**Course: Operating System**

**Chapter 2**

**Group assignment (Submit on next class)**

1. Program in execution is called?

a. process b. procedure c. instruction d. Function

2. What is the name given to the organized collection of software that controls the overall operation of a computer?

a. working system b. operating system c. peripheral system d. controlling system

3. To access the service of operating system, the interface is provided by the

a. system calls b, API c. Library d. Assembly intructions

4. What is operating system?  
a) collection of programs that manages hardware resources  
b) system service provider to the application programs  
c) link to interface the hardware and application programs  
d) all of the mentioned

5. Which one of the following is the address generated by CPU?  
a) physical address  
b) absolute address  
c) logical address  
d) none of the mentioned

6. The address loaded into the memory address register of the memory is referred to as :  
a) Physical address  
b) Logical address  
c) Neither physical nor logical  
d) None of theabove

7. Physical memory is broken into fixed-sized blocks called \_\_\_\_\_\_\_\_  
a) frames  
b) pages  
c) backing store  
d) none of the mentioned

8. Logical memory is broken into blocks of the same size called \_\_\_\_\_\_\_\_\_  
a) frames  
b) pages  
c) backing store  
d) none of the mentioned

9. Every address generated by the CPU is divided into two parts :  
a) frame bit & page number  
b) page number & page offset  
c) page offset & frame bit  
d) frame offset & page offset

10. The \_\_\_\_\_ table contains the base address of each page in physical memory.  
a) Process  
b) memory  
c) page  
d) frame

11. There is a set of page replacement algorithms that can never exhibit Belady’s Anomaly, called :  
a) queue algorithms  
b) stack algorithms  
c) string algorithms  
d) none of the mentioned

12. For every process there is a \_\_\_\_\_\_\_\_\_\_  
a) page table  
b) copy of page table  
c) pointer to page table  
d) all of the mentioned

13. Because of virtual memory, the memory can be shared among  
a) processes  
b) threads  
c) instructions  
d) none of the mentioned

14. \_\_\_\_\_ is the concept in which a process is copied into main memory from the secondary memory according to the requirement.  
a) Paging  
b) Demand paging  
c) Segmentation  
d) Swapping

15. When a program tries to access a page that is mapped in address space but not loaded in physical memory, then  
a) segmentation fault occurs  
b) fatal error occurs  
c) page fault occurs  
d) no error occurs

16. In FIFO page replacement algorithm, when a page must be replaced  
a) oldest page is chosen  
b) newest page is chosen  
c) random page is chosen  
d) none of the mentioned

17. Which algorithm chooses the page that has not been used for the longest period of time whenever the page required to be replaced?  
a) first in first out algorithm  
b) additional reference bit algorithm  
c) least recently used algorithm  
d) counting based page replacement algorithm

18. Which of the following page replacement algorithms suffers from Belady’s Anomaly?  
a) Optimal replacement  
b) LRU  
c) FIFO  
d) Both optimal replacement and FIFO

19. Referenced string is in the order : A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page frames is 3 find number of page faults?   
a) 8  
b) 10  
c) 9  
d) 7

20. For 3 page frames, the following is the reference string:   
1 0 7 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1  
How many page faults does the LRU page replacement algorithm produce?  
a) 10  
b) 15  
c) 11  
d) 12

**ASSIGNMENT OF CHAPTER 4 (CPU scheduling)**

# For all the following question use the scheduling algorithm specified each question

1. Draw the timeline diagram
2. Complete time for each process
3. Turnaround time for each process
4. Waiting time for each process
5. Calculate average waiting time
6. Calculate average turnaround time

Q1) using shortest job first scheduling algorithm with preemptive

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | AT | BT | CT | TAT | WT |
| P1 | 0 | 11 |  |  |  |
| P2 | 2 | 8 |  |  |  |
| P3 | 3 | 9 |  |  |  |
| P4 | 5 | 3 |  |  |  |
| P5 | 7 | 13 |  |  |  |
| P6 | 8 | 6 |  |  |  |
| P7 | 9 | 8 |  |  |  |

Q2) Using priority scheduling algorithm with preemptive  **-**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | AT | priority | BT | CT | TAT | WT |
| P1 | 0 | 4 | 11 |  |  |  |
| P2 | 2 | 2 | 9 |  |  |  |
| P3 | 4 | 3 | 12 |  |  |  |
| P4 | 6 | 1 | 6 |  |  |  |
| P5 | 8 | 5 | 5 |  |  |  |
| P6 | 10 | 3 | 8 |  |  |  |

Q3) using priority scheduling algorithm with non-preemptive

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | AT | priority | BT | CT | TAT | WT |
| P1 | 0 | 5 | 12 |  |  |  |
| P2 | 2 | 3 | 15 |  |  |  |
| P3 | 4 | 7 | 4 |  |  |  |
| P4 | 6 | 1 | 5 |  |  |  |
| P5 | 8 | 4 | 8 |  |  |  |
| P6 | 10 | 2 | 10 |  |  |  |

Q4) using Round Robing schedule algorithm if quantum=3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | AT | BT | CT | TAT | WT |
| P1 | 1 | 8 |  |  |  |
| P2 | 2 | 10 |  |  |  |
| P3 | 3 | 11 |  |  |  |
| P4 | 4 | 6 |  |  |  |
| P5 | 5 | 5 |  |  |  |
| P6 | 6 | 7 |  |  |  |
| P7 | 7 | 4 |  |  |  |

Q5) using first come first serves algorithm

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | AT | BT | CT | TAT | WT |
| P1 | 0 | 11 |  |  |  |
| P2 | 2 | 8 |  |  |  |
| P3 | 3 | 9 |  |  |  |
| P4 | 5 | 3 |  |  |  |
| P5 | 7 | 13 |  |  |  |
| P6 | 8 | 6 |  |  |  |

Q6) use multilevel which are two different queues 1 and 2, queue1 is the highest priority and uses round robin scheduling with quantum of 3 and queue 2 uses FCFS scheduling algorithm.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | AT | queue | BT | CT | TAT | WT |
| P1 | 0 | 2 | 11 |  |  |  |
| P2 | 2 | 2 | 9 |  |  |  |
| P3 | 4 | 1 | 12 |  |  |  |
| P4 | 6 | 1 | 6 |  |  |  |
| P5 | 8 | 1 | 5 |  |  |  |
| P6 | 10 | 2 | 8 |  |  |  |

**Group Assignment Answers**

**1. Program in execution is called?**

* **Answer:** a. process

**2. What is the name given to the organized collection of software that controls the overall operation of a computer?**

* **Answer:** b. operating system

**3. To access the service of operating system, the interface is provided by the**

* **Answer:** a. system calls

**4. What is operating system?**

* **Answer:** d. all of the mentioned

**5. Which one of the following is the address generated by CPU?**

* **Answer:** c. logical address

**6. The address loaded into the memory address register of the memory is referred to as:**

* **Answer:** a. Physical address

**7. Physical memory is broken into fixed-sized blocks called**

* **Answer:** a. frames

**8. Logical memory is broken into blocks of the same size called \_**

* **Answer:** b. pages

**9. Every address generated by the CPU is divided into two parts:**

* **Answer:** b. page number & page offset

**10. The \_ table contains the base address of each page in physical memory.**

* **Answer:** c. page

**11. There is a set of page replacement algorithms that can never exhibit Belady’s Anomaly, called:**

* **Answer:** b. stack algorithms

**12. For every process there is a \_\_**

* **Answer:** a. page table

**13. Because of virtual memory, the memory can be shared among**

* **Answer:** a. processes

**14. \_ is the concept in which a process is copied into main memory from the secondary memory according to the requirement.**

* **Answer:** b. Demand paging

**15. When a program tries to access a page that is mapped in address space but not loaded in physical memory, then**

* **Answer:** c. page fault occurs

**16. In FIFO page replacement algorithm, when a page must be replaced**

* **Answer:** a. oldest page is chosen

**17. Which algorithm chooses the page that has not been used for the longest period of time whenever the page required to be replaced?**

* **Answer:** c. least recently used algorithm

**18. Which of the following page replacement algorithms suffers from Belady’s Anomaly?**

* **Answer:** c. FIFO

**19. Referenced string is in the order: A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page frames is 3 find number of page faults?**

* **Answer:** a. 8

**20. For 3 page frames, the following is the reference string: 1 0 7 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1. How many page faults does the LRU page replacement algorithm produce?**

* **Answer:** c. 11

**Assignment of Chapter 4 (CPU Scheduling)**

**Q1) Using shortest job first scheduling algorithm with preemptive:**

* **Process Completion Table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | AT | BT | CT | TAT | WT |
| P1 | 0 | 11 | 11 | 11 | 0 |
| P2 | 2 | 8 | 19 | 17 | 9 |
| P3 | 3 | 9 | 18 | 25 | 16 |
| P4 | 5 | 3 | 5 | 5 | 2 |
| P5 | 7 | 13 | 32 | 25 | 12 |
| P6 | 8 | 6 | 38 | 30 | 24 |
| P7 | 9 | 8 | 46 | 37 | 29 |

* **Average Waiting Time:** (0 + 9 + 16 + 2 + 12 + 24 + 29) / 7 = 10.14
* **Average Turnaround Time:** (11 + 17 + 25 + 5 + 25 + 30 + 37) / 7 = 20.14

## Q2) Priority Scheduling Algorithm (Preemptive)

|  |  |  |  |
| --- | --- | --- | --- |
| Process | CT | TAT | WT |
| P1 | 11 | 11 | 0 |
| P2 | 9 | 7 | 5 |
| P3 | 12 | 8 | 5 |
| P4 | 6 | 6 | 0 |
| P5 | 8 | 5 | 0 |
| P6 | 8 | 5 | 0 |

## Q3) Priority Scheduling Algorithm (Non-Preemptive)

|  |  |  |  |
| --- | --- | --- | --- |
| Process | CT | TAT | WT |
| P1 | 12 | 12 | 7 |
| P2 | 15 | 13 | 10 |
| P3 | 4 | 4 | 0 |
| P4 | 5 | 5 | 0 |
| P5 | 8 | 8 | 4 |
| P6 | 10 | 10 | 8 |

## Q4) Round Robin Scheduling Algorithm (Quantum = 3)

|  |  |  |  |
| --- | --- | --- | --- |
| Process | CT | TAT | WT |
| P1 | 11 | 10 | 2 |
| P2 | 15 | 13 | 3 |
| P3 | 18 | 15 | 4 |
| P4 | 9 | 5 | 0 |
| P5 | 10 | 5 | 0 |
| P6 | 12 | 6 | 1 |
| P7 | 14 | 7 | 3 |

## Q5) First Come First Serve (FCFS) Algorithm

|  |  |  |  |
| --- | --- | --- | --- |
| Process | CT | TAT | WT |
| P1 | 11 | 11 | 0 |
| P2 | 19 | 17 | 9 |
| P3 | 28 | 25 | 16 |
| P4 | 5 | 5 | 2 |
| P5 | 32 | 25 | 12 |
| P6 | 38 | 30 | 24 |

## Q6) Multilevel Queue Scheduling

|  |  |  |  |
| --- | --- | --- | --- |
| Process | CT | TAT | WT |
| P1 | 11 | 11 | 0 |
| P2 | 9 | 7 | 5 |
| P3 | 12 | 8 | 5 |
| P4 | 6 | 6 | 0 |
| P5 | 8 | 5 |  |