OSu HW4

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Writing exercise

10.21

x= page fault rate

$(1-x)\cdot 100+x\cdot(8\cdot 0.3+20\cdot 0.7)\cdot 10^6\leq 200$

$x\leq 6.0976\times 10^{-6}$

10.24

FIFO: 15

LRU: 16

OPT: 10

10.37

When the process is too much, the system spending more time dealing on page fault for than executing it. By control the count of multiprogramming, the problem could be eliminated. It can whether achieve by tracking the page fault rate or use a working set to prevent.

11.13

(a) FCFS: 13011

(b) SCAN: 7492

(c) C-SCAN: 4918

11.20

(a) 1 + 1 = 2 blocks (data and parity block)

(b) 4 + 1 + 3 + 1 = 9 blocks (every 4 blocks have 1 parity check block)

11.21

Assume the RAID 1 organization has N disks, RAID 5 organization has M disks.

(a)

While reading single block operation can be split into reading the i-th partition(i from 1 to N) of the block in RAID 1, RAID 5 can only read the block using a single reading head, which makes RAID 1 have an N times throughput than the RAID 5 organization.

(b)

Assume there are k continuous blocks to read

RAID 1 can always achieve a throughput of N . However, the RAID 5 organization for reading multiple blocks can have a $\min(k, M-1)$ throughput

14.14

Let Z be the starting block number

Contiguous:

(a)

X = Logical address/512 = The count of physical blocks.

Z + X = physical block number

Y= Logical address%512 = the displacement into the block

(b) 1 block

Linked:

(a)

X = Logical address/511 = The count of physical blocks.

Start from Z, Chase down X blocks to obtain the physical block.

Y = Logical address%511 +1 = the displacement into the block

(b) 5 blocks (from 1 to 5)

Indexed:

(a)

X = Logical address/512 = The count of physical blocks.

By checking the index block with the given index X, can obtain the physical block address

Y= Logical address%512 = the displacement into the block

(b) 2 blocks (index block + access)

14.15

12 * 8KB = 96KB

single indirect: (8KB/4B) * 8KB =16 MB

double indirect: (16MB/4B) * 8KB = 32GB

triple indirect: (32GB/4B) * 8KB = 64TB

⇒ 64TB + 32GB + 16MB + 96KB = 68753047648KB