

Table 11.1 I/O Techniques

	No Interrupts	Use of Interrupts
I/O-to-memory transfer through processor	Programmed I/O	Interrupt-driven I/O
Direct I/O-to-memory transfer		Direct memory access (DMA)

Table 11.3 Disk Scheduling Algorithms [WIED87]

Name	Description	Remarks
Selection according to requestor		
RSS	Random scheduling	For analysis and simulation
FIFO	First in first out	Fairest of them all
PRI	Priority by process	Control outside of disk queue management
LIFO	Last in first out	Maximize locality and resource utilization
Selection according to requested item		
SSTF	Shortest service time first	High utilization, small queues
SCAN	Back and forth over disk	Better service distribution
C-SCAN	One way with fast return	Lower service variability
N-step-SCAN	SCAN of N records at a time	Service guarantee
FSCAN	N-step-SCAN with $N =$ queue size at beginning of SCAN cycle	Load sensitive

Table 11.5 Device I/O in UNIX

	Unbuffered I/O	Buffer Cache	Character Queue
Disk drive	X	X	
Tape drive	X	X	
Terminals			X
Communication lines			X
Printers	X		X

Table 11.6 Physical Characteristics of Disk Systems

Head Motion	Platters
Fixed head (one per track)	Single platter
Movable head (one per surface)	Multiple platter
Disk Portability	Head Mechanism
Nonremovable disk	Contact (floppy)
Removable disk	Fixed gap
	Aerodynamic gap (Winchester)
Sides	
Single sided	
Double sided	

Table 11.7 Typical Disk Drive Parameters

Characteristics	Seagate Cheetah 36	Western Digital Enterprise WDE18300
Capacity	36.4 GB	18.3 GB
Minimum track-to-track seek time	0.6 ms	0.6 ms
Average seek time	6 ms	5.2 ms
Spindle speed	10000 rpm	10000 rpm
Average rotational delay	3 ms	3 ms
Maximum transfer rate	313 Mbps	360 Mbps
Bytes per sector	512	512
Sectors per track	300	320
Tracks per cylinder (number of platter surfaces)	24	8
Cylinders (number of tracks on one side of platter)	9801	13614

Table 11.8 Optical Disk Products

CD

Compact Disk. A nonerasable disk that stores digitized audio information. The standard system uses 12-cm disks and can record more than 60 minutes of uninterrupted playing time.

CD-ROM

Compact Disk Read-Only Memory. A nonerasable disk used for storing computer data. The standard system uses 12-cm disks and can hold more than 650 Mbytes.

CD-R

CD Recordable. Similar to a CD-ROM. The user can write to the disk only once.

CD-RW

CD Rewritable. Similar to a CD-ROM. The user can erase and rewrite to the disk up to 1000 times.

DVD

Digital Versatile Disk. A technology for producing digitized, compressed representation of video information, as well as large volumes of other digital data. Both 8 and 12 cm diameters are used, with a double-sided capacity of up to 15.9 Gbytes. The basic DVD is read-only (DVD-ROM).

DVD-R

DVD Recordable. Similar to a DVD-ROM. The user can write to the disk only once.

DVD-RW

DVD Rewritable. Similar to a DVD-ROM. The user can erase and rewrite to the disk up to 1000 times.

Magneto-Optical Disk

A disk that uses optical technology for read and magnetic recording techniques assisted by optical focusing. Both 3.25-inch and 5.25-inch disks are in use. Capacities above 5 Gbyte are common.