



United International University (UIU)

Final Exam. :: Trimester: Summer- 2017

Course Code: CSI 309

Course Title: Operating System Concepts

Total Marks: 40

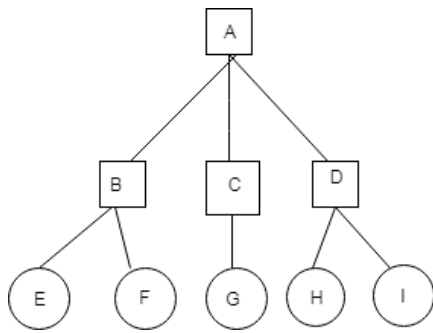
Duration: 2 hours

There are five (5) questions. **Answer any four (4) questions.** Figures are in the right-hand margin indicates full marks.

1.	<div><div>a) What is race condition?</div><div>b) What are the problems of busy waiting?</div><div>d) Explain Peterson’s solution for two processes with pid 0 and 1.</div><div>c) Suppose A and B are two dependent processes where we must ensure the following sequence of execution :<div><div>➤ codeBlockAx need to execute after codeBlockBy1</div><div>➤ codeBlockBy2 need to execute after codeBlockAx</div></div></div><div>How will you ensure this sequence of execution?</div><table><tr><th>Process A</th><th>Process B</th></tr><tr><td>..... codeBlockAx</td><td>..... codeBlockBy1 codeBlockBy2</td></tr></table></div>	Process A	Process B codeBlockAx codeBlockBy1 codeBlockBy2	<div><div>(1)</div><div>(2)</div><div>(3)</div><div>(4)</div></div>
Process A	Process B					
..... codeBlockAx codeBlockBy1 codeBlockBy2					
2.	<div>Consider the following process</div> <table><tr><th>Process ManageDocument</th></tr><tr><td><div><div>Read choice</div><div><div>IF choice == EDIT</div><div><div>Read docId</div><div>editDocument(Documents[docId])</div></div></div><div><div>ELSE IF choice == CREATE</div><div><div>Doc = createNewDocument()</div><div>saveDocument(Documents, Doc)</div></div></div><div><div>ELSE</div><div><div>Read docId</div><div>printDocument(Documents[docId])</div><div>deleteDocument(Documents[docId])</div></div></div></div></td></tr></table>	Process ManageDocument	<div><div>Read choice</div><div><div>IF choice == EDIT</div><div><div>Read docId</div><div>editDocument(Documents[docId])</div></div></div><div><div>ELSE IF choice == CREATE</div><div><div>Doc = createNewDocument()</div><div>saveDocument(Documents, Doc)</div></div></div><div><div>ELSE</div><div><div>Read docId</div><div>printDocument(Documents[docId])</div><div>deleteDocument(Documents[docId])</div></div></div></div>			
Process ManageDocument						
<div><div>Read choice</div><div><div>IF choice == EDIT</div><div><div>Read docId</div><div>editDocument(Documents[docId])</div></div></div><div><div>ELSE IF choice == CREATE</div><div><div>Doc = createNewDocument()</div><div>saveDocument(Documents, Doc)</div></div></div><div><div>ELSE</div><div><div>Read docId</div><div>printDocument(Documents[docId])</div><div>deleteDocument(Documents[docId])</div></div></div></div>						

	<p>There are multiple users in the system with access to ManageDocument process. Any user can asynchronously attempt to create, edit or print&delete a document. NB: In the code, "Documents" is a shared array (buffer) of all the documents. Buffer size = N. Value of docId will be in between 1 and N.</p> <p>i) What are the synchronization problems that may arise? (Mention with scenario) (2)</p> <p>ii) Identify critical region/s. (2)</p> <p>iii) <i>"Using a single semaphore (mutex) enclosing critical region will solve the synchronization problem but there is a performance issue"— what is that performance issue?</i> (1)</p> <p>iv) Propose a solution that ensures maximum simultaneous access without any conflict. (5)</p>																																									
3.	<p>a) What are the information shared by different threads of same process? What are the data structures (state or information) that are private to those threads? (3)</p> <p>b) Write the comparison of user level threads and kernel level threads. (4)</p> <p>c) Give an example where threads are used for parallelism. (2)</p> <p>d) When the ostrich algorithm is suitable or rational to apply? (1)</p>																																									
4.	<p>a) Draw a graph to model the following sequence of instructions: (3)</p> <p>i) A requests P ii) B requests Q iii) C requests R iv) B requests R v) C releases R vi) A requests Q</p> <p>Here A, B, C are processes; P, Q, R are resources where only one instance of each resource is available.</p> <p>b) Find if deadlock will happen for the following data: (5)</p> <p>Available=(1 0 1 1 1) Current Allocation Matrix:</p> <table><tr><td>1</td><td>0</td><td>2</td><td>2</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>2</td></tr><tr><td>3</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>3</td></tr></table> <p>Total Resources needed:</p> <table><tr><td>2</td><td>1</td><td>3</td><td>4</td><td>0</td></tr><tr><td>0</td><td>2</td><td>0</td><td>2</td><td>2</td></tr><tr><td>3</td><td>2</td><td>1</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>3</td></tr></table> <p>c) Process P1 needs DVD ROM in instruction number 200-300 and printer in instruction number 400-500. Process P2 needs DVD ROM in instruction number 300-500 and printer in instruction number 200-400. Draw a graph showing the common area where both need DVD ROM and both need printer. Also determine if there is any an unsafe state, if there is any, then show it in figure. (2)</p>	1	0	2	2	0	0	1	0	0	2	3	1	0	0	0	0	1	0	1	3	2	1	3	4	0	0	2	0	2	2	3	2	1	0	0	0	1	1	1	3	
1	0	2	2	0																																						
0	1	0	0	2																																						
3	1	0	0	0																																						
0	1	0	1	3																																						
2	1	3	4	0																																						
0	2	0	2	2																																						
3	2	1	0	0																																						
0	1	1	1	3																																						
5.	a)Draw the file system layout with proper labeling. (2)																																									

b) Show the steps of logical dumping for the following file system hierarchy. Squares represent directories, circles represent files. Here file F, G, H are modified. (4)



c) Write one advantage and one disadvantage of linked list allocation of file system. (2)

d) What is the problem in using pointer to inodes in case of file sharing? How can we overcome the problem? (2)