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Operating Systems. - CS220

Assignment No. 1 Date 05/04/2020

Q3.1 Q1 and Q2:

PARENT: value = 5.

Because the Child process was not created, so the value was not changed.

Q3.2

2^N is the formula for number of childern.
where N = number of fork() called.

Here N=3

$2^3 = 8$ childern

3.b

int num[size] = {0,1,2,3,4};

Line X: (child). operation = nums[i] *= -1;

output = Child: 0, -1, -4, -9, -16

Line Y: (Parent) unchanged.

output: Parent: 0,1,2,3,4 #

Date

Q3

Q4.13

Ans: First lets understand what is concurrency and parallelism.

Concurrency:

When two or more tasks can start, run and complete in overlapping time periods. It doesn't necessarily mean they'll ever both be running at the same instant.

for example multitasking on a ~~multicore~~ single-core processor., with help of scheduling.

Parallelism:

It means when two tasks are literally running at a same time, example. on a multiple processor, using pipelining or multi-threading.

It depends on systems.

Yes, we can have concurrency of processes or threads but at the same time they are not parallel.

Date

Q4 to Q9

Q9.4 ⇒ 64 pages. Logical address space
⇒ Page size = 1024 words.
⇒ 32 frames Physical address space.

(a) 64 pages = 2^6
1024 words = 2^{10}
Bits of Logical Address = 6+10 = 16 Bits.

(b) 32 frames = 2^5
1024 words = 2^{10}
Bits of Physical Address = 5+10 = 15 Bits.

Q9.6

First-Fit

1- 115 KB in 300 KB. partition.
2- 500 KB in 600 KB partition
3- 358 KB in 750 KB Partition.
4- 200 KB in 350 KB Partion.
5- 375KB must wait.

Best-fit

1- 115 KB in 125 KB partition
2- 500 KB in 600 KB partition
3- 358 KB in 750 KB partition
4- 200 KB in 200 KB partition.
5- 375 KB must wait.

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Date _____

Worst-fit

1- 115 kB in 750 kB Partition
2- 500 kB in 600 kB partition
3- 358 kB must wait
4- 200 kB in 350 kB partition.
5- 375 kB must wait.

9.7

Page size 1KB (1024 Bytes).

#	Address	Address / Page size	P.#	Address % Page size.	offsets
a-	3085	3085 / 1024	3	3085 % 1024	13
b-	42095	42095 / 1024	41	42095 % 1024	111
c-	215201	215201 / 1024	210	215201 % 1024	161
d-	650000	650000 / 1024	634	650000 % 1024	784
e-	2000001	2000001 / 1024	1953	2100000 % 1024	129

9.13

First-fit

1- 200 MB in 205 MB Partition
2- 15 MB in 100 MB Partition
3- 185 MB in 300 MB partition
4- 75 MB in 170 MB partition
5- 115 MB in 185 MB partition
6- 80 MB must wait

Date

Best-Fit

1- 200 MB in 205 MB partition
2- 15 MB in 40 MB partition
3- 185 MB in 185 MB partition
4- 75 MB in 100 MB partition
5- 175 MB in 300 MB partition
6- 80 MB in 170 MB partition

Worst-fit

1- 200 MB in 300 MB Partition.
2- 15 MB in 205 MB partition.
3- 185 MB in 185 MB partition
4- 75 MB in 170 MB partition.
5- 175 MB must wait
6- 80 MB in 100 MB partition.

9.21

Page size 1KB (1024 Bytes).

#	Address.	Address / Page size	P.#	Address % Page size.	Offset
a-	21205	21205 / 1024	20	21205 % 1024	725
b-	164250	164250 / 1024	160	164250 % 1024	410
c-	121357	121357 / 1024	118	121357 % 1024	525
d-	16479315	16479315 / 1024	16093	16479315 % 1024.	83
e-	27253187	27253187 / 1024	26614	27253187 % 1024.	451

Date

Q 9.23

⇒ logical address space of 2048 pages
⇒ Page size 4-KB
⇒ Physical memory of 512 frames.

(a)

2048 pages = 2^{11}
Page size = 4-KB = $2^2 \cdot 2^{10} = 2^{12}$
Bits of logical Address = 11+12 = 23 Bits.

(b)

512 frames = 2^9
page size = 2^{12}
Physical memory bits = 9+12 = 21 Bits.

Q 10

⇒ Physical Memory = 2^{32} bytes.
⇒ Page size = 2^{12} Bytes
⇒ logical address = 2^{20} pages.

(1) logical address Bits = 12+20 = 32 Bits.

(2) Bytes of frame = A frame was to be same size as a page 2^{12} Bytes.

Date

③ Physical Address Bits = 12 + 32 = 44 Bits.

④ Number of entries in the Page table =

$$\text{Page table entries} = \frac{\text{Logical Address Bits}}{\text{Page size}} = \frac{2^{32}}{2^{12}} = 2^{20} \text{ entries}$$

⑤

for a 32-bit CPU each page-table is 4 bytes long.

$2^2 = 2$ Bits.