

# CS372 Operating System Midterm Exam

Name: Andre' Puth

Question Number	Score
1	5
2	4
3	3
4	0
5	4
6	
7	
Total:	15

15

Question 1:

Explain the following terminology: (1pt each)

1. **System Call** SYSTEM CALL IS A SYSTEM IMPLEMENTATION FOR THE OS THAT IS STORED WITH CORRESPONDING NUMBERS TO PERFORM TASKS.

2. **Process** A PROCESS IS AN EXECUTING PROCESS

3. **I/O-bound process** I/O BOUND PROCESS IS A PROCESS THAT IS BOUND TO INPUT AND OUTPUT.

4. **Context Switch** CONTEXT SWITCH IS ~~THE~~ OF PROCESS OF MOVING OR SWITCING ONE PROCESS TO THE STOP STATE AND ALLOCATE TO IT RESTORE STATE.

5. **LWP**

6. **Symmetric multiprocessing** SYMMETRIC MULTIPROCESSING IS WHEN THE PROCESSORS ARE ALLOCATED TO WORK ON THE SAME THING.

Question2:

② 2.1 Explain and describe 3 different types of process schedulers. (3 pts)

~~SHORT TERM SCHEDULER: DECIDES WHICH ITEMS ARE MOVED TO THE READY QUEUE~~

~~LONG TERM SCHEDULER: DETERMINES WHICH JOBS ARE MOVED FROM THE READY QUEUE TO THE CO.~~

~~MEDIUM SCHEDULER,~~

② 2.2 Describe 3 different multithreading models for mapping user threads to kernel threads. Also, describe at least one advantage or disadvantage for each model. (5 pts)

~~ONE TO ONE : ONE USER LEVEL THREAD TO BE BOUND TO ONE KERNEL  
DISADVANTAGE : SLOW~~

~~ONE TO MANY : ONE USER LEVEL THREAD TO BE BOUND TO MORE THAN ONE KERNEL,~~

~~MANY TO MANY ; MANY USER LEVEL THREADS TO MUNIPLE KERNELS  
ADVANTAGE : FASTER~~

2.3 Draw the state diagram of a process from its creation to termination, including all transitions, and briefly elaborate every state and every transition . (5 pts)



Question 3:

According to the bounded buffer code below in shared memory system, draw the ring structure with size 4 and indicate the location of "in" and "out" for each time space. (If the buffer is full or empty, indicates how many jobs are waiting) (10pts, 2 pts for each)

3

Producer View

```

while (true) {
    /* produce an item and put in next Produced*/
    while (count == BUFFER_SIZE)
        ; // do nothing

    buffer [in] = nextProduced;
    in = (in + 1) % BUFFER_SIZE;
    count++;
}

```

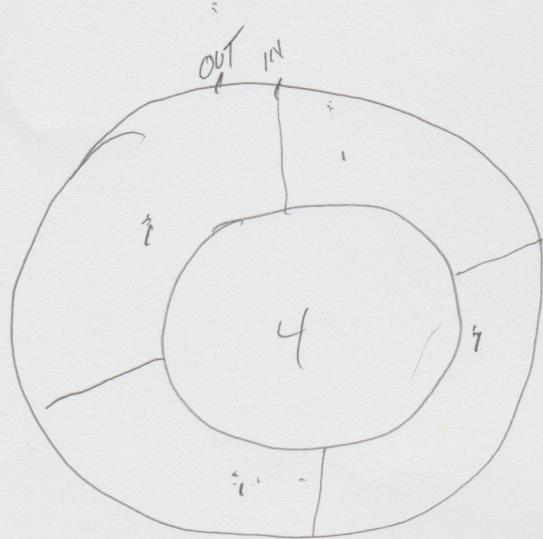
Consumer View

```

while (true) {
    while (count == 0)
        ; // do nothing

    nextConsumed= buffer[out];
    out = (out + 1) % BUFFER_SIZE;
    count--;
    /* consume the item in next Consumed
}

```



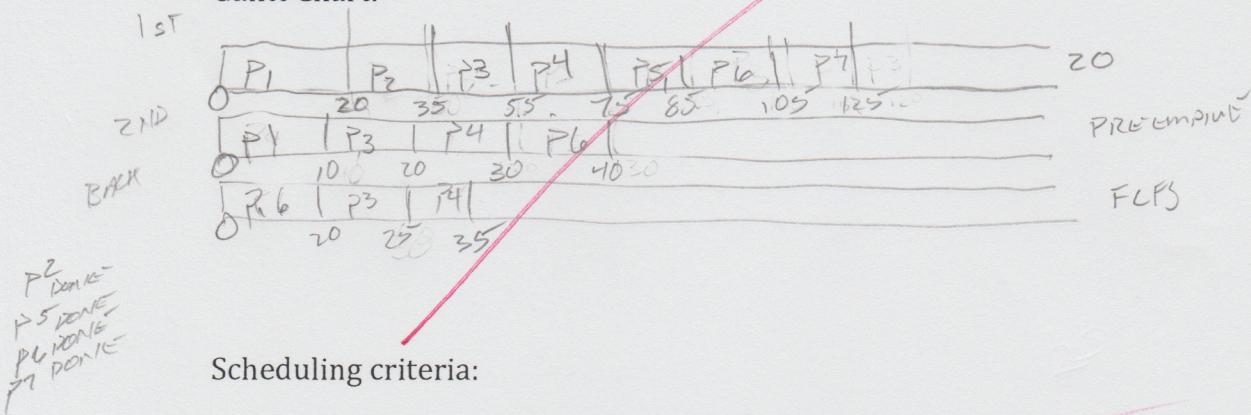
Time	Action	in:1	out:1
1	Producer produces 2 jobs	3✓	0✓
2	Consumer consumes 1 job	X	X
3	Producer produces 3 jobs	X	.2✓
4	Consumer consumes 3 jobs	X	.4✓
5	Consumer consumes 3 jobs	X	X

Q Question 4:

By "Multilevel Queue Fixed priority" scheduling algorithm, draw the CPU scheduling Gantt chart (5 pts) and complete the table for the given processes information. ( 10 pts)

	Process	Burst time	Arriving time	Algorithm
■ 1 <sup>st</sup> Foreground	P1 ✓ P2 ✓ P3 ✓	50 15 45	0.0 30.0 30.0	RR interval:20 (RR is a non-preemptive algorithm)
■ 2 <sup>nd</sup> Foreground	P4 ✓ P5 ✓	40 10	0.0 120.0	SJF Preemptive
■ Background	P6 ✓ P7 ✓	30 20	60.0 130.0	FCFS

Gantt Chart:



Scheduling criteria:

	P1	P2	P3	P4	P5	P6	P7
Waiting time	0	15	5	55	45		
Turnaround time							
Response time							

Foreground  
Execution's slot  
2

*Question 5:*

**4**

Circle the best answer. (14 pts, 1 pt for each)

1. The major difficulty in designing a layered operating system approach is B.

- A) appropriately defining the various layers
- B) making sure that each layer hides certain data structures, hardware, and operations from higher-level layers
- C) debugging a particular layer
- D) making sure each layer is easily converted to modules

2. A boot block B.

- A) typically only knows the location and length of the rest of the bootstrap program
- B) typically is sophisticated enough to load the operating system and begin its execution
- C) is composed of multiple disk blocks
- D) is composed of multiple disk cylinders

3. Microkernels use C for communication.

- A) message passing
- B) shared memory
- C) system calls
- D) virtualization

4. The UNIX fork() system call creates a new process. What is the equivalent system call in WINDOWS:

- A) NTCREATEPROCESS()
- B) process()
- C) CreateProcess()
- D) getpid()

~~5.~~ All access to POSIX shared memory requires a system call.

- A) True
- B) False

~~6.~~ When a child process is created, which of the following is a possibility in terms of the execution or address space of the child process?

- A) The child process runs concurrently with the parent.
- B) The child process has a new program loaded into it.
- C) The child is a duplicate of the parent.
- D) All of the above

~~7.~~ Cancellation points are associated with \_\_\_\_\_ cancellation.

- A) asynchronous
- B) deferred
- C) synchronous
- D) immediate

~~8.~~ The \_\_\_\_\_ model allows a user-level thread to be bound to one kernel thread.

- A) many-to-many
- B) two-level
- C) one-to-one
- D) many-to-one

~~9.~~ Which of the following is true of cooperative scheduling?

- A) It requires a timer.
- B) A process keeps the CPU until it releases the CPU either by terminating or by switching to the waiting state.
- C) It incurs a cost associated with access to shared data.
- D) A process switches from the running state to the ready state when an interrupt occurs.

~~10.~~ \_\_\_\_\_ is the number of processes that are completed per time unit.

- A) CPU utilization
- B) Response time
- C) Turnaround time
- D) Throughput

11. \_\_\_\_ scheduling is approximated by predicting the next CPU burst with an exponential average of the measured lengths of previous CPU bursts.

- A) Multilevel queue
- B) RR
- C) FCFS
- D) SJF

12. The \_\_\_\_ scheduling algorithm is designed especially for time-sharing systems.

- A) SJF
- B) FCFS
- C) RR

13. Which of the following scheduling algorithms must be nonpreemptive?

- A) SJF
- B) RR
- C) FCFS
- D) priority algorithms

14. Which of the following is true of multilevel queue scheduling?

- A) Processes can move between queues.
- B) Each queue has its own scheduling algorithm.
- C) A queue cannot have absolute priority over lower-priority queues.
- D) It is the most general CPU-scheduling algorithm.