

CSE 760: Au 2009: Homework III

Due in Class, Friday, Nov 20th

(No solutions turned in after the end of the class that day will receive credit)

- 1) Assume a system has P processes and R identical units of a reusable resource. If each process can claim at most N units of a resource, show that the system will be deadlock free if and only if $R \geq P(N-1) + 1$.
- 2) Consider a system consisting of m resources of the same type, being shared by n processes. Resources can be requested or released by processes only one at a time. Show that the system is deadlock free if the following two conditions hold: 1) the maximum need of each process is between 1 and m resources, and 2) the sum of all maximum needs is less than $m + n$.
- 3) Suppose, we have a system with only a single resource type. We can do deadlock avoidance for such a system by modifying Banker's algorithm as follows – reducing the dimensionality of each array used by 1. Now, suppose we have a system with multiple resource types. Show through an example that the multiple resource type Banker's scheme cannot be implemented by individual application of single-resource-type scheme to each resource type.
- 4) Consider the claim “if two logs are equivalent, then their serializability graphs are identical.”. Do you think is this correct ? Is there a specific condition under which this may be true ?
- 5) Consider a database system in which a set of transactions are executed. There are two requirements for correct execution of the transactions. First, the log of execution of operations in these transactions must be serializable. Second, the equivalent serial execution must follow a given partial order among the transactions. Describe a concise approach for verifying that the above two conditions are met by a log.