University of California, Berkeley
College of Engineering
Computer Science Division — EECS

Spring 1998 D.A. Patterson

Assignment 3
Excercises due Thursday, April 2 in 283 Soda by 5PM.
CS252 Graduate Computer Architecture

For this homework, you should work in pairs. Do excercises 6.6, 6.10, 7.3, and 7.13, using the folling assumptions:

6.6) The disks:

- have 16 surfaces
- have 6526 tracks per surface
- have 171 sectors/track
- use 512-byte sectors
- rotate at 10,033 RPM
- are advertised with Time_{min} of 0.98 ms
- are advertised with Time_{avg} of 7.71 ms
- are advertised with Time_{max} of 18.2 ms
- are connected to a disk controller with a 1 ms delay per transaction

You should use the equations given in figure 6.43 and at the bottom of page 549. Use the advertised Time_{min}, Time_{avg}, and Time_{max} to calculate a, b, and c in the equation from figure 6.43, but use 1500 cylinders as the distance in the equation at the bottom of page 549.

6.10) DMA I/O can not occur when the cache requires the bus. Assume a write-allocate policy for all caches. Assume that the cycles given for the differnet misses (23, 16, 31) are miss penalties that also describe how many stall cycles are due to that sort of miss. Assume that the cache uses the bus during all its stall cycles. Assume that the DMA controller can only do one initiation or transfer at a time; initiations and transfers can not be overlapped with each other, but either can be overlapped with the time to the time to find the data on a disk. The different parts of the DMA transfer (initiation, finding data, transfer) for a single disk can not be overlapped with each other, but the initiation or transfer for one disk can be overlapped with the time to find data on another disk. For parts (c) and (d), assume that that bus should only be loaded up to 80% capacity.

7.3) The available bandwidth for the ftp transfers is .75 Mbits per second for the T1 route, and 5 MBits per second for the Ethernet route. For this problem, treat Mbit $= 10^6$ bits and GB$=8 * 10^9$ bits.

7.13) Assume that the service time is 2 ms; "number of packets in the gateway" include packets in the server and the queue; "time spent in the gateway" includes time spent in the server and the queue; if the FIFO can hold 10 messages, an overflow occurs when there is one message in the server, 10 in the FIFO, and a twelfth message arrives.