

ITCS 4145/5145 Parallel Computing
Test 2
5:00 pm - 6:15 pm, Monday November 12th, 2007

Name:

Part I is closed book. Do not refer to any materials for this part. Return Part I to get Part II.

Part I /25
Part II /25
Total /50

Part I

Do not refer to any materials for this part

Qu. 1 Answer each of the following briefly:

(a) What is meant by the term “data parallel computation”? 2

(b) What is meant by the term “chaotic relaxation”? 2

(c) What specific situation does the dual-pass ring termination algorithm handle that is not handled with the (single pass) ring termination algorithm? 2

(d) Both locks and semaphores can be used to control access to critical sections. What additional feature is provided with semaphores? (More than one acceptable answer.) 2

(e) In the following shared memory code where x is available to both processes:

Process 1	Process 2
<code>flag = TRUE;</code>	<code>.</code>
<code>x = z;</code>	<code>.</code>
<code>.</code>	<code>.</code>
<code>.</code>	<code>while (flag != TRUE) { };</code>
<code>.</code>	<code>y = x;</code>

under what circumstances would y not equal z after both sequences are executed?

2

(f) Use Bernstein's conditions to determine whether the two code sequences:

```
forall (i = 0 i < 4; i++)
    a[i] = a[i+3];

for (i = 0 i < 4; i++)
    a[i] = a[i+3];
```

always produces the same results.

2

(g) What is the parallel time complexity of Odd-Even (Transposition) sort given n numbers and p processors?

2

(h) Suppose two sequence of numbers are know to be bitonic sequences. Describe the way to merge these sequences into one sorted list using Bitonic merging algorithm. Illustrate your answer starting with two bitonic se-

quences each having 4 numbers.

3

(h) What characteristic of numbers is required for counting sort?

2

(h)

5

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Part II

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

Qu. 2 Write MPI code that implements Shearsort with four processes and 16 numbers. Use counting sort for sorting within a process.

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

20

Briefly describe your method.

5