

Department of Computer Science

Gujarat University



Certificate

Roll No: 18

Seat No: 30014

This is to certify that Mr. MODI KSHITIJ ALPESHKUMAR student of MCA Semester – III has duly completed his term work for the semester ending in December 2020, in the subject of OPERATING SYSTEM towards partial fulfillment of his Degree of Masters in Computer Applications.

10/12/2020
Date of Submission

Internal Faculty

Head of Department

Department Of Computer Science
Rollwala Computer Centre
Gujarat University

MCA -III

Subject: - OPERATING SYSTEM

Name :- MODI KSHITIJ ALPESHKUMAR

Roll No.: - 18

Exam Seat No.: - 30014

Assignment Qs

- 1) Base address:- An address that is used as the origin in the calculation of address in execution of computer program.
- 2) Batch processing:- pertaining to each the technique of executing a set of computer programs such that each is completed before the next program of the set is started.
- 3) Binary Semaphore:- A semaphore that takes on only the values 0 & 1. A binary semaphore allows only one process or thread to have access to a shared critical resource at a time.
- a) Block:- i) A collection of contiguous records that are recorded as a unit, the units are separated by interblock gaps.
ii) A group of bits that are transmitted as a unit.
- 5) B-tree:- A technique for organizing indexes. In order to keep access time to a minimum, it stores the data keys in a

minimizes Balanced hierarchy that continually redesigns itself as items are inserted and deleted. Thus all nodes always have a similar number of keys.

- c) Busy waiting :- The repeated execution of a loop of code while waiting for an event to occur.
- d) Cache Memory :- A memory that is smaller and faster than main memory and that is interposed between the processor and main memory. The cache acts as a buffer for recently used memory locations.
- e) CPU :- That portion of a computer that fetches and executes instruction. It consists of an ALU, a control unit and register file. Simply referred to as a processor.
- f) Cluster :- A group of interconnected cohesive computers working together as a unified computing resource that can create the illusion of being one.

machine. The term whole computer means a system that can run on its own apart from the cluster.

(10) Concurrent:- pertaining to processes or threads that take place within a common interval of time during which they may have to alternately share common resources.

(11) Consumable Resource:- A resource that can be created and destroyed when a resource is acquired by a process, the resource ceases to exist. Eg: of consumable resource are interrupt, signal, message and information in the buffer buffers.

(12) Database:- A collection of interrelated data often with controlled redundancy, organized according to schema to serve one or more applications.

→ The data are stored so that they can be used in different programs without concern for the data structure or organization. A common approach is used to add new data and to modify and retrieve existing data.

(3) Deadlock:-

i) An impasse that occurs when multiple processes are waiting for the availability of a resource that will not become available because it is being held by another process that is in a similar wait state.

(4) Deadlock avoidance:-

A dynamic technique that examines that examines each new resources request for deadlock. If the new request for deadlock could lead to a deadlock then the request is denied.

(5) Deadlock detection:-

A technique in which requested resources are always granted when available periodically the operating system tests for deadlock.

(6) Deadlock prevention:-

A technique that guarantees that a deadlock will not occur. Prevention is achieved by ensuring that one of the

necessary conditions for deadlock is not met.

(17) Demand paging:- The transfer of a page from secondary memory to main memory storage at the moment of need compare pre-paging.

(18) Device driver:- An operating system module that deals directly with a device or I/O module

(19) Direct Access:- The capability to obtain data from a storage device or to enter data into a storage device in a sequence independent of their relative position by means of address that indicate the physical location of the data.

(20) DMA:- A form of I/O in which a special module called a DMA module controls the exchange of data between main memory and an I/O device. The processor sends a request for the transfer of a block of data to the DMA module and is interrupted only after the entire block has been transferred.

- (21) Disabled Interrupt:- A condition usually created by the OS during which the processor will ignore interrupt request signals of a specified class.
- (22) Disk allocation table:- A table that indicates which blocks on secondary storage are free and available for allocation to files.
- (23) Dispatch:- To allocate time on a processor to jobs or tasks that are ready for execution.
- (24) Distributed operating system:- A common operating system shared by a network of computers. The distributed OS provides support for interprocess communication, process migration, mutual exclusion and the prevention or detection of deadlock.
- (25) Dynamic relocation:- A process that assigns new absolute address to a computer program during execution so that the program may be executed from a different area of main storage.

(26) **Enable interrupt:** A condition usually created by the OS during which the processor will respond to interrupt request signals of a specified class.

(27) **External fragmentation:** Occurs when memory is divided into variable-size partitions corresponding to the blocks of data assigned to the memory. As segments are moved into and out of the memory gaps will occur between the occupied portions of memory.

(28) **Field:** i) Define logical data that are part of a record.
ii) The elementary unit to a record that may contain a data item a data aggregate or a pointer or a link.

(29) **file :-** A set of related records treated as a unit.

(30) **file allocation table:-** A table that indicate the physical location on secondary storage of the space allocated to a file. There is one file allocation table. For each file.

(31)

File organisation:- The physical order of records in a file as determined by the access method used to store and retrieve them.

(32)

FCFS, FIFO :- Queuing technique in which the next item (to be retrieved) is the item that has been in the queue for the longest time.

(33)

Hash file:- A file in which records are accessed according to the value of a key field hashing is used to locate a record on the basis of its key value.

(34)

Hashing:- The selection of storage location for an item of data by calculating the address as a function of the contents of the data this technique complicates the storage allocation function but results in rapid random retrieval..

(35)

Hit ratio:- In a two-level memory the fraction of all memory accesses that are found in the faster memory.

(36) Indexed access:- pertaining to the organization and accessing of the records of a storage structure through a separate index to the location of the stored records.

(37) Indexed Sequential access:- pertaining to the organization and accessing of the records of a storage structure through an index of the keys of that are stored in arbitrarily partitioned sequential files.

(38) Indexed file:- A file in which records are accessed according to the value of key fields. An index is required that indicates the location of each record on the basis of each key value.

(39) Indexed Sequential file:- A file in which records are ordered according to the values of a key field. The main file is supplemented with an index file that contains a partial list of key values. The index provides a lookup capability to quickly reach the vicinity of a desired record.

(i) Instruction cycle:- The time period during which one instruction is fetched from memory and executed when a computer is given an instruction in machine language.

(ii) Internal fragmentation:- Occurs when memory is divided into fixed-size partitions. If a block of data is assigned to one or more partition. Then there may be wasted space in the last partition. This will occur if that last partition of data is smaller than last partition.

(iii) Interrupt:- A suspension of a process such as the execution of a computer program, caused by an event external to that process and performed in such a way that the process can be resumed.

(iv) Interrupt handler:- A routine generally part of the OS. When an interrupt occurs control is transferred to corresponding interrupt handler which takes some action in response to the condition that caused the interrupt.

(4)

Job:- A set of computational steps packaged to run as a unit.

(45)

Kernel:- A portion of OS that includes the most heavily used portions of software. Generally the kernel is maintained permanently in main memory. The kernel runs in a privileged mode and responds to calls from processes and interrupts from device.

(46)

Kernel mode:- A privileged mode of execution reserved for the kernel of the operating system. Typically kernel mode allows access to regions of main memory that are unavailable to processes executing in a less-privileged mode and also enables execution of certain machine instruction that are restricted to the Kernel mode. Also referred to as System mode or privileged mode.

(47)

LIFO:- A queuing technique in which the next item to be retrieved is the item most recently placed in the queue.

(h) Live lock:- A condition in which two or more processes continuously change their state in response to change in the other processes without doing any useful task. This is similar to deadlock in that no progress is made, but it differs in that neither process is blocked or waiting for anything.

(ii) Logical address:- A reference to a memory location independent of the current assignment of data to memory. A translation must be made to a physical address before the memory access can be achieved.

(iii) logical record:-

A record independent of its physical environment. Portions of one logical record may be located in different physical records or several logical records or parts of logical records may be located in one physical record.

(iv) Main Memory:- Memory that is referred to the computer system is program addressable and can be loaded into registers for use.

Execution or processing.

(52) Malicious Software:- Any software designed to cause damage or use up the resources of a target computer. Malicious software is frequently concealed within or masquerades as legitimate software. Some cases it spread itself to other computers via email or infected disks.

→ Types of malicious software include viruses, trojan, horse, worms and hidden software for launching denial of service attacks.

(53) Memory cycle time:- The time it takes to read one word from or write one word to memory. This is the inverse of the rate at which words can be read from or written to memory.

(54) Memory partitioning:- The subdivision of storage into independent sections.

(55) Micro kernel:- A small privileged operating system core that provides process scheduling, memory management and communication.

Services and relies on other processes to perform some of the functions traditionally associated with operating system kernel.

(56) Multi-processing :- A mode of operation that provides for parallel processing by two or more processor of a multiprocessor.

(57) Multiprogramming :- A mode of operating that provides for the interleaved execution of two or more computer programs by a single processor. The same as Multitasking using different terminology.

(58) Multiprogramming level :- The number of processes that are partially or fully resident in memory.

(59) Multitasking :- A mode of operation that provides for the concurrent performance or interleaved execution of two or more computer tasks. The same as Multiprogramming using different terminology.

(60) Mutual Exclusion :- A condition in which there is a set of process only one of which is able

to access a given resource or perform a given function at any time. See critical section.

(61) Operating System:- Software that controls the execution of programs and that provides services such as resource allocation, scheduling, input/output control and data management.

(62) Page:- In virtual storage a fixed length block that has a virtual address and that is transferred as a unit between main memory and secondary memory.

(63) Page fault:- Occurs when the page containing a referenced word is not in main memory. This causes an interrupt and requires that the proper page be brought into main memory.

(64) Page frame:- A fixed size contiguous block of main memory used to hold page.

(65) Paging:- A fixed size transfer of pages between main memory and secondary memory.

(66)

physical address:- The absolute location of a unit of data in memory.

(67)

Pipe:- A circular buffer allowing two processes to communicate on the producer-consumer model. Thus it is a first-in-first-out queue, written by one process and read by another. In some system the pipe is generated to allow any item in the queue to be selected for consumption.

(68)

Preemption:- Reclaiming a resource from a process before the process has finished using it.

(69)

Prefetching:- The retrieval of pages other than the one demanded by a page fault. The hope is that the additional pages will be needed in the near future, and so using disk I/O, complete demand paging.

(70)

Process:- A program for execution. Process is controlled and scheduled by the OS same as task.

(A1) PCB:- The manifestation of a process is an OS. It is a data structure containing information about the characteristics and state of the process.

(A2) Process State:- All of the information that the OS needs to manage a process and that the process needs to properly executes the process.

The process state includes the contents of the various processor registers such as the program counter and data register. It also includes information of use to the OS, such as the priority of the process and whether the process is waiting for the completion of particular I/O event. Same as execution context.

(A3) Processor:- In a computer a fundamental unit that interprets and executes instructions. A processor consist of at least an instruction control unit and an arithmetic unit.

(A4) Program Counter:- Instruction address register.

(73)

Programmed I/O:- A form of I/O in which the CPU issues an I/O command to an I/O module and must then wait for the operation to be complete before proceeding.

(74)

Real time system:- An OS that must schedule and manage real-time tasks

(75)

Real time task:- A task that is executed in connection with some process or function or set of events external to the computer system and that must meet one or more deadlines to interact effectively and correctly with the external environment.

(76)

Registers:- High-speed memory internal to the CPU some registers are user visible that is available to the programmer via the machine instruction set other registers are used only by the CPU, for control purpose.

(77)

Relative addressing:- An address calculated as a displacement from a base address.

- (80) Response Time:- In a data system the elapsed time between the end of transmission of an e.g. enquiry message and the beginning of the receipt of a response message measured at the enquiry terminal.
- (81) Round Robin:- A scheduling algorithm in which processes are activated in a fixed cyclic order, that is all processes are in a circular queue. A process that cannot proceed because it is waiting for some event returns control to the scheduler.
- (82) Scheduling:- To select jobs or tasks that are to be dispatched. In some operating systems, other units of work such as input/output operations may also be scheduled.
- (83) Segment:- In virtual memory a block that has a virtual address. The blocks of a program may be of unequal length and may even be of dynamically varying length.

(83) Segmentation:- The division of a program or application into segments as part of a virtual memory schema.

(84) Seq Semaphore:- An integer value used to signaling many processes only those operations may be performed on a semaphore all of which are atomic, initialize, decrement and increment.

Depending on the exact definition of Semaphore the decrement operation may result in the blocking of a process and the increment operation may result in the unblocking of a process. Also known as a counting semaphore or a general semaphore.

(85) Sequential file:- A file in which records are stored according to the value of the key fields and processed in the same sequence from the beginning of the file.

(86) Shell:- The portion of the OS that interprets interactive user command and job control language commands. It functions as an interface between the user and OS.

(89) Stack:- An ordered list in which items are appended to and deleted from the same end of the list, known as the top. That is the next item appended to the list is put on the top and the next item to be removed from the list is the item that has been in the list the shortest time. This method is characterized as last in first out.

(90) Starvation:- A condition in which a process is indefinitely delayed because other processes are always given preference.

(91) Strong Semaphore:- A semaphore in which all processes waiting on the same semaphore are queued and will eventually proceed in the same order as they executed the wait (P) operations.

(92) Swapping:- A process that interchanges the contents of an area of main storage with the contents of an area in secondary memory.

(Q3)

SMP:- A form of Multiprocessing that allows the OS. to execute on ~~any~~ any available processor or on several of available processors simultaneously.

(Q4)

Synchronous operation:- An operation that occurs regularly or predictably with respect to the occurrence of a specified event in another process. For e.g.: - the calling of an input / output routine that receives control at a predefined location in a computer program.

(Q5)

Synchronization:- Situation in which two or more process coordinates their activities based on a condition.

(Q6)

System bus:- A bus used to interconnect major computer component.

(Q7)

Thread :- A dispatchable unit of work. It includes a processor context and its own data area for a stack. A thread executes sequentially and it's interruptible so that the processor can turn to another thread. A process may consist of multiple threads.

18 Thread Switch:- The act of switching processes control from one thread to another within the same process.

19 Time Sharing:- The concurrent use of a device by a number of users.

20 Time Slice:- The maximum amount of time that a person can execute before being interrupted.

21 Trap:- An unprogrammed conditional jump to a specified address that is automatically activated by hardware. The location from which the jump was made is recorded.

22 Trojan horse:- Secret undocumented routine embedded within a small program. Execution of the program results in execution of the secret routine.

23 User mode:- The least privileged mode of execution. Certain regions of main memory and certain machine instruction cannot be used in this mode.

(104)

Virtual Address :- The address of a storage location in virtual memory.

(105)

Virtual memory :- The storage space that may be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped onto real addresses.

→ The size of virtual storage is limited by the addressing scheme of the computer system and by the amount of secondary memory available and next by the actual number of main storage locations.

(106)

Virus :- Secret undocument routine embedded within a useful program execution of the program - result on execution of the secret routine

(107)

Weak Semaphore - A semaphore for which all process waiting on the same semaphore proceed in an unspecified order.

(108)

Word:- An ordered set of bytes or bits that is the minimal unit on which information may be stored transmitted or operated on ~~order~~ within a given computer. Typically if a processor has a fixed length instruction sets then the instruction length equals the word length.

(109)

Worm:- program that can travel from computer to computer across network connections may contain a virus or bacteria.

Q) Numericals:-

5) Banker's Algorithm:-

(work) (Max allocation)

process Allocation Max Available Need

	A	B	C	ABC	ABC	ABC
P ₀	0	1	0	753	332	
P ₁	2	0	0	322		
P ₂	3	0	2	402		
P ₃	2	1	1	222		
P ₄	0	0	2	633		

→ Process Allocation Max Available Need

	A	B	C	ABC	ABC	ABC
P ₀	0	1	0	753	332	743
P ₁	2	0	0	322		122
P ₂	3	0	2	402		600
P ₃	2	1	1	222		011
P ₄	0	0	2	633		637

⇒ Need & Work \neq Work = Work + Allocation

P₀ 743 < 332 \leftarrow Condition fails.

P₁ 122 < 332 \rightarrow Condition true

$$W = 332 + 100 \\ = 532$$

$P_2 \rightarrow 600, 5 \leq 532 \rightarrow$ condition false

$P_3 \rightarrow 011 \leq 532 \rightarrow$ condition true.

$$w = 532 + 011$$

$$= 543$$

$P_4 \rightarrow 431 \leq 743 \Rightarrow w = 743 + 002$
 $= 745.$

$P_0 \rightarrow 743 \leq 745 \Rightarrow w = 745 + 010$
 $= 755.$

$P_2 \rightarrow 600, 5 \leq 755 \Rightarrow w = 755 + 302$
 $= 1057.$

'Safe Sequence': $\leftarrow \langle R_1, P_3, P_4, P_0, P_2 \right\rangle$

* FIFO:

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 6, 3, 2; 1, 2, 0, 1

7	0	1	2	0	3	0	4
7	7	7	2	2	2	2	4
0	0	1	0	3	3	0	3
1	1			1	0		0

2	3	0	0	3	2	1	2	0	1	7
4	4	0				0	0			7
2	2	2				1	1			1
0	3	3				3	2			2

0	1
7	7
0	0
2	1

Page fault = 15.

No. of frames = 3.

(4) LRU:-

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

7	0	1	2	0	3	0	4	0	3	0	3
7	7	7	2		2		4	4	4	0	0
0	0	0			0		0	0	3	3	3
1	1	1			3		3	2	2	2	2

2	1	2	0	1	7	0	1
1		1		1			
3		0		0			
2		2		7			

no. of frames = 3.

Page fault = 12.

(5) Optimal:-

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

7	0	1	2	0	3	0	4	2	3	0	3	0	3	2
7	7	7	2	2	2	2	2	2	2	3	0	0	0	2
0	0	0	0	0	0	0	0	0	0	3	3	3	3	0
1	1	1	1	3	3	3	3	3	3	3	3	3	3	3

1	2	0	1	7	0	1
2				7		
0				0		
1				1		

no. of frames = 3
page fault = 9.

④ FIFO:- 1, 3, 0, 3, 5, 6, 3.

1	3	0	3	5	6	3
1	1	1		5	5	5
3	3			3	6	6
0				0	0	3

page fault = 6 no. of frame = 3

⑤ optimal:- 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 3.

7	0	1	2	0	3	0	4	2	3	0	3	2
7	7	7	7	7	3	3	3	3	3	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1
1	1	1	2	2	2	2	2	2	2	4	4	4
2										2	2	2

page fault :- 6

no. of frames :- 4.

**DEPARTMENT OF COMPUTER SCIENCE
ROLLWALA COMPUTER CENTRE
GUJARAT UNIVERSITY
M.C.A. - III**

ROLL NO : 18

NAME : Modi Kshitij Modi

SUBJECT : Operating System (OS)

NO.	TITLE	PAGE NO.	DATE	SIGN
1	Calculate Gross Salar		10-Dec-20	
2	Distance between two cities		10-Dec-20	
3	Area of Rectancle & Circle		10-Dec-20	
4	Sum of digits of a number		10-Dec-20	
5	Lognames		10-Dec-20	
6	File details		10-Dec-20	
7	Profit/ Loss		10-Dec-20	
8	Odd/ Even		10-Dec-20	
9	Prime or No		10-Dec-20	
10	Leap Year		10-Dec-20	
11	Similar Files		10-Dec-20	
12	---Cancelled ---		10-Dec-20	
13	--Cancelled ---		10-Dec-20	
14	Date Display		10-Dec-20	
15	Greeting		10-Dec-20	
16	Menu Driven Interface		10-Dec-20	
17	Arithmetic Calculator		10-Dec-20	
18	Factorial		10-Dec-20	
19	Fibonacci		10-Dec-20	
20	Power of yraised to x		10-Dec-20	
21	Similar to Head/Tail Command		10-Dec-20	
22	Files > 1000		10-Dec-20	
23	---Cancelled ---		10-Dec-20	
24	Prime numbers 1-2=300		10-Dec-20	
25	Combinations of 1, 2, 3		10-Dec-20	

D E P A R T M E N T O F C O M P U T E R S C I E N C E
ROLLWALA COMPUTER CENTRE
GUJARAT UNIVERSITY
M.C.A. – III

R O L L N O : 18

N A M E : Modi Kshitij Modi

S U B J E C T : Operating System (OS)

26	Rename each file with extension .PID	10-Dec-20
27	Occurrence of each word in file	10-Dec-20
28	Delete lines with word “unix”	10-Dec-20
29	Stop at the first file that encounter word “unix”	10-Dec-20
30	Copy even files	10-Dec-20
31	All files in current directory with read, write & execute permissions	10-Dec-20
32	File or Directory?	10-Dec-20
33	File exists or not? If not create in mydi	10-Dec-20
34	Calculate Percentage & Grades	10-Dec-20
35	Armstrong numbers between 1 to 500	10-Dec-20
36	Acute / Right / Obtuse Angle	10-Dec-20
37	Numbers divisible by 7 in 1-100	10-Dec-20
38	Smallest & Largest of 3 numbers	10-Dec-20
39	HCF & LCM	10-Dec-20
40	Dates falling on Sunday of current month	10-Dec-20