CSE 102 **Assignment: due in class**
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A disk drive has the following performance characteristics: 5400 rpm speed and each track contains 64KB divided into 512 byte sectors. The minimum and maximum seek latencies are 4ms and 16ms respectively. For these exercises, a stripe unit consists of 8KB.

1. What is the read and write service times T_S for a single stripe unit on a single disk.

2. What is the read and write service times T_S for a single stripe unit on a RAID level 5 configuration composed of five disks.

   The following problems are more intricate versions of the above in which each operation accesses a total of 1 MB of "contiguous" data.

3. What is the read and write service times T_S for a 1 MB operation on a single drive?

4. What is the read and write service times T_S for a 1 MB operation on the RAID level 5 configuration composed of five disks.

   The response times T_R for these operations naturally depend upon the workload – as the workload increases the queueing time T_Q increases.

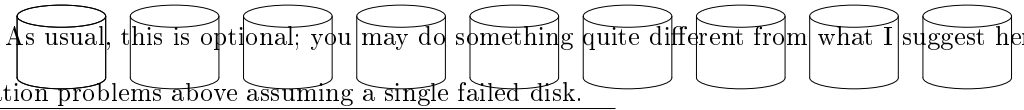
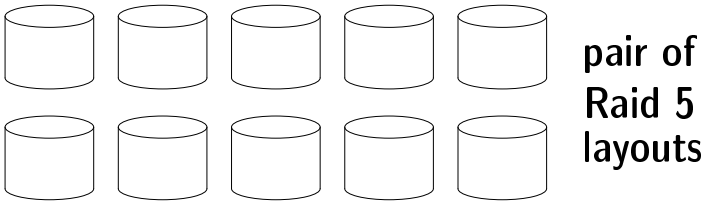
   Using the RaidFrame simulator with your own craid5-like files, obtain response time versus workload plots for both 8KB and 1 MB accesses for a five disk RAID level 5 configuration. You will also need to create appropriate workload r0- and w0-like files. Present your results as a pair of graphs; they may be hand drawn; alternatively, you can use the gnuplot or the metapost graphics packages to create "professional" graphs. You are to submit your versions of craid5, r0, and w0-like files.

5. Create a plot of the 8KB fault-free read and write response times versus workloads. Both curves should be based on the 1,2,3,4,5,10,15,20,25 thread workloads (at least!)

6. Create a plot of the 1 MB fault-free read and write response times versus workloads. Both curves should be based on the 1,2,3,4,5,10 thread workloads (at least!)

7. You are to compare *MTTDL* for the following two Raid level 5 configurations. In both configurations, there are eight data disks; in the single group configuration, the total redundant data could reside on a single disk and in the pair of stripes, the total could reside on a pair of disks. For the single, Raid level 5, all you need is the formula we derived in class. You will have to derive a similar formula for the pair of stripes.

Extra Credit: As usual, this is optional; you may do something quite different from what I suggest here.



8. Redo the simulation problems above assuming a single failed disk.