STIK2043 OPERATING SYSTEM

FINAL EXAM
FIRST SEMESTER SESSION 2011/2012

COURSE CODE / NAME : STIK2043 OPERATING SYSTEM
DATE : 13 JANUARY 2012 (FRIDAY)
TIME : 9.00 A.M – 11.30 A.M (2 ½ HOURS)
VENUE : DMS

INSTRUCTION :
1. Answer ALL of the questions in this exam sheet only.
2. You are allowed to use scientific calculator
3. This booklet contains TWO (2) sections in NINE (9) printed pages (not including this page)
   a. Section A: SEVEN (7) questions
   b. Section B: SIX (6) questions

MATRIC NO : ____________________________ (with word) ____________________________ (with number)
IDENTIFICATION CARD NO : ____________________________
LECTURER : ____________________________
GROUP : ____________________________ TABLE NO : ____________________________

DO NOT OPEN THIS EXAMINATION PAPER UNTIL INSTRUCTED

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SECTION A (37 MARKS)

1. The following questions are related to fundamental understanding of operating system.

   a) Describe the relationship between operating systems managers. Provide your example.
      (3 Marks)

   b) Describe the importance of Command Line Interface (CLI) in modern operating system management?
      (3 Marks)

2. Write down the command line interface required in Linux to perform the following operations.
   a) Copy the contents of chapt1 and chapt2 into a file named sectiona
      (2 Marks)

   b) Store the names of all users logged on to the system in a file called temporary
      (2 Marks)

3. The following questions are related to memory management in operating system administration.

   a) Between fixed partition memory scheme and single user continuous scheme, which one is better in term of performance and why?
      (3 Marks)
b) What are the differences between demand paging and segmented demand paging and what benefit's segmented demand paging has over demand paging. 

(4 Marks)

c) Provide TWO (2) advantages on having virtual memories in a computer system?

(2 Marks)

4. The following questions are related to process management.

a) Define the relationship between process and program.

(2 Marks)

b) Describe TWO (2) good process scheduling policy criteria.

(2 Marks)

c) In the case of "aging" in Multiple Level Queues scheduling, how does the policy solve the problem?

(4 Marks)
5. Describe **TWO (2)** problems of explicit parallelism in concurrent programming? (2 Marks)

6. The following questions are related to file manager in operating system.
   a. When a data is stored in fixed length fields, what will happen if the data is less then or extends beyond the fixed size fields? (2 Marks)

   b. What is the primary disadvantage of contiguous storage? (2 Marks)

7. The following questions are related to security management in operating system.
   a) Describe how a logic bomb operates on a computer (2 Marks)

   b) What is the program that can be used to capture a user password without him/her knowing it. (2 Marks)
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SECTION B (63 MARKS)

1. Suppose there is a job list of J1, J2, J3 and J4 and with memory requested of 100, 50, 25, and 40 each respectively. Using best fit and first fit algorithm fit each job in the following memory blocks and calculate the total fragmentations for each allocation scheme. Which of the scheme provides the lowest fragmentation and why.

a. First Fit

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Memory block</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Total Fragmentation: __________

b. Best Fit

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Memory block</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Total Fragmentation: __________

c. Which allocation scheme has the lowest fragmentation?  

(2 Marks)
2. Given is the following job list of J1, J2, J3, and J4 with 5ms, 6ms, 4ms, and 9ms as their CPU time respectively.

<table>
<thead>
<tr>
<th>Job</th>
<th>CPU time</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>5</td>
</tr>
<tr>
<td>J2</td>
<td>6</td>
</tr>
<tr>
<td>J3</td>
<td>4</td>
</tr>
<tr>
<td>J4</td>
<td>9</td>
</tr>
</tbody>
</table>

a. Using the Round Robin scheduling policy, calculate the average waiting time for the job list given. (time quantum = 3 ms)

(4 Marks)

b. Using the First Come First Serve (FCFS) policy, calculate the average waiting time for the job list given.

(4 Marks)

c. Using the Shortest Job First (SJF) policy, calculate the average waiting time for the job list given.

(4 Marks)
d. Which policy provides the lowest average waiting time? Provide your reason. 

(2 Marks)

3. Given are processes P1, P2, P3 with resources R1, R2, R3 and R4. Based on the following scenario (draw resource allocation graph). Decide if the system is in deadlock or not and provide your reason and how to solve it.

a. P1 access R1, P1 request R2, P2 access R3, P1 Release R1 and get R4, P3 Request for R3

(4 Marks)

b. P1 access R1, R4 request R2, P2 hold R3 request R4, P2 hold R2 request R3

(4 Marks)

c. P1 access R1 and request for R2, P2 request for R1 but holding R2, P3 hold R3

(4 Marks)
4. Given is the following head track movement for a disk storage: 20 (base location), 15, 55, 80, 110, 40, and 35.

   a. Calculate the average number of track movement for the R/W head using SSTF algorithm.

       (4 Marks)

   b. Calculate the average number of track movement for the R/W head using SCAN algorithm.

       (4 Marks)

   c. Calculate the average number of track movement for the R/W head using LOOK algorithm.

       (4 Marks)

   d. Which of the algorithms provides the best average track movement? Provide your reason.

       (1 Mark)
5. Based on the following frame and pages table below.

<table>
<thead>
<tr>
<th>Page No</th>
<th>Residence Bit</th>
<th>Reference Bit</th>
<th>Modified Bit</th>
<th>Frame No</th>
</tr>
</thead>
<tbody>
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<td>0</td>
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<td>5</td>
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</tbody>
</table>

a) convert the following virtual address into physical address. \( V(0,350) \)  
[3 Marks]

b) convert the following physical address to virtual address. 2200  
(3 Marks)

6. The following questions are related to shell script programming.

a. Convert the following algorithm into a shell program.  
(5 Marks)

```bash
# Algo:
# 1) Input number n
# 2) Set sum=0, sd=0
# 3) Find single digit in sd as n % 10 it will give (left most digit)
# 4) Construct sum no as sum=sum+sd
# 5) Decrement n by 1
# 6) Is n is greater than zero, if yes goto step 3, otherwise next step
# 7) Print sum
```
b. Write a script that can print out the following output. 

```
1
22
333
4444
55555
```

(5 Marks)