CS & IT ENGINEERING

Operating System

Memory Management

DPP 01 (Discussion Notes)

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01 Question

02 Discussion

Q.1

According to abstract view of memory, memory is _____. [MCQ]

A. Non-linear three-dimensional array.

B. Linear three-dimensional array.

C. Non-linear one-dimensional array of words.

D. Linear one-dimensional array of words.

Q.2

What is smallest addressable unit in a memory?

[MCQ]

A. 1 Bit

B. 1 Byte (=8 bits) ✓

C. 2^{10} byte ✗

D. 2^2 bit ✗

$\therefore$

2^{10} B = 1KB

2^{20} B = 1MB

2^{30} B = 1GB

2^{40} B = 1TB

0 0 0 1 1 0 0 0

2^{50} = 1PB

8 bits = 1Byte

Q.3 If there are total 16 words in memory and each word has a size of 8 bytes. How many bits of address is required to refer one word?

[NAT]

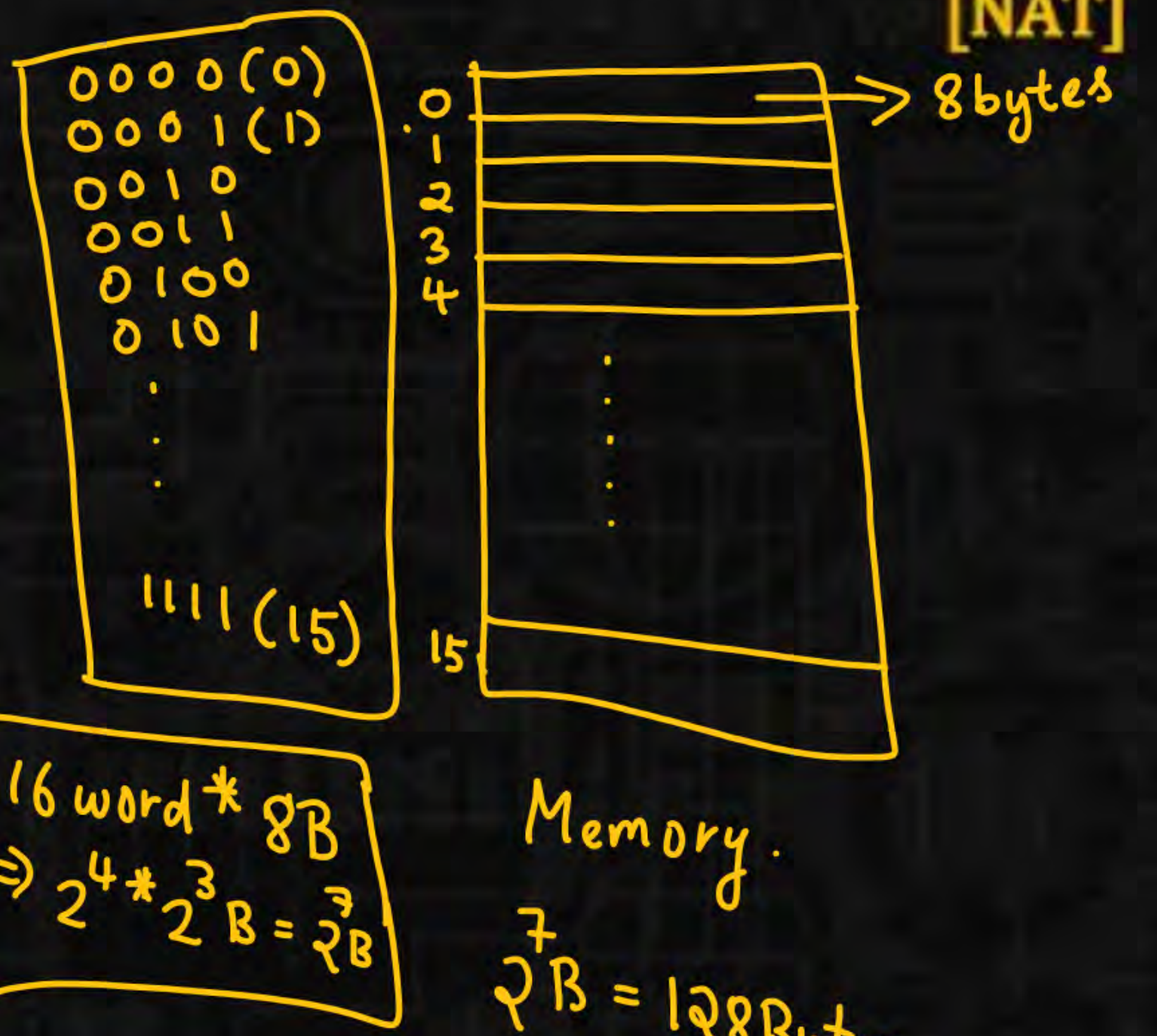
4

No. of words = 16 words

Size of each word = 8 Bytes

$\log_2 16 \Rightarrow 4$ bits

$\log_2 8 \Rightarrow 3$ bits



Q.4 [NAT]

Consider the following statements:

(i) If there is a memory of size 32 KW, then number of bits required to address one word is x.

(ii) If number of bits required to address a memory are 18 bits, then the memory capacity is y KW.

Calculate x * y?

$[1K = 2^{10}]$

(i) x ⇒ No. of bits to reps mem.

$32KW \Rightarrow 2^5 * 2^{10} W \Rightarrow 2^{15} W$

$x = 15$

$\log_2 2^{15} \Rightarrow 15$ bits

$x = 15$, $Y = 256$

$x * Y = 15 * 256$

$\Rightarrow 3840$

(ii) 18 bits $\Rightarrow 2^{18} W$

$\Rightarrow 2^8 * 2^{10} W$

$2^8 * KW$

$\Rightarrow 256 (y)$

Q.5

How many of the following are functions of memory manager?

[NAT]

(i) Memory allocation ✓

(ii) Protection ✓

(iii) Fragmentation ✗

(iv) Address Translation ✓

(v) Manage the execution of larger program in smaller memory area. ✗ (Goal)

3

Q.6

An operating system uses the Banker's algorithm for deadlock avoidance. There are three types of resource A, B, and C allocated to three processes P_0, P_1, P_2. The below table represents the current system state.

[MCQ]

There are 2 units of each resource still available. The system is in safe state. Consider the following independent requests for additional resources in current state.

	Allocation			Max		
	A	B	C	A	B	C
P_0	1	1	3	7	4	8
P_1	5	6	2	7	8	4
P_2	3	2	1	4	5	2

Request 1: P_0 request 2 units of A, 0 units of B, 1 units of C.

Request 2: P_1 request 2 units of A, 0 units of B, 2 units of C.

Which one of the following is TRUE?

A. Request 1 can be granted, Request 2 cannot.

B. Request 2 can be granted, Request 1 cannot.

C. Both Request 1 and Request 2 can be granted.

D. Neither of Request 1 and Request 2 can be granted.

	Allocated			Maximum			Required/Need		
	A	B	C	A	B	C	A	B	C
P_0	3	1	4	7	4	8	4	3	4
P_1	5	6	2	7	8	4	2	2	2
P_2	3	2	1	4	5	2	1	3	1

Avail = [2 2 2] P_0 = [2 0 1]

[2 2 2] - [2 0 1] => [0 2 1]

P_1 = [2, 0, 2]

Q.7

Request of any process should be granted iff the resulting state is safe otherwise it is denied, this is known as_____. [MCQ]

A. Resource -Allocation Algorithm

B. Resource -Access Algorithm

C. Resource- Request Algorithm

D. None of these

Q.8

Which of the following are deadlock prevention schemes? [MCQ]

A. Each process request resources either in only increasing order or in only decreasing order. (Circular wait)

B. Whenever a process requests a resources, it does not hold any other resources. (Hold & wait)

C. If a process is holding some resources and request another resources that cannot be immediately allocated to it, all resources being held are pre-empted. (No preemption)

D. All of these

Q.9 [MSQ]

Consider the following system.
Which of the following Statement is/are correct.

A. The system in unsafe state.

B. The system in safe state.

C. Data missing

D. Deadlock will take place

	A	B	C	D
P_0	0	0	1	2
P_1	1	0	0	0
P_2	1	3	5	4
P_3	0	6	3	2

Allocation

	A	B	C	D
P_0	0	0	1	2
P_1	1	7	5	0
P_2	2	3	5	6
P_3	0	6	5	2

Max

A	B	C	D
1	5	2	0

Available

Avail = [1 5 2 0]

New Avail$_3$ ⇒ [1, 11, 5, 2]

Q.10

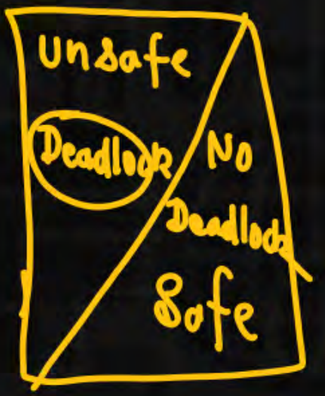
Consider which of the following statements is/are correct regarding deadlock? [MSQ]

A. If a system is in unsafe state, the process may complete its execution without entering a deadlock state.

B. If a process releases all its resources before requesting new resource, then deadlock and starvation both are possible.

C. Deadlock avoidance is less restrictive than deadlock prevention.

D. In deadlock avoidance, the request for resources is always granted if the resulting state is safe.



Q.11

For mutual exclusion to prevail in the system ____.

[MCQ]

A. The processor must be a uniprocessor rather than a multiprocessor.

B. There must be at least one resource in a sharable mode.

C. At least one resource must be held in a non-sharable mode.

D. All of the these.


THANK YOU GW
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