

ChE 5480 Summer 2005 HPC Homework #1

Due in class Tue June 21 2005

Please feel free to discuss these questions with your classmates.

1. What are the two major issues that supercomputing is concerned about?
 - (a)
 - (b)

2. What are the three categories of common supercomputing applications?
 - (a)
 - (b)
 - (c)

3. Name three categories of supercomputing issues.
 - (a)
 - (b)
 - (c)

4. What is the correct order of speed for these storage devices, from fastest to slowest?
cache memory CD-ROM, hard disk, main memory

5. When do data reside in each of these kinds of storage?
 - (a) registers
 - (b) cache
 - (c) main memory
 - (d) secondary storage

6. In computing, what is the relationship between speed, price and size?
7. Aside from speed, price and size, what is the major difference between primary storage and secondary storage?
8. Why do most contemporary computers have cache? Explain.

9. Suppose that computing speed was measured in units called OSCERs. Suppose that, on Henry's laptop, 100 Mbps Ethernet is 1 OSCER fast. Approximately how fast, in OSCERs, is each of these components on Henry's laptop?
 - (a) hard drive
 - (b) main memory
 - (c) cache
 - (d) registers
10. What is parallelism?
11. What is the main difference between instruction-level parallelism and multiprocessing?
12. Based on the jigsaw puzzle analogy, describe the major differences between shared memory parallelism and distributed parallelism.
13. What is load balancing? Why does it matter?
14. What does Moore's Law say?
15. According to Moore's Law, approximately how much faster will computers be 30 years from now than they are today? **Show your work.**