20K-1052.

OS Assignment #3

Date: 16-5-22

S.M. Hassan Ali
BSE-4B.

Q.1 Single Paging

EAT = 150ns M.M = 100ns TLB = ?

Hit ratio = 0.70 miss ratio = 0.30.

$EAT = H.R(TLB + M.M) + M.R(TLB + 2 \times M.M)$

$150 = 0.70(T + 100) + 0.3(T + 200)$

$150 = 0.70T + 70 + 0.3T + 60$

$150 - 130 = 1T \quad / \quad T = 20ns.$

Q.2 Two level Paging.

TLB = 25ns M.M = 100ns H.R = 0.75
M.R = 0.25

EAT = ?

$EAT = 0.75(25 + 100) + 0.25(25 + 3 \times 100)$

$= 0.75(125) + 0.25(325)$

$= 175 ns.$

ALBA

20k-1052

Date:

Q.3 Three level paging.

TLB = 30ns M.M = 100ns H.R = 0.7
EAT = ? M.R = 0.3

EAT = 0.7(30 + 100) + 0.3(30 + 4 x 100)

= 220ns.

Q.4. Transfer time = 25ms. / Avg memo access
M.M = 1 μs
H.R = 0.80
Page fault = 0.02.
EAT in ms ?

EMAT = TLB access time + avg memo access (2 - TLB hit)

due to page fault we have e.m.a as
e.m.a = memo access time + p.f (page selvice time).

= 0.8(1 μs) + 0.18(2 μs) +
0.02(25002 μs)

= 501.2 μs
= 0.5 ms.

25×10^{-3}
25000×10^{-6}
$+ \quad 2 \times 10^{-6}$

= 25002 μs

20k-1052

Date:

Paging

1- Memo size=?

No of possible location with 22 bits
$= 2^{22}$

Size of one location = 2 bytes

Memory size $= 2^{22} \times 2^1 = 2^{23}$ bytes.

$= 2^{23}/(1024)^2 = 8$ Mb

2- No of bits = ?

M.S $= 2^n \times 4$ bytes.

16 Gb $= 2^n \times 4$ bytes

$2^4 \times 2^{30} = 2^n \times 2^2$

$\frac{2^{34}}{2^2} = 2^n \Rightarrow n = 32$ bits.

3- Size of page table in Mb. ?

20k-1052

Date:

3- Page table size in Mb.

No of bits logical address = 32 bits
Page size = 4 Kb
Page table entry size = 4 bytes.

Process size = 2^{32} B

$= 2^{32}/(1024)^3 = 4$ GB

No of Entries in Page table:

= Process size / Page size
= 4GB / 4KB = 2^{20} pages.
↳ entries.

Page Table size.

= No of entries in Page table × Page table entry size.
= ~~20~~ 2^{20} × 4 bytes
= 4Mb.

20k-1052.

Date:

Page Replacement Algorithm

5, 0, 1, 2, 9, 0, 5, 0, 4, 2, 5, 0, 5, 0, 5, 2, 1, 2, 0, 1, 9, 0, 1

	5	0	1	2	9	0	5	0	4	2
f_1	5	5	5	2	2	2	5	5	5	2
f_2		0	0	0	9	9	9	9	4	4
f_3			1	1	1	0	0	1	0	0
	F	F	F	F	F	F	H	H	F	F

	5	0	1	2	9	0	5	0	4	2
f_1	2	2	2	2	2	2	1	1	1	1
f_2	5	5	5	5	5	5	5	2	2	9
f_3	0	0	0	0	0	0	0	0	0	0
	H	H	H	H	H	H	F	H	H	F

	1	1
f_1	1	1
f_2	9	9
f_3	0	0
	H	H

Fault = 13
Hit = 10

Fault ratio = $13/10+13 = 13/23$.