Parallel Computing

CS 1202 CIE 1 9th Dec 2012

 Given a (scaled) speed up of 20 on 32 processors, what is the serial fraction from Amdahl's law? From Gustafson's Law? Which law is pessimistic and why?
 [3]

a. Suppose that a calculation has a 4% serial portion, how many processors are required to obtain a speedup of 10?
 b. What is the maximum speedup? [2]

- 3. The bisection bandwidth of a network is defined as the minimum number of communication links that have to be removed to partition the network into two equal halves. What is the bisection bandwidth of [2]
 - (i) A ring network with p processors?
 - (ii) A hypercube with p processors? (Assume p is even)

- 4. In ______ routing, a packet is divided into smaller units that are called flits (flow control bits) such that flits move in a pipeline fashion. [1]
- 5. In the ______ system, each processor has part of the shared memory attached. [1]
- 6. Recall the two fundamental communication models, shared data space and message passing. Compare the two by giving for each both the advantages and disadvantages. [4]

7. What is a race condition? Give an example. [Indicate any assumptions that you have made. [2]

- 8. Develop a parallel algorithm for the problem of Matrix Vector multiplication? [5]
 - a. Is the algorithm efficient, why? What type of parallelism exists in this problem?
 - b. Is there any communication involved? If yes, what is the type of communication involved?
 - c. Running this code on a distributed memory computer, which type of network topology is efficient with respect to the optimization of communication involved?

9. How crucial is the mapping stage in a parallel algorithm design process? When do you say that the mapping is optimal? List out the guidelines that help in making good mapping decisions?
[5]

10. What are the few most important lessons you learned till now in this course? In addition to listing the lessons, please write a sentence expanding on each.

11. A quote of Bhagawan which you like the most -