文件和大存储

6. A file’s absolute path name starts from_____ .

单选题 (4 分) 4 分

- A. current directory
- B. root directory
- C. home directory
- D. multi-level directory

7. Commonly, In memory the file control block of a file does not contain_____.

单选题 (4 分) 4 分

- A. the access rights
- B. the timestamp
- C. the file size
- D. the file name

10. The system design the structure File Control Block (FCB) to manage the files. Commonly, File control block is created on disk when the _____ system call is invoked.

单选题 (4 分) 4 分

- A. fork
- B. open
- C. read
- D. write

要注意FCB在disk和在主存里（这个没见过）

6. _____ present a uniform device-accessinterface to the I/O subsystem, much as system calls provide a standardinterface between the application and the operating system.

单选题 (9 分) 9 分

- A. Kernel
- B. Device drivers
- C. Bus
- D. Operating system

4. Which kind of swap space is fastest?

单选题 (9 分) 9 分

- A. A swap file on FAT
- B. A swap file on ext3
- C. A partition with sophisticated file systemfunctions
- D. A raw partition

a. The FCFS scheduleis 143, 86, 1470, 913, 1774, 948, 1509, 1022,1750, 130. The total seek distanceis 7081.
b. The SSTF scheduleis 143, 130, 86, 913, 948, 1022, 1470, 1509, 1750,1774. The total seek distanceis 1745.
c. The SCAN scheduleis 143, 913, 948, 1022, 1470, 1509, 1750, 1774,4999, 130, 86. The total seekdistance is 9769.
d. The LOOK scheduleis 143, 913, 948, 1022, 1470, 1509, 1750, 1774,130, 86. The total seek distanceis 3319.
e. The C-SCAN scheduleis 143, 913, 948, 1022, 1470, 1509, 1750, 1774,4999, 86, 130. The total seekdistance is 9985.
f. The C-LOOK scheduleis 143, 913, 948, 1022, 1470, 1509,1750, 1774, 86, 130. The total seek distanceis 3363.

这里主要的是LOOK算法，它回的时候是不会到边界的，就算是C-look也是回到另一边最末尾然后再按照原顺序跑

8. Contiguous allocation of files is not good for files that change in size because:

单选题 (6 分) 6 分

- A. random access time is too slow.
- B. it is slow to move backwards in the file.
- C. the files need to be moved around when they grow in size.
- D. the files cannot be made smaller.

正确答案: C

9. 某文件系统采用索引节点存放文件的属性和地址信息，簇大小为 4KB。每个文件索引节点占 64B，有 11个地址项，其中直接地址项8个，一级、二级和三级间接地址项各1个，每个地址项长度为 4B。请回答下列问题。
（1） 该文件系统能支持的最大文件长度是多少？ ① KB+ ② MB+ ③ GB+ ④ TB （空格内填写数字）
（2） 文件系统用 1M（$1M=2^{20}$）个簇存放文件索引节点，用 512M个簇存放文件数据。若一个图像文件的大小为 8000B，则该文件系统最多能存放多少个这样的图像文件？ ⑤ M个（填写以M为单位的数值）
（3） 若文件 F1 的大小为 31KB，文件 F2 的大小为 33KB，则该文系统获取 F1 和 F2 最后一个簇的簇号需要的时间是否相同？ ⑥ （填写：相同 或 不相同）

填空题 (24 分) 24 分 (请按题目中的空缺顺序依次填写答案)

① 32
② 4
③ 4
④ 4
⑤ 64
⑥ 不相同

10. Considera file system on a disk that has both logical and physical block sizes of 512bytes. Assume that the information about each file is already in memory.Suppose we use indexed allocation and are currently at the 10th logical block.If we want to access the 3rd logical block, how many disk blocks should weaccess?

单选题 (6 分)　6 分

- A. 3
- B. 1
- C. 2
- D. 4

6.　下述设备中，___ 是块设备。

单选题 (5 分)　5 分

- A. 硬盘
- B. 虚拟终端
- C. 打印机
- D. 串行口

8.　如果以硬链接方式共享一个普通文件，但ln命令返回了一个错误信息，以下哪一项可能导致这个错误信息?

单选题 (5 分)　5 分

- A. 原始文件是只读的
- B. 原始文件是防止拷内
- C. 目标文件和原始文件在不同的文件系统中
- D. 原始文件(source file)是隐藏的

11. 安装模块的命令是(　　)。

单选题 (5 分)　5 分

- A. lsmod
- B. modinfo
- C. insmod
- D. listmod

16. 在操作系统中，信号量表示资源，其值_____。

单选题 (5 分)　5 分

- A. 只能进行布尔型运算来改变
- B. 仅能用初始化和P、V操作来改变
- C. 只能进行加减乘除运算来改变
- D. 进行任意的算术运算来改变

正确答案: B

17. Which statement is incorrect when executing the “make” command with no parameters in the current directory?　回答错误

单选题 (5 分)　0 分

- A. make will execute corresponding commands according to rules specified in makefile or Makefile
- B. make does nothing if no targets exist in makefile, even if Makefile exists
- C. make does nothing if both makefile and Makefile do not exist
- D. make will compile the file makefile or Makefile

问的是错的，选的是D

20. 从下列关于驱动程序的论述中，选出一条正确的论述。

单选题 (5 分)　5 分

- A. 由于驱动程序与I/O设备（硬件）紧密相关，故必须全部用汇编语言书写
- B. 对于一台多用户机，配置了相同的16个终端，此时可以只配置一个由多个终端共享的驱动程序
- C. 驱动程序与I/O设备的特性紧密相关，因此应为每一I/O设备配备一个驱动程序
- D. 驱动程序与I/O控制方式紧密相关，因此对DMA方式应是以字节为单位去启动设备及进行中断处理

D中，是数据块不是字节

内存与虚拟存储部分

4. The BTV operating system has a 21-bitvirtual address, yet on certain embedded devices, it has only a 16-bit physicaladdress. It also has a 2-KB page size. How many entries are there in each ofthe following?
   a. A conventional, single-level page table . Answer: ①　（填写10进制数）
   b. An inverted page table.　Answer: ②　（填写10进制数）

填空题 (16 分)　16 分　(请按题目中的空缺顺序依次填写答案)

① 1024

② 32

正确答案:
① 1024
② 32

6. Consider a paging system with the page table stored in memory.
a. If a memory reference takes 50 nanoseconds, how long does a paged memory reference take?
b. If we add TLBs, and if 75 percent of allpage-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entryis present.)
Answer:
a. ① ns
b. ② ns

填空题 (14 分) 14 分 (请按题目中的空缺顺序依次填写答案)

① 100

② 64.5

注意TLB是减少了一次去访问内存的时间，存储的是物理页号

4. Consider the two-dimensional array A:
int A[][] = new int[100][100];
where A[0][0] is at location 200 in apaged memory system with pages of size 200. A small process that manipulates the matrix resides in page 0 (locations 0 to 199). Thus, every instruction fetch will be from page 0.
For three page frames, howmany page faults are generated by the following array-initialization loops,using LRU replacement and assuming that page frame 1 contains the process and the other two are initially empty?
a.
for (int j = 0;j < 100; j++)
for (int i = 0; i < 100; i++)
A[i][j] = 0;
b.
for (int i = 0; i < 100; i++)
for (int j = 0; j < 100; j++)
A[i][j] = 0;
Answer:
a. ① page faults
b. ② page faults

5000 50

5. _____ memory allocation scheme may produce external fragmentation.

单选题 (3 分) 3 分

- A. Demand
- B. system halts
- C. Multiple-partition
- D. None of above

21. Implementing LRU precisely in an OS is expensive, so practical implementations often use an approximation called .

单选题 (3 分) 3 分

- A. MRU
- B. MFU
- C. LFU
- D. NRU

1. 设某计算机的逻辑地址空间和物理地址空间均为64KB，按字节编址。若某进程最多需要6页（Page）数据存储空间，页的大小为1KB，操作系统采用固定分配局部置换策略为此进程分配4个页框（PageFrame）。在时刻260前的该进程访问情况如下表所示（访问位即使用位）。

页号	页框号	装入时刻	访问位
0	7	130	1
1	4	230	1
2	2	200	1
3	9	160	1

当该进程执行到时刻260时，要访问逻辑地址为17AFH的数据。请回答下列问题：

（1）该逻辑地址对应的页号是 ① ？

（2）若采用先进先出（FIFO）置换算法，该逻辑地址对应的物理地址是 ② H（**填写4位十六进制数，且字母为大写A、B、C、D、E、F**）？

（3）若采用时钟（CLOCK）置换算法，该逻辑地址对应的物理地址是 ③ H？（**填写4位十六进制数，且字母为大写A、B、C、D、E、F**）（设搜索下一页的指针沿顺时针方向移动，且当前指向2号页框，示意图如下。）

这个题要注意的就是，这里的page frame代表的是物理的地址，frame代表实际地址，查页表就是用page number去对应查抄frame的

所以第一个是1 1111 A F 则是1FAF H

导论和进程

3. Whichof the following instructions should be privileged(in kernel mode)?

多选题 (15 分) 15 分

- [x] A. Setvalue of timer
- [ ] B. Readthe clock.
- [x] C. Clear memory.
- [ ] D. Issuea trap instruction.
- [x] E. Turn off interrupts.
- [x] F. Modifyentries in device-status table.
- [ ] G. Switchfrom user to kernel mode.
- [x] H. AccessI/O device.

正确答案: A C E F H

而系统调用和中断既可以发生在用户态又可以发生在内核态。

12. Themain disadvantage of the batch system is ____ ?

单选题 (5 分) 5 分

- A. lowCPU utilization
- B. lack of concurrency
- C. lack of interaction
- D. none of the above

11. Threads belonging to the same process share the ____ .

单选题 (3 分)　3 分

- A. stack
- B. data section
- C. register set
- D. thread ID

13. A message-passing system is ____ .

单选题 (3 分)　3 分

- A. A kind of direct communication
- B. A kind of low-level communication
- C. A kind of inter-processcommunication
- D. A kind of symmetrical communication

正确答案: C

6. Which of the following components of program state are shared across threads in a multithreaded process?

多选题 (6 分)　6 分

- [ ] A. Register values
- [x] B. Heap memory
- [x] C. Global variables
- [ ] D. Stack memory

正确答案: B C

16. Which of the following item should not bein the PCB (Process Control Block)?

单选题 (3 分)　3 分

- A. process state
- B. CPU-scheduling information
- C. memory-management information
- D. code section

能让你找到，但是不是说直接放在里面

23. 以下描述中，_____并不是多线程系统的特长

单选题 (3 分)　3 分

- A. 利用线程并行地执行矩阵乘法运算
- B. web服务器利用线程请求http服务
- C. 键盘驱动程序为每一个正在运行的应用配备一个线程，用来响应相应的键盘输入
- D. 基于GUI的应用程序用不同线程处理用户的输入、计算、输出等操作

5. Which of the following statement is incorrect?

单选题 (6 分)　6 分

- A. Virtual machines improve OS development and testing process
- B. Micro-kernels allow some system services to be implemented just as user programs
- C. Layered OS is more efficient than monolithic OS
- D. Monolithic OS is usually difficult to modify

Monilithic OS(整体操作系统)

Layerd OS（分层操作系统）

8. Operating system is a set of software for managing_____.

单选题 (6 分)　6 分

- A. Computer hardware
- B. Computer resources
- C. Application programs
- D. Computer software

10. 下列选项中，通过系统调用完成的操作是（ ）。

单选题 (7 分)　7 分

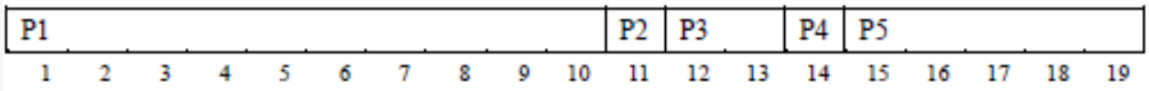
- A. 创建新进程
- B. 生成随机整数
- C. 页置换
- D. 进程调度

页置换这个属于异常处理范畴等里面了，不是调用接口的

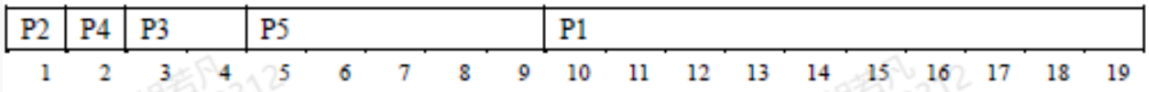
进程调度

a. Gantt Charts

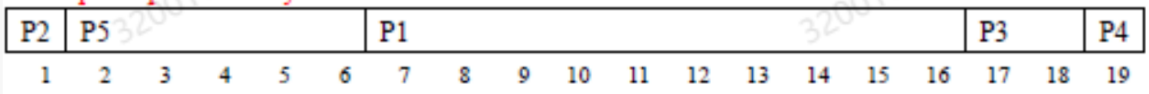
FCFS



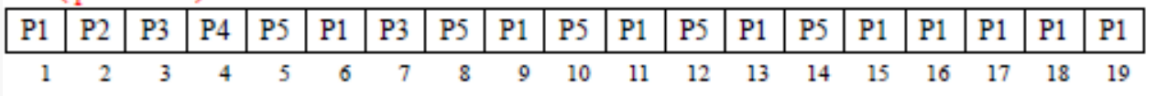
SJF



Non-preemptive Priority



RR(quantum=1)



RR算法

4. Usingt he Windows XP scheduling algorithm, what is the numeric priority of a thread for the following scenarios?

a. A thread in the REALTIME PRIORITYCLASSwith a relative priority of HIGHEST. ①

b. A thread in the NORMAL PRIORITY CLASSwith a relative priority of NORMAL. ②

c.A thread in the HIGH PRIORITY CLASS with a relative priority of ABOVE NORMAL. ③

填空题 (12 分) 12 分 (请按题目中的空缺顺序依次填写答案)

① 26

② 8

③ 14

9. Why the Shortest-Job-Firstprocess scheduling cannot be implemented?

单选题 (5 分) 5 分

- A. It is too complex
- B. It requires special hardware
- C. The length of the next CPU burst is not known
- D. The length of the next I/O burst is notknown

同步与死锁

6. Suppose 9 producers and 6 consumers share a buffer with size of 8. In order to use the buffer properly, the semaphore mutex of critical section of the buffer is initialized to _____ 。

单选题 (5 分) 5 分

- A. 1
- B. 6
- C. 8
- D. 9

8. Which of the following Critical Section problem solutions results in busy-waiting?

单选题 (5 分) 5 分

A. Monitor

B. Special machine instruction

C. Semaphore

D. critical region

8. Banker’s algorithm is oneof _____ algorithm。

单选题 (8 分) 8 分

A. deadlock recovery

B. deadlock avoidance

C. deadlock prevention

D. deadlock detection

9. Which of the following operating systemuses Banker's Algorithm to perform deadlock avoidance?

单选题 (8 分) 8 分

A. Windows 10

B. Linux

C. iOS

D. Noneof the above

8. While a process is blocked on a semaphore'squeue, it is engaged in busy waiting.

判断题 (4 分) 4 分

A. TURE

B. FALSE

9. Suppose a shared printer is printing my job currently.While the printer is in use, you seek to print your job. Under any of the modern OS’s which of the following events are likely to happen :

单选题 (6 分) 6 分

A. you will be notified that the printer is busy, print later

B. my job will be aborted because you are my boss

C. your job will be queued based on its priority

D. your job will be spooled for printing in the order it arrived

假脱机技术

13. 文件F由200条记录组成，记录从1开始编号。用户打开文件后，欲将内存中的一条记录插入到文件F中，作为其第30条记录。请回答下列问题，并说明理由。

(1)若文件系统采用连续分配方式，每个磁盘块存放一条记录，文件F的存储区域前后均有足够空闲的磁盘空间，则完成上述插入操作最少需要访问 ① 次存储块? F的文件控制块内容会发生哪些改变?

(2)若文件系统采用链接分配方式，每个磁盘块存放一条记录和一个链接指针，则完成上述插入操作需要访问 ② 次磁盘块?若每个磁盘块大小为1KB，其中4个字节存放链接指针，则该文件系统支持的文件最大长度是 ③ GB（填写以G为单位字节数）？

填空题 (20 分)　20 分　(请按题目中的空缺顺序依次填写答案)

① 59

② 31

③ 4080

正确答案:

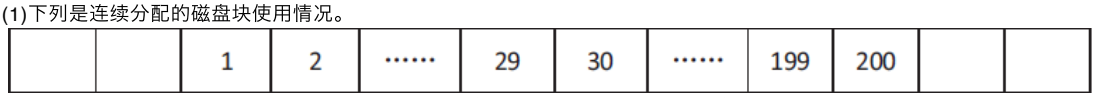
① 59

② 31

③ 4080

答案解释:

(1)下列是连续分配的磁盘块使用情况。

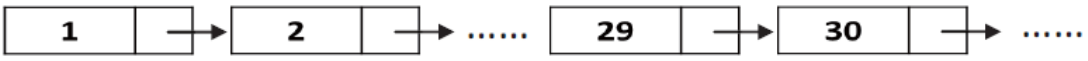


现在需要将一条记录插入到文件F中，作为其第30条记录，也就是插入到第29条记录的后面。这需要向前移动文件的前29条记录。移动后如下图，其中灰底的磁盘块存储的是插入的记录。

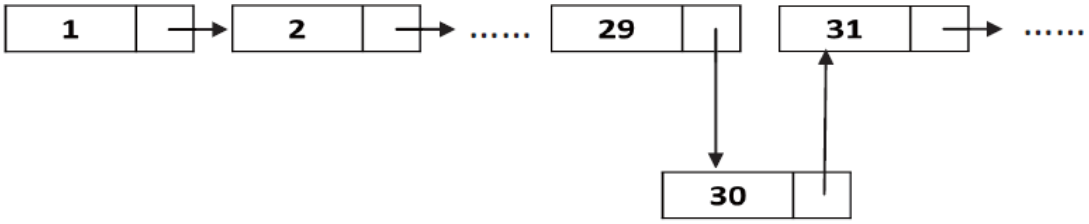
向前移动文件的前29条记录，每条记录需先读一次，然后写到其前一块磁盘块中，共需29×2=58次。然后需要将新记录写到腾出的那个磁盘块中，作为该文件的第30条记录。故总共需要58+1=59次。

由于文件的起始位置前移了一个磁盘块，同时文件也增加了一条记录，因此F的文件控制块中的文件的起始位置和文件的大小会发生改变。

(2)下列是链接分配的磁盘块使用情况。



现在需要将一条记录插入到文件F中，作为其第30条记录，也就是插入到第29条记录的后面。插入后效果如下图。



这就需要先找到第29条文件记录的磁盘块，然后获得第30条文件记录的磁盘块地址（需读磁盘29次）。再为该记录分配一个空闲磁盘块，将该记录以及第30条文件记录的磁盘块　地址写入其中，再将该块写入磁盘（需写磁盘1次）。最后还需要修改第29块的链接指针，指向新的插入块，并将第29块写回磁盘（需写磁盘1次）。故共需要29+1+1= 31次。

由于每个磁盘块大小为1KB，其中4个字节存放链接指针，因此用于存放文件的空间为（1KB-4B）。又4个字节的指针的地址空间为232。因此该文件系统支持的文件最大长度是(1024-4)B×232=4080GB。

2. In a system, there are multiple producer processes which produce numbers to a buffer and multiple consumer processes which consume numbers from the buffer, where the buffer is shared among all producers and consumers. The following variables are shared among all processes:

int nextc=0, nextp=0,buf[10];

semaphore full; empty;mutex;

Producer and consumer processes are given in thefollowing C++-like pseudo programs

Producer Process:

```
int itemp;
while(1){
1    itemp = rand(); // Generate a number
2    P(empty);
3    P(mutex);
4    buf[nextp]=itemp;
5    nextp=(nextp+1)%10;
6    V(mutex);
7    V(full);
}
```

ConsumerProcess:

```
 int itemc;
 while(1){
1    P(full);
2    P(mutex);
3    itemc=buf[nextc];
4    nextc=(nextc+1)%10;
5    V(mutex);
6    V(empty);
7    cout<< itemc << endl;
    }
```

(1) What are the critical sections in the givenproducer and consumer processes?

(2) How should the semaphores **full, empty**, and **mutex** be initialized?

(3) If we switch the order of 2 and 3 in the producer process and the order of 1and 2 in the consumer process,would the system still work properly? Justify your answer.

Producer Process

```
…
1 itemp = rand(); // Generatea number
2 P(mutex);
3 P(empty);
…
```

ConsumerProcess

```
…
1 P(mutex);
2P(full);
3itemc=buf[nextc];
…
```

简答题 (12 分)　12分

(1)Lines 4,5 in Producer, line 3,4 in Consumer
(2)full=0,empty=10,mutex=1
(3)No,a deadlocked will be created, if producer get mutex semaphore but there's no empty item, then no consumers continue and the system is deadlocked

(/api/uploads/10436956/blc

答案解释:

(1) Producer: Lines4 and 5.

Consumer: Lines 3 and4.

(2) empty = 10,mutex = 1, and full = 0.

(3) No, the systemmay be deadlocked. For example, if a producer gets mutex semaphore but there isno more empty item, no consumers can continue and the system is deadlocked.

16. Consider the two-dimensional array A:
int A[][] = new int[100][100];
where A[0][0] is at location 200 in apaged memory system with pages of size 200. A small process that manipulates the matrix resides in page 0 (locations 0 to 199). Thus, every instruction fetch will be from page 0.
For three page frames, howmany page faults are generated by the following array-initialization loops,using LRU replacement and assuming that page frame 1 contains the process and the other two are initially empty?
a.
for (int j = 0;j < 100; j++)
for (int i = 0; i < 100; i++)
A[i][j] = 0;
b.
for (int i = 0; i < 100; i++)
for (int j = 0; j < 100; j++)
A[i][j] = 0;
Answer:
a. ① page faults
b. ② page faults

填空题 (10 分) 0 分 (请按题目中的空缺顺序依次填写答案)

① 50000 回答错误

② 500 回答错误

正确答案:
① 5000
② 50