

Distributed Computing Systems – Written Assignment-1

Due date: 03/09/2007, 11:59 PM. Please type in your answers and email it to me. Acceptable file formats are MS word, PDF and plain text. Keep your answers concise, but discuss all relevant issues and show all steps, so that I can give partial credit.

Graduate students are required to answer all questions. Undergrads are required to answer questions 1, 2, and 3.

1. A multicomputer with 1024 CPUs is organized as a 32 X 32 grid. What is the worst-case delay (in hops) that a message might have to take? What is the worst case delay (in hops) for a 1024 CPU hypercube (25 points)
2. An experimental file system is up $\frac{3}{4}$ of the time and down $\frac{1}{4}$ of the time. How many times does this file server have to be replicated to ensure an availability of at least 99% (10 points)?
3. In many layered protocols, each layer has its own header. Surely, it would be more efficient to add a single header at the front of each message with all the control in it, rather than all the separate headers. Why do you think that this is not a good idea (15 points)?
4. Should an identifier be allowed to maintain any information about the entity it refers to? Discuss the pros and cons (15 points).
5. Consider a process P that requires access to file F that is locally available on the machine where P is currently running. When P moves to another machine, it still requires access to F. If the file-to-machine binding is fixed, how can the system-wide reference to F be implemented? (15 points)