Quiz1

1. Which is (are) the correct definition(s) for the Operating System? (Multiple Selections)
A. Middleware between the hardware and the various applications
B. Hardware drivers
C. A resource allocator
D. A control program

答案：ACD

2. Please fill the following blanks to boot up an operating system.
(1) Load _____
(2) Select boot from Hard Disk Drive (HDD)
(3) Read Master Boot Record (MBR) Information
(4) Load _____
(5) Initialize Operating System

答案：bootstrap program, GRUB/LILO/OS boot options

3. Which is (are) Volatile Memory(Memories)? (Multiple Selections)
A. Hard Disk Drives (HDDs)
B. Static Random Access Memory (SRAM)
C. Dynamic Random Access Memory (DRAM)
D. Solid State Disks (SSDs)

答案：BC

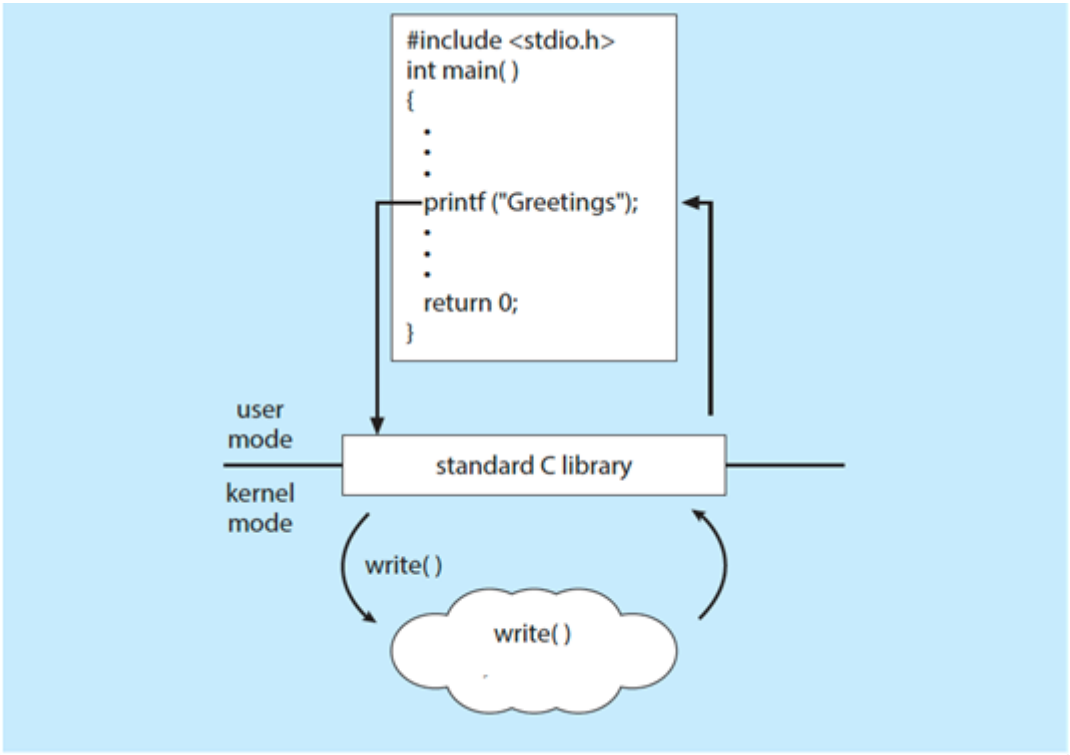
4. Which option(s) will cause an Interrupt? (Multiple Selections)
A. Finishing read data from a Hard Disk Drive (HDD)
B. Execute an instruction DIV 100 % 0 /*calculate 100 % 0 */
C. Execute an instruction LOAD R1 100 /*load a data into R1 register with an address is 100 */
D. Finishing printing the related data into monitor

答案：ABD

5. Which is (are) Correct for Direct Memory Access (DMA)? (Multiple Selections)
A. DMA is controlled by CPU
B. DMA can decrease the interrupts
C. DMA transfers data without CPU intervention
D. DMA can speed up the data transfer

答案：BCD

6. According to the figure, fill the blank with the name of a system call.



答案： write()

7. Which is (are) the benefits for microkernel? (Multiple Selections)

A. Reduce the communications between User mode and Kernel mode

B. Easier to extend

C. Easier to adapt new computer architectures

D. More reliable and secure

答案：BCD

8. Which command(s) can shows the version of the current Linux system? (Multiple Selections)

A. # uname -a

B. # ls -a

C. # cat /proc/version

D. # cat /etc/issue

E. # lsb_release -a

答案：ACDE

下面是运行示例

[root@localhost ~]# uname -a

Linux bogon 2.6.32-504.el6.x86_64 #1 SMP Wed Oct 15 04:27:16 UTC 2014 x86_64 x86_64

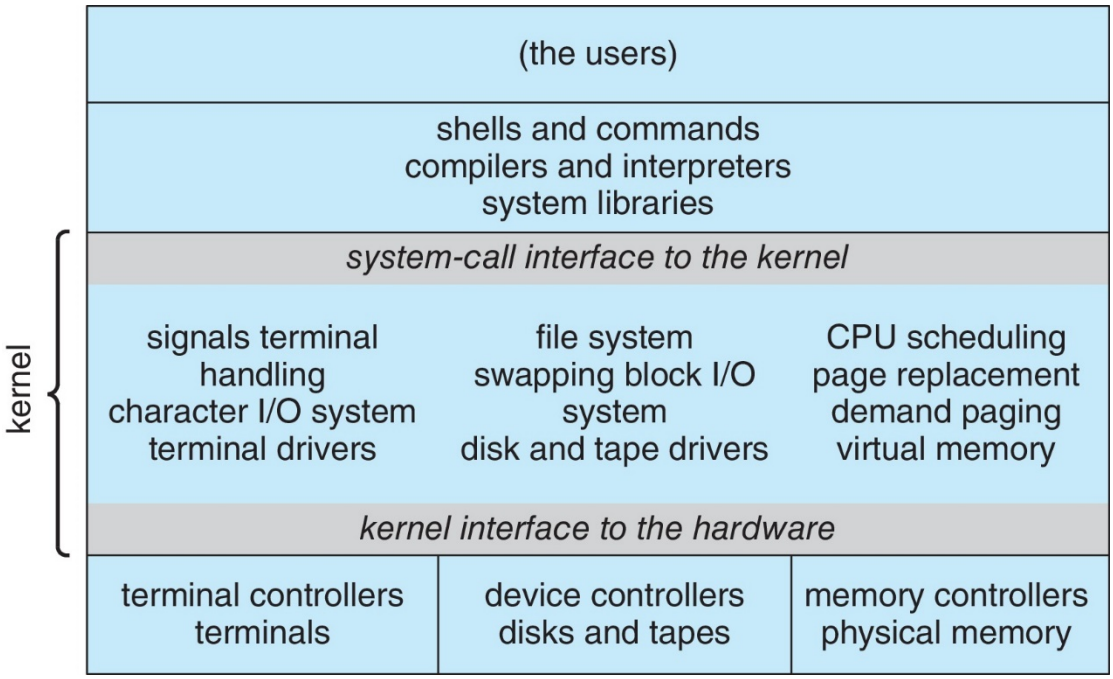
x86_64 GNU/Linux

[root@localhost /]# cat /proc/version
Linux version 2.6.32-504.el6.x86_64 (mockbuild@c6b9.bsys.dev.centos.org) (gcc version 4.4.7 20120313 (Red Hat 4.4.7-11) (GCC)) #1 SMP Wed Oct 15 04:27:16 UTC 2014

[root@localhost /]# cat /etc/issue
CentOS release 6.6 (Final)
Kernel \r on an \m

[root@localhost /]# lsb_release -a
LSB Version: :base-4.0-amd64:base-4.0-noarch:core-4.0-amd64:core-4.0-noarch:graphics-4.0-amd64:graphics-4.0-noarch:printing-4.0-amd64:printing-4.0-noarch
Distributor ID: CentOS
Description: CentOS release 6.6 (Final)
Release: 6.6
Codename: Final

9. As we know, the traditional UNIX system is designed based on layered approach, fill the following blanks based on the following figure.



Layer 0: _____
Layer 1: _____
Layer 2: _____
Layer 3: _____
Layer 4: _____
Layer 5: _____

答案：

Layer 0: hardware

Layer 1: device drivers (kernel interface to hardware)

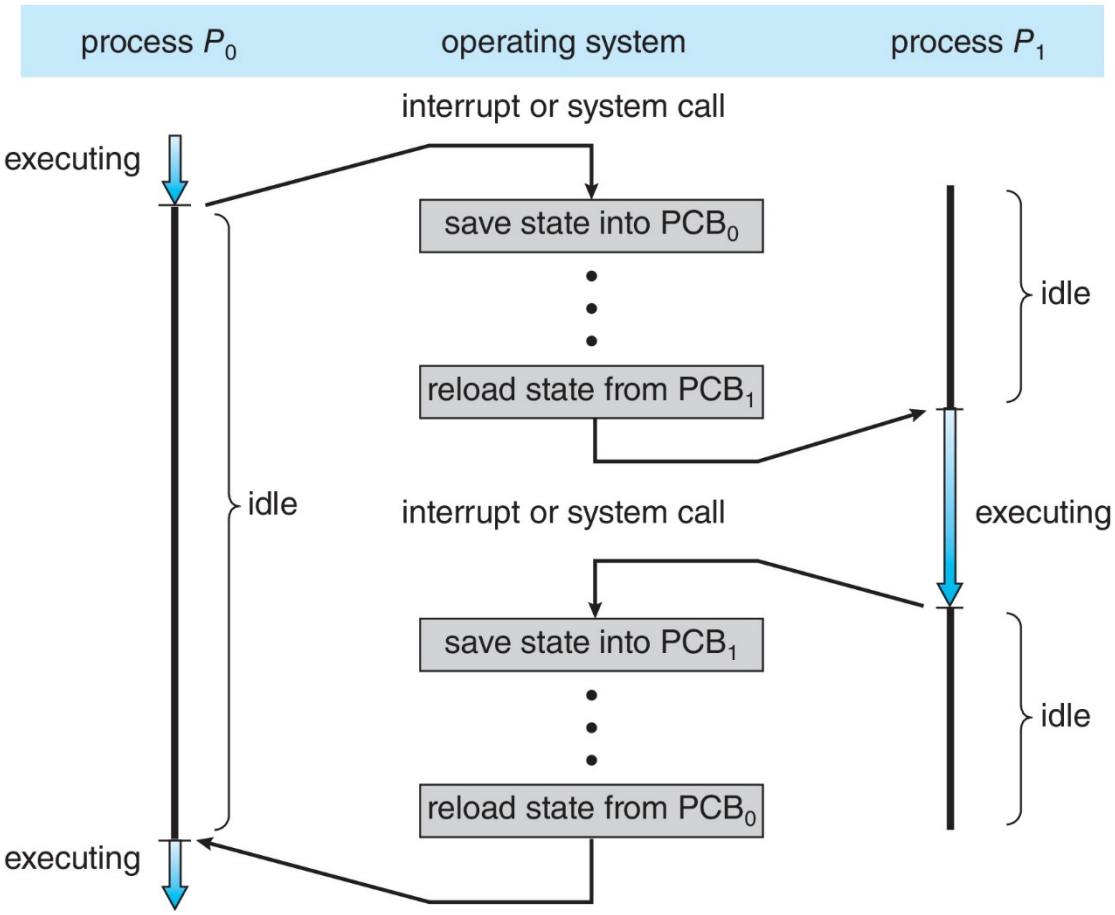
Layer 2: OS kernel

Layer 3: system call interface

Layer 4: user interface

Layer 5: users

10. Which is (are) correct for the following context switch? (Multiple Selections)



A. The saving state of PCB0 is the same as the reloading state of PCB0

B. The saving state of PCB1 is the same as the reloading state of PCB1

C. When P0 becomes idle, the corresponding process state should be changed

D. The context switches have additional overhead for OS

答案：ACD

Quiz 2

1. Which is (are) the correct for multithreading? (Multiple Selections)

A. Multithread can be regarded as the Lightweight Process (LWP) in Linux
B. Multithreads can utilize fork-join parallelism
C. Multithreads can be created via clone( ) system call
D. Multithreading models include a two-level model (e.g., a combination of One-to-One and Many-to-Many)

答案：ABCD

2. Which is (are) the correct for the benefits of multithreading? (Multiple Selections)

A. Reduce response time
B. Improve resource sharing
C. Decrease creation overhead
D. Increase reliability of the whole system
E. Enhance scalability of multicore architecture
F. Save context switch overhead

答案：ABCEF

3. In the CPU scheduling, which are included in the dispatch latency? (Multiple Selections)

A. Load the PCB information of processes
B. Switch between the user mode and the kernel mode
C. Save the PCB information of processes
D. Read the Program Counter (PC) register information

答案：ABCD

4. Regarding to the Linux Scheduling, which is (are) correct? (Multiple Selections)

A. Real time processes have the highest priorities
B. Higher priority processes have shorter time quantum
C. Starvation can be avoided by adjusting the nice values
D. The priority of a normal process can be 99

答案：AC

5. Which is (are) correct methods for process synchronization? (Multiple Selections)

A. Memory barrier
B. Atomic operations
C. Mutex locks

D. Binary semaphore
E. CPU disabling
F. Read Copy Update (RCU)
G. Spinlocks

答案：ABCDEFG

6. Regarding to the solution of Critical-Section problem, which is (are) correct? (Multiple Selections)

A. Mutual exclusion is the basic requirement for the Critical-Section problem
B. Peterson's solution is suitable for multiple processes' synchronization
C. In the exit section of critical section, typically there is a progress notification to other processes
D. Circular waiting is required for multiple processes

答案： AC

7. Which is (are) correct for the readers-writers problem? (Multiple Selections)

A. Multiple readers can be executed at the same time
B. Multiple writers can be executed in parallel
C. The "read_count" variable can be regarded as another critical section
D. The second reader need to check the status of the "rw_mutex" lock

答案：AC

8. How many processes and threads in the following code segment? (Single Selection)

```
pid_t pid;
pid = fork();
if (pid == 0) { /* child process */
fork();
thread create( . . .);
}
fork();
```

A. 2 processes, 3 threads
B. 3 processes, 4 threads
C. 4 processes, 6 threads
D. 6 processes, 8 threads

答案：D

9. In the following scheduling algorithms, which one can avoid starvation? (Single Selection)

A. Round Robin (RR)
B. Priority based scheduling
C. Shortest Job First (SJF)
D. Shortest Remaining Time First (SRTF)

答案：A

10. Regarding to the bounded buffer problem (producer consumer problem), assume a consumer process must take 10 continuous products from the buffer, and then other consumer processes can get products. Please select the proper codes to fill the blanks for consumer process. (Multiple Selections in order)

semaphore mutex=1; /*original mutex lock in the textbook*/
semaphore mutex_consumer=1; /*mutex lock for 10 continuous products*/
semaphore empty=n;
semaphore full=0;

Consumer Process

```
while (true) {
    _____
    for (int i = 0; i < = 10; i ++){
    _____
    _____
    /* remove an item from buffer to next_consumed */
    _____
    _____
    }
    _____
}
```

A. wait (mutex_consumer);
B. wait (mutex);
C. wait (empty);
D. wait (full);
E. signal (mutex_consumer);
F. signal (mutex);
G. signal (empty);
H. signal (full);

答案：ADBFGE

Quiz 3

1. To prevent/avoid the deadlock, in the following which are effective solutions? (Multiple Selections)

为了预防/避免死锁，下列哪些是有效的方法？（多选题）

A. Disable mutual exclusion 禁用互斥
B. Disable hold and wait 禁用持有和等待
C. Apply preemptive scheduling 使用抢占式调度
D. Manage processes based on the linked tables 利用链表管理进程
E. Utilize resource allocation graph with claim edge 利用带申请边的资源分配图
F. Use Banker's algorithm 使用银行家算法

答案：CDEF

2. Which is (are) the correct for the deadlock? (Multiple Selections)

下列关于死锁的说法，哪些是正确的？（多选题）

A. If a system is in unsafe state, it has no deadlock.
如果系统处于不安全状态意味着它没有死锁
B. If a system is in unsafe state, it is possible to have a deadlock
如果系统处于不安全状态意味着它可能有死锁
C. If a system is in unsafe state, it should have a deadlock
如果系统处于不安全状态意味着它应该有死锁
D．The unsafe state can be justified via resource allocation graph
不安全状态的判断可以通过资源分配图

答案：BD

3. Regarding to contiguous allocation, which are correct? (Multiple Selections)

下列关于内存连续分配的说法，哪些是正确的？（多选题）

A. Improve the performance of data accesses
提高数据访问的性能
B. Improve the efficiency of memory space utilization
提高内存空间使用效率
C. Reduce the memory fragmentation
减少内存碎片
D. Simplify the address description of processes
简化进程内存地址描述

答案：ABCD

4. Regarding to the recovery from deadlock, which are correct? (Multiple Selections)

下列关于死锁恢复的说法，哪些是正确的？（多选题）

A. The abort process may have the lowest priority
终止的进程可能有最低的优先级
B. The abort process may have a long execution time

终止的进程可能有很长的执行时间

C. The abort process may hold the largest number of resources
终止的进程可能持有最多的资源数量

D. The abort process may have a long time to complete the execution
终止的进程可能有很长的时间才能完成

答案：ACD

5. Which are correct for page table? (Multiple Selections)
关于页表的说法以下哪些是正确的？（多选题）

A. The page size could be 16MB
页的大小可以是 16MB

B. The whole page table is in the main memory
完整的页表存放于内存中

C. A small part of page table is stored in the TLB
少部分的页表存放于 TLB 中

D. There are several types of page tables, such as hierarchical page tables
页表有多种类型，如分级页表

E. In the hash page table, page numbers and page offsets are generated via hash function
在哈希页表中，页号和页内偏移地址都通过哈希函数生成

答案：ABCD

6. Regarding to data locality, which are correct? (Multiple Selections)
关于数据局部性的说法，哪些是正确的？（多选题）

A. One type of data locality is temporal locality
一种数据局部性是时间局部性

B. One type of data locality is spatial locality
一种数据局部性是空间局部性

C. One type of data locality is access granularity
一种数据局部性是访问粒度

D. One type of data locality is access frequency
一种数据局部性是访问频率

答案： ABD

7. Regarding to buddy system and slab allocator, which are correct? (Multiple Selections)
关于伙伴系统和块分配器的说法，哪些是正确的？（多选题）

A. Buddy system can reduce the external fragmentation
伙伴系统可以减少外在碎片

B. Buddy system can reduce the internal fragmentation
伙伴系统可以减少内在碎片

C. Slab allocator can reduce the external fragmentation

块分配器可以减少外在碎片

D. Slab allocator can reduce the internal fragmentation
块分配器可以减少内在碎片

答案：AD

8. Regarding to page replacement algorithm, which are correct? (Multiple Selections)
关于页面替换算法，下列哪些是正确的？（多选题）

A. OPT algorithm has the lowest number of page faults
OPT 算法有最少的页面失效数量

B. LRU algorithm uses spatial locality to improve the performance
LRU 算法利用空间局部性来提高性能

C. CLOCK algorithm can achieve higher hit ratio than LRU
CLOCK 算法能比 LRU 算法实现更高的命中率

D. FIFO algorithm can achieve low page fault ratio under a proper list of data accesses
在合适的数据访问队列中，FIFO 算法可以实现很低的页面失效率

答案：ACD

9. If we have a memory with three frames, considering the following page queue with page-replacement algorithms, which are correct? (Multiple Selections)
如果内存只有 3 个页框，请考虑用不同的页面替换算法处理以下页面队列，下列说法哪些是正确的？（多选题）
5, 0, 1, 2, 1, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 5, 0, 1, 2, 3, 1, 5

A. For FIFO algorithm, the number of page faults is 17
对于 FIFO 算法而言，页面失效的数量是 17 个

B. For FIFO algorithm, the cache hit ratio is 28%
对于 FIFO 算法而言，缓存命中率是 28%

C. For OPT algorithm, the number of page faults is 11
对于 OPT 算法而言，页面失效的数量是 11 个

D. For OPT algorithm, the cache hit ratio is 54%
对于 OPT 算法而言，缓存命中率是 54%

答案：BC

10. A computer system is byte addressable, and adopts two-level page table. The logical address format is as follows, which are correct? (Multiple Selections)
某计算机系统按字节编址，采用二级页表的分页存储管理方式，逻辑地址格式如下所示，下列说法哪些是正确的？（多选题）

10 位	10 位	12 位
Page Directory 页目录号	Page Table 页表索引	Page Offset 页内偏移量

A. The page size is 4KB
页的大小是 4KB

B. The frame size is 2KB
   页框的大小是 2KB
C. The logical address space is 2^{32}B
   逻辑地址空间大小是 2^{32}B
D. The number of pages is 2^{20} in the logical address space
   逻辑地址空间总共有 2^{20} 个页

答案：ACD