part II.

Total /40
Part I /25
Part II /25

Part I

Do not refer to any materials for this part

Qu. 1 Answer each of the following briefly:

(a) Specify one reason why the speedup factor can be greater than *p* with *p* processors. 2

(b) What is the essential difference between an MPI blocking send routine and an MPI non-blocking send routine? 2

(c) Write the command to compile an MPI program called prog1.c to create an executable called prog1. 2

(d) What is the name of the default MPI communicator? 2

(e) What does a scatter routine do? 2

(f) What is the routine that combines a gather operation with an arithmetic or logical operation called? 2

(g) Why is parallelizing the Mandlebrot computation using static assignment not very effective? 2

(h) Explain in 3-5 sentences how Bucket Sort could be parallelized. 4

(i) Why is the basic sequential algorithm for *N*-body problem a O(n^2) algorithm, i.e.has O(n^2) time complexity? 2

(j) Briefly describe one sorting algorithm implemented using pipelining. Illustrate your answer by showing how the sequence 3, 1, 5, 2 7 is sorted. 5

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Part II

Name: .....

You may refer to any materials for this part (but not others in the class).

Qu. 2 Write a complete MPI program that uses a partitioning approach to compute factorial *n* (i.e. 1 * 2 * 3 * 4 * 5 .... * *n*) where *n* = 100,000. Use 5 processes. The final answer should be printed out.

Provide comments in your code to help the grader! If I do not understand the code, I will assume it is incorrect.

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