第3、4章作业

答题版本 2020.10.19 22:04　　试卷得分 86

1. Describe the actions taken by a kernel to context-switch betweenprocesses.

简答题 (6 分)　6分

First, save the current process's state to its PCB. And then according to process scheduler's instruction, load the PCB of next process. PCB includes CPU regsiter values, process state, program counter, scheduling infomation, memory-management infomation, accounting infomation, I/O status, etc.

答案解释:

Ingeneral, the operating system must **save the state** of the currentlyrunning process and restore the state of the process scheduled to be run next. Saving the stateof a process typically includes the values of all the CPU registers in additionto memory allocation. Context switches must also perform manyarchitecture-specific operations, including flushing data and instructioncaches.

2. Using the program shown in following, explain what will be output at Line A.

```
#include <stdio.h>
#include <unistd.h>
#include <sys/types.h>
int value=8;
int main()
{
pid_t pid;
      /*fork a child process */
      pid= fork();
if (pid == 0) { /* child process */
            value+=15;
      }
      else{ /* parent process */
            /*parent will wait for the child to complete */
            wait(NULL);
            printf("Parent :value= %d\n",value);/*LINE A*/
            exit(0);
      }
}
```

注意区分fork(创建子进程)和
pthread_create(创建子线程)
创建子进程: 子进程拷贝了一份父进程，只有pid和ppid不同
创建子线程：子线程拥有自己的PC, stack, regs, 其余与父进程共享

请把数值填入下面方框内:

Answer: Parent:value=_____

填空题 (8 分)　8 分　(请按题目中的空缺顺序依次填写答案)

8

正确答案:

(1) 8

3. Includingthe initial parent process, how many processes are created by the program

```
#include <stdio.h>
#include <unistd.h>
int main() {
int i;
for (i = 0; i< 4; i++)
fork();
return 0;
}
```

请把数值填入下面方框内：

Answer: There are _____ processes created.

填空题 (8 分)　0 分　(请按题目中的空缺顺序依次填写答案)

15　回答错误

正确答案:

(1) 16

4. Using the program , identifythe values of pid at lines A, B,C, and D. (Assume that the actual pids of theparent and child are 2600 and 2603, respectively.)

```
#include<sys/types.h>
#include<stdio.h>
#include<unistd.h>
#include<sys/wait.h>

int main()
{
pid_t pid,pid1;
    /* fork a child process */
    pid = fork();
    if (pid < 0) { /* error occurred */
        fprintf(stderr, "ForkFailed");
        return 1;
    }
    else if (pid == 0) { /* child process */
        pid1 = getpid();
        printf("child: pid =%d\n",pid); /* A */
        printf("child: pid1 =%d\n",pid1); /* B */
    }
    else { /* parent process */
        pid1 = getpid();
        printf("parent: pid =%d\n",pid); /* C */
        printf("parent: pid1 =%d\n",pid1); /* D */
        wait(NULL);
    }
    return 0;
}
```

请把数值依次填入下面方框内:

Answer:

LINE A child: pid= _____

LINE B child: pid1= _____

LINE C parent: pid= _____

LINE D parent:pid1 = _____

填空题 (8 分)　6 分　(请按题目中的空缺顺序依次填写答案)

(1) 2603　回答错误

(2) 2603

(3) 2603

(4) 2600

正确答案:

(1) 0

(2) 2603

(3) 2603

(4) 2600

5. Consider the following code segment:

```
pid_t pid;
pid = fork();
if (pid == 0) { /* childprocess */
fork();
thread_create(. . .);
}
fork();
```

a. How many unique processes are created? _____（包括第一次运行该程序的进程）

b. How many unique threads are created? _____ (没有主线程)

请把数值依次填入下面方框内：

填空题 (8 分)　4 分　(请按题目中的空缺顺序依次填写答案)

(1) 4　回答错误

(2) 2

正确答案:

(1) 6

(2) 2

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

B. Heap memory

C. Global variables

D. Stack memory

正确答案: B C

7. Consider thefollowing the program ,uses the Pthreads API. What would be the output from the program at LINE C and LINE P?

```
#include<pthread.h>
#include<stdio.h>
#include<unistd.h>
#include<wait.h>
#include<sys/types.h>
int value = 0;
void*runner(void *param); /* the thread */
int main(intargc, char *argv[]){
pid_t pid;
pthread_t tid;
pthread_attr_t attr;
pid = fork();
if (pid == 0) { /* child process */
pthread_attr_init(&attr);
pthread_create(&tid,&attr,runner,NULL);
pthread_join(tid,NULL);
printf("CHILD: value = %d",value); /*LINE C */
}
else if (pid > 0) { /* parent process */
wait(NULL);
printf("PARENT: value = %d",value); /*LINE P */
}
}
void*runner(void *param) {
value = 10;
pthread_exit(0);
}
```

Answer:

LINE C：CHILD: value =_____

LINE P：PARENT: value =_____

请把数值依次填入下面方框内：

填空题 (8 分)　8 分　(请按题目中的空缺顺序依次填写答案)

(1) 10

(2) 0

正确答案:

(1) 10

(2) 0

8. Aprocess will change its state from running to ready state when ___ .

单选题 (3 分)　3分

A. ithas been selected for execution by scheduler

B. its time slice is finished

C. it waits for some event

D. the event it has been waiting for hasoccurred

正确答案: B

9. Arunning process may be switched to release CPU, when one of following eventsoccurs EXCEPT:

单选题 (3 分) 3分

A. The process calls asubroutine

B. The process issues an I/O request

C. The process creates a sub-process and waitsfor its termination

D. An interrupt occurred

正确答案: A

10. In following descriptions of process, _____ is not proper.

单选题 (3 分) 3分

A. A process is a program

B. A process includes code, data, stack, and PCB

C. A kernel-level thread is like a lightweight process

D. A process is the basic unit in allocating resources

正确答案: A

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

正确答案: B

12. When a process is waken up, it means that_____ .

单选题 (3 分) 3分

A. its priority is becoming the highest

B. its state is changed intoready state

C. the process is provided with CPU again

D. its PCB is moved to the head of ready queue

正确答案: B

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

14. A computer has only one CPU, however with multiprogramming operating system. At a snapshot, it is running in user modeand has 5 user processes loaded. Therefore, at most ___ user processes that arein ready status

单选题 (3 分)　3分

A. 0

B. 1

C. 4

D. 5

正确答案: C

15. Which of the following statement aboutprocesses is incorrect?

单选题 (3 分)　3分

A. A process is dynamic

B. A process has a lifetime

C. A process is a set of instructions

D. Multiple processes may execute concurrently

正确答案: 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

正确答案: D

17. Which of following descriptions aboutprocess is incorrect?

单选题 (3 分)　3分

A. process is a dynamic concept

B. process has life-cycle

C. process is a set of instructions and stacks

D. processescan run concurrently

正确答案: C

18. 操作系统中提供了一种进程间的通信机制，把一个进程的标准输出与另一个进程的标准输入连接起来，这种机制称为___。

单选题 (3 分)　3分

A. 重定向

B. 管道

C. socket

D. 共享内存

正确答案: B

19. 下列哪种方法不能实现进程之间的通信？

单选题 (3 分)　3分

A. 共享文件

B. 数据库

C. 全局变量

D. 共享内存

正确答案: C

20. 下面哪一种情况不会引起进程之间的切换？

单选题 (3 分)　3分

A. 进程调用本程序中定义的sinx函数进行数学计算

B. 进程处理I/O请求

C. 进程创建了子进程并等待子进程结束

D. 产生中断

正确答案: A

21. 一个进程可以包含多个线程，各线程_____ 。

单选题 (3 分)　3分

A. 共享进程的虚拟地址空间

B. 必须串行工作

C. 是资源分配的独立单位

D. 共享堆栈

正确答案: A

22. 一个由于等待键盘输入而不能运行的进程处于_____ 。

单选题 (3 分)　3分

A. 就绪状态

B. 运行状态

C. 等待状态

D. 终止状态

正确答案: C

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

正确答案: C