# Homework 4

[MM]

1. Which memory partition cannot cause internal fragmentation （ **C** ）

A）fixed partitions B）paging

C）segmentation D）segmentation with paging.

1. Which page replacement algorithm can cause Balady’s Anomaly. （ **C** ）

A）LRU. B）FIFO.

C）Working Set. D）Optimal

1. Here we use the hybrid scheme to support virtual memory. The segment number is no more than 128, and each segment can contain at most 512 pages. If the size of the page is 4KB, how many bits should be used to indicate the position of an instruction (1 byte) in the program space?

A. 26 B. 28 C. 30 **D. 32**

Figure 2.

1. Figure 2 illuminates the layout of 1MB memory when using Buddy system, in which the two blocks with characters (A and B) are occupied. If here is a new memory request of **c = 64K**, **C** is the correct situation after the allocation.

A. 

B. 

C. 

D. 

1. Paging strategy partitions memory into small equal fixed-size chunks and divide each process into the same size chunks. The chunks of a process are called pages and chunks of memory are called **B**.

A. sectors B. blocks C. frames D. holes

1. The default file system for Windows Vista is **A**.

A. FAT32 B. HFS (Hierarchical FS) C. NFS D. NTFS

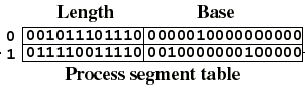


Figure 3.

1. Figure 3 is the segment table of a process. When given the logical address <0001, 001011110000>, its physical address is **B**.

A. 001011101110001011110000 B. 011110011110001011110000

C. 0000010000000000001011110000 D. 0010000000100000001011110000

1. The address space of virtual memory is limited by （ **D** ）

A）the size of the main memory B）the width of address bus

C）the user’s space inside the main memory D）the size of hard disk

1. Buddy system is a method of managing the space in main memory assigned to OS. Please

(1) Describe the algorithm of its idea with pseudo code. The input contains two parameters – size of the memory space as 2N bytes, and a request of a new process whose size is k bytes. You are only required to consider how to cope with the request, no need to consider the merging.

Buddy (sizeOfM, sizeOfNewProg){

u = getThePowerOfTwo(sizeOfM)

if (2\*\*(u-1) < sizeOfNewProg <= 2\*\*u){

#allocate the block

{

else{

try{

buddy(sizeOfM/2, sizeOfNewProg) # part 1

}

except{

#if the first allocation failed, allocate in the other part of the memory

}

}

}

(2) Use the following memory requests [req(200B), req(100B), req(150B), req(30B), req(256B), req(60B), req(120B)] to demonstrate your algorithm. The kernel space assigned to OS is 1024 bytes, shown in Fig. 1, and the whole space initially is free.

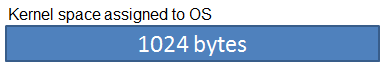


Fig. 1 Kernel space assigned to OS

1. Consider the following segment table:

Segment Base Length

0 219 600

1 2300 14

2 90 100

3 1952 96

What are the physical addresses for the following logical addresses [(x,y): “x” is the segment, and “y” corresponds to the relative address]?

**a**. 0,430

b. 1,10

c. 2,500

d. 3,112

1. An OS uses demand paging system in memory management. Assume the capacity of the main memory which a process could be allocated to is 300 byte, which is divided into 3 frames. The process will access the following Logical address byte series: 115, 228, 120, 88, 446, 102, 321, 432, 260, 167（Attention: 115B is only equivalent to 1 page）. Please Answer：

(a) Writing down the page-reference string.

(b) Analyze the page replacement situation and calculate the page fault frequency when LRU and FIFO algorithm is used

1. In partitioning scheme, (1) please describe the popular data structures to manage the partitions, (2) propose the replacement algorithms and their pros and cons [赞成和反对的理由].
2. Here is an operating system, and its memory size used for user is 512K. The free space is managed using free partition table. The partitions are allocated following the order of from lower address to higher address, that is, the free partitions with lower address are first assigned to a new request. All the user space is free in the beginning. Answer the following questions after assign the partitions following the request sequence, without considering the compaction:

req(300kB), req(100kB), release(300kB), req(150kB), req(30kB), req(40kB), req(60kB)

1. With Fist fit scheme, describe the free partitions (with the information of address and size) after the allocation.
2. Answer the above questions when taking Best fit scheme.
3. When here is a new request 90K, could it be assigned following (1) and (2)? If yes, please give out the position.
4. Assume that the main memory is organized using pure paging. The page table (uncompleted) is shown as Figure 2.

|  |  |
| --- | --- |
| Page table | |
| 0 | 4 |
| 1 |  |
| 2 |  |
| 3 | 3 |
| 4 | 1 |

Figure 2

For each of the following decimal logical addresses, the **physical addresses** according to them are shown in Figure 3.

|  |  |
| --- | --- |
| logical addresses | physical addresses |
| 0 | 2048 |
| 600 | 88 |
| 1024 | 0 |

Figure 3

(1) Compute the page size.

(2) Fulfill the page table.

(3) For each of the following decimal logical addresses, compute the **physical addresses** according to the page table.

(3-1) 1600

(3-2) 2500