

CS-450 & CS-550: *Operating Systems*, Sections 1 & 2

Fall 2008: Quiz # 5

ANSWERS

© 2008 Charles Abzug

INSTRUCTIONS:

- (1) Closed book, closed notes (but open mind), NO calculators allowed.
- (2) For each question, **circle** the identifying letter next to the choice corresponding to your answer, or fill in the blank, as appropriate.*
- (3) You will not get credit for your grade unless you sign the Honor Code declaration on the back of this page (this is a JMU requirement).
- (4) You must also print your name legibly *on the back of this page sheet*, so that I know who you are, and also write the **last four digits only** of your JMU ID number in the indicated location on the back of the page.
- (5) For any questions requiring calculation, you must show all your work. If you perform your calculation on sheet(s) of paper not part of the exam, then you must write your name **legibly** on all such sheets and hand them in together with your exam.

Consider the following situations for three processes: **P1**, **P2**, and **P3**:

- A.** **P1** is holding resource **R1**, but is tied up in a busy-wait loop repeatedly trying to access resource **R2**, which it never gets because **R2** is held by **P2**. **P2** is also stuck in a busy-wait loop repeatedly trying to access resource **R3**, which it never gets because **R3** is held by **P3**. And **P3** is also in a busy-wait loop, repeatedly trying to access resource **R1**.
- B.** **P1** is holding resource **R1**, but is unrunnable because it had issued a blocking call for resource **R2**, which is held by **P2**. **P2** is also unrunnable because it had issued a blocking call for resource **R3**, which is held by **P3**. And **P3** is also unrunnable because it had issued a blocking call for resource **R1**.
- C.** Processes **P1**, **P2**, and **P3** all start up at about the same time. After about 30 seconds of processing time, **P1** starts submitting jobs to the print SPOOLer of between one and three pages in size. It takes the printer about 5 seconds to print each job, and **P1** submits 5 print jobs per minute to the SPOOLer. After about a minute of processing time, **P2** starts repeatedly sending print jobs to the print SPOOLer of between ten and 16 pages in size. These take about 15 seconds each to service, and **P2** submits them at a rate of three jobs per minute. After about 15 minutes of processing time, **P3** submits a single job to the printer of about 100 pages in length. This job takes about 1-1/2 minutes to print. The print spooler is programmed to select jobs for printing in "shortest job first" order.

2 pts each

1. Which of these situations, if any, corresponds to **starvation**? Answer **A, B, C**, or **N (None)**. *Answer: C*
2. Which of these situations, if any, corresponds to **deadlock**? Answer **A, B, C**, or **N (None)**. *Answer: B*
3. Which of these situations, if any, corresponds to **livelock**? Answer **A, B, C**, or **N (None)**. *Answer: A*
4. Can any of the following strategies be employed to alleviate the **deadlock**?
 - a. Kill one of the processes, wait for the other two to complete, and then restart the killed process. Assume that nothing has yet been accomplished by the killed process that cannot safely be repeated.
 - b. Remove the resource held by one of the processes, wait for the other two processes to complete, and then restore the confiscated resource. Assume that nothing has yet been accomplished by the affected process that cannot safely be repeated.
 - c. Either of the above strategies will work.
 - d. Nothing needs to be done. If we wait long enough, one of the deadlocked processes will finish and release its resources, and then the others will also finish.

Answer: C

Last four digits of your JMU Number: ____ ____ ____ ____

This work complies with the JMU Honor Code: _____

YourSignature

Please **print** your name **legibly**: _____

5. Can any of the following strategies be employed to alleviate the **starvation**?
- a. Kill **P1** or **P2**, wait for the other two to complete, and then restart the killed process. Assume that nothing has yet been accomplished by the killed process that cannot safely be repeated.
 - b. Nothing needs to be done. If we wait long enough, the situation will resolve itself through completion of all processes.

Answer: **B**

Question	Answer	Points
1	C	
2	B	
3	A	
4	C	
5	B	
TOTAL:		