Problem Set 21

CS 311

Due at the beginning of class the following Monday in hardcopy.
Sections 9.8–11

1. Consider the parameter Δ used to define the working-set window in the working-set model. What is the effect of setting Δ to a small value on the page fault frequency and the number of active (non-suspended) processes currently executing in the system? What is the effect when Δ is set to a very high value?

2. Assume there is an initial 1,024-KB segment where memory is allocated using the Buddy system. Using Figure 9.26 as a guide, draw a tree illustrating how the following memory requests are allocated:

   (a) request 6-KB
   (b) request 250 bytes
   (c) request 900 bytes
   (d) request 1,500 bytes
   (e) request 7-KB

   Next, draw a modified tree for the following releases of memory. Perform coalescing whenever possible:

   (a) request 250 bytes
   (b) request 900 bytes
   (c) request 1,500 bytes

3. The slab allocation algorithm uses a separate cache for each different object type. Assuming there is one cache per object type, explain why this doesn't scale well with multiple CPUs. What could be done to address this scalability issue?