EN605.204.82.SU17 Computer Organization

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Assignment 10b

Check Yourself Questions:

Which of the following are true about RAID levels 1, 3, 4, 5, and 6?

1. RAID systems rely on redundancy to achieve high availability:
    a. TRUE. RAID is an acronym for "redundant arrays of inexpensive disks", so every type of RAID has a redundancy of some sort through check disks that allows for faster recovery and high availability.
2. RAID 1 (mirroring) has the highest check disk overhead:
    a. TRUE. For each RAID 1 disk there is a mirror disk, so each time data is written to a disk it has to be rewritten to the mirrored disk. There is a 1:1 (n:n) ratio of disks for a disk in a protection group. The other types of RAID storage do not have that high of a ratio. RAIDs 3, 4, and 5 have an n:1 ratio and RAID 6 has a ratio of n:n/2 for the number n disks in a protection group. In comparison of the check disk overheads, RAID 1 has the highest.
3. For small writes, RAID 3 (bit-interleaved parity) has the worst throughput:
    a. TRUE. RAID 3 has a dedicated parity disk per detection group and as such requires access to all disks in the group, which prevents simultaneous writes from being possible. This can cause a bottleneck to occur when writes are necessary. In comparison, RAID 4 uses the process in Figure 5.11.2 and needs only to access 2 disks 4 times instead of all disks. RAID 5 distributes the parity and this removes any potential bottleneck for small writes.
4. For large writes, RAID 3, 4, and 5 have the same throughput:
    a. FALSE. As stated in statement 3, RAID 3 requires access to all disks, for both small and large writes, so it has the highest throughput. RAID 4 requires access to the same parity disk for all disks, so simultaneous writes are still not possible. RAID 5 allows simultaneous writes as long as the needed parity blocks aren't on the same disk, so throughput is increased for RAID 5 leading to an inequality in throughput for RAIDs 3, 4, and 5.