Question 1

a. FCFS

First-Come, First-Served (FCFS)

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
| 2000 | |2000 - 1150| = 850 |
| 1212 | |2000 - 1212| = 788 |
| 2396 | |2396 - 1212| = 1184 |
| 2800 | |2800 - 2396| = 404 |
| 544 | |2800 - 544| = 2256 |
| 1618 | |1618 - 544| = 1074 |
| 346 | |1618 - 346| = 1272 |
| 1523 | |1523 - 346| = 1177 |
| 3965 | |3965 - 1523| = 2442 |
| 3681 | |3965 - 3681| = 284 |
|  | TOTAL: 11731 cylinders |

b. SCAN

**SCAN** disk scheduling algorithm

moving downwards

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
|  | |1150 - 544| = 606 |
|  | |544 - 346| = 198 |

lowest request = 346

moving upwards

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
|  | |346 - 1212| = 866 |
|  | |1212 - 1523| = 311 |
|  | |1523 - 1618| = 95 |
|  | |1618 - 2000| = 382 |
|  | |2000 - 2396| = 396 |
|  | |2396 - 2800| = 404 |
|  | |2800 - 3681| = 881 |
|  | |3681 - 3965| = 284 |
|  | TOTAL: 4423 cylinders |

c. C-SCAN

C-SCAN disk scheduling algorithm

moving downwards

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
|  | |1150 - 544| = 606 |
|  | |544 - 346| = 198 |

moving downwards

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
|  | |346 - 0| = 346 |

moving downwards

|  |  |
| --- | --- |
| FIFO Order | FCFS distance  (cylinders) |
|  | |3999 - 3965| = 34 |
|  | |3999 - 3681| = 284 |
|  | |3681 - 2800| = 881 |
|  | |2800 - 2396| = 404 |
|  | |2396- 2000| = 396 |
|  | |2000 - 1618| = 382 |
|  | |1618 - 1523| = 95 |
|  | |1523 - 1212| = 311 |
|  | TOTAL: 3937 cylinders |

|  |  |  |
| --- | --- | --- |
| **Feature** | **RAID 1** | **RAID 5** |
| **Configuration** | Mirroring (Data is duplicated on two or more disks) | Striping with parity (Data and parity spread across all disks) |
| **Fault Tolerance** | High (Can tolerate failure of any mirrored disk) | Moderate (Can tolerate failure of one disk) |
| **Read Performance** | Excellent (Can read from any mirrored disk) | Good (Data is read from multiple disks) |
| **Write Performance** | Moderate (Data must be written to all mirrored disks) | Slower (Requires parity calculation and writing) |
| **Storage Efficiency** | 50% (Usable capacity is half due to mirroring) | High (Uses (N-1)/N of total disk capacity) |
| **Best Use Cases** | Critical files requiring high availability, such as databases, system files, and VMs | Large files, backups, and general-purpose storage |
| **Recovery Time** | Fast (Mirrored disk is immediately available) | Longer (Requires parity reconstruction) |
| **Data Availability** | High (Data remains available as long as one disk survives) | Good (Data remains available after one disk failure) |
| **Cost** | High (Requires double the disk space) | Moderate (Better storage efficiency with more disks) |
| **Write Penalty** | Low (Simple duplication of data) | High (Data and parity must both be updated) |
| **Capacity** | Low (50% of total capacity) | Higher (More efficient use of total capacity) |
| **Suitability for Small Files** | Excellent (Quick access and write) | Good (May be impacted by parity calculations) |
| **Suitability for Large Files** | Moderate (Good reads, slower writes) | Excellent (Efficient storage with parity protection) |

RAID1

RAID1 is best used for files that are frequently accessed.

Examples of these are files on web servers, files used on virtual machines, Operating system files, boot files, & database files are examples of the files that best stored with RAID 1.

RAID5

RAID5 is best used for large files & in scenarios where storage needs to be cost effective.

Examples of these are Media Files, backup/archive/ data files, email server files, shared network files are examples of the files that best stored with RAID 5.

Question 2

a) what is the advantage of supporting memory-mapped I/o to device-control registers?

b) what is the disadvantage of supporting memory-mapped I/O to device-control registers?

Question 3

Question 4