Homework #7

**Q1 – Explain the 2 advantages and disadvantages between RAID 4 and RAID 6.**

- Advantages
    - Block Interleaved parity uses much less redundancy
    - Improve performance and improve the reliability of the storage system by storing redundant data
- Disadvantages
    - Within a storage array can still fail if the array fails, so automatic replication of the data between arrays is common
    - Frequently, a small number of hot-spare disks are left unallocated, automatically replacing a failed disk and having data rebuilt on them

(CH11 Slide 30)

**Q2 - What are different type of secondary storages available for operating systems.**

- Hard Disk Drivers (HDD)
- Nonvolatile Memory (NVM)

(CH11 Slide 20)

**Q3 – How booting can be done from external devices. Write down the steps in few lines.**

- A small piece of code known as the bootstrap program or boot loader locates the kernel
- The kernel is loaded into memory and started
- The kernel initializes hardware
- The root file system is mounted

(OSC pg 94)

**Q4- How parity and mirroring help in data integrity and data reliability.**

- Parity is one form of checksums, which use modular arithmetic to compute, store, and compare values on fixed-length words. (OSC pg 462)
- Mirroring provides high reliability and keeps duplicate of each disk (CH11 Slide 30)
    - This helps by keeping copies of the same data and integrity checks can be made by comparing the copies

**Q5- Show the head movement for the following queue when disk head is at 44. Use algorithm c-Scan and SSTF**

**Queue – 54,41,99,37,23,77,91,103,22,29,82,61**

- SSTF: 44 -> 41 -> 37 -> 29 -> 23 -> 22 -> 54 -> 61 -> 77 -> 82 -> 91 -> 99 -> 103
- C-Scan: 44 -> 54 -> 61 -> 77 -> 82 -> 91 -> 99 -> 103 -> 22 -> 23 -> 29 -> 37 -> 41

**Q6 – T/F – RAID 1+0 is first mirroring then striping.**

- True
    - Striped mirrors (RAID 1 + 0)

- Mirrored stripes (RAID 0 + 1)

(CH11 Slide 30)

**Q7 – T/F – Access to flash drive is faster than HDD.**

- True

**Q8 – T/F – If seek time is 10 ms and random access time is 15ms then latency is 25 ms.**

- True

**Q9 – T/F – SAN disk consists of several storage arrays.**

- True

**Q10- T/F – Garbage collection is a way to find out error detection.**

- True