Department Of Computer Science

ROLLWALA COMPUTER CENTRE

Gujarat University

Certificate

Roll No : 03 *Seat No :* _____

This is to certify that Mr./Ms. Baraiya Dhaval M *student of MCA Semester – III, has duly completed his/her term work for the semester ending in December 2020, in the subject of* OPERATING SYSTEM *towards partial fulfillment of his/~~her~~ 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 – 3

Subject:_____OPERAING SYSTEM_____

Name: - Baraiya Dhaval M.

Roll No.: - __03___ **Exam Seat No.: -**_____

Assignment - 1

Page No. 1
Date / /

1. Base address

⇒ An address that is used as the origin in the calculation of addresses in the execution of computer program.

2. Batch Processing

→ Pertaining to the techniques of executing a set of computer program such that each is completed before the next program of the set is started.

* Binary semaphore

→ A semaphore that takes on only one the values 0 and 1. A Binary semaphore allows only one process or thread to have access to shared critical resources at a time.

* Block.

1) A collection of contiguous records that are recorded as a unit; The units are separated by interblock gaps.

2) A group of bits that are transmitted as a unit.

* B-tree

→ A technique for organizing indexes. In order to keep access time to a minimum. It stores the data keys in a balanced heirachy that continually realigns itself as ites are inserted and deleted. Thus all nodes always have a similiard number of keys.

* busy waiting

→ The Repeated execution of loop of code while waiting for an event to occur

* Cache memory

→ A memory that is smaller and faster than main memory and that is interpos Between the Processors and main memory. The ~~Cache~~ cache acts as a Buffer for recently used memory locations.

* CPU.

→ That Portion of computer that fetches and executes instructions. It consists of an arithmetic and logic unit(ALU), a control unit, and registers, often simply referred to as a Processor.

* Cluster.

→ A group of interconnected, whole computers working together as a unified computing resources 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.

* Concurrent

→ Pertaining to Process or threads that take Place within a common interval of time during which they may have to alternately share common resources.

* Consumable resources.

→ A resources that can be created and destroyed, when a resources is required by a process, The Resource ceases to exist.

Example of Consumable Resource are interrupt, signals, message and information in I/o Buffers.

* Database.

→ A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications, the data are stored so that they can be used by different

Programs without concern for the data structures or organization.

* Deadlock

→ 1) An impasse that occurs when mutiple process 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 similiar wait state.

2). An impasse that occurs when multiple processes are waiting for an action by or a response from another process that is in a similiar wait state.

* Demand Paging.

→ The transfer of a page from secondary memory to main memory storage at the moment of need. Compare to Prepaging.

* Device Driver

→ An operating system module that deals directly with a device or I/O module.

* DMA

→ A form of I/O in which a special module, control 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.

* Disable Interrupt.

→ A condition, usually created by the operating system, during which the processor will ignore an interrupt request signal for a specified class.

* Disk allocation table

→ A table that indicates which blocks on secondary storage are free and available for allocation to files.

* Distributed operating system

→ A common operating system shared by a network of computers. The distributed operating system provides support for interprocess communication, process migration, mutual exclusion, and the prevention or detection of deadblock.

* 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.

* Dispatch

→ To allocate time on a processor to jobs or tasks that are ready for execution.

* Enable Interrupt.

→ A condition, usually created by the operating system, during which the processor will respond to interrupt request signals of a specified call.

* 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 occurs between the occupied portion of memory.

* File.

→ A set of related records treated as a unit.

* Field

→ 1) Defined logical data that are part of a record.

2) The elementary unit of a record that may contain a data item, a data aggregate, a pointer or a link.

* FAT

→ A table that indicates the physical location on secondary storage of the space allocated to a file. There is one file allocation table for each file.

* File management system

→ A set of system software that provides services to users and applications in the use of files, including file access, directory maintenance and access control.

* File organization

→ The physical order of records in a file, as determined by the access method used to store and retrieve them.

* FCFS.

→ First come first served. Same as FIFO.

* FIFO

→ A queueing technique in which the next item to be retrieved is the item that has been in the queue for the longest time.

* hash file.

→ A file in which records are placed according to the value of a key field. Hashing is used to locate a record on the basis of its key value.

* hit ratio.

→ In a two level memory, the fraction of all memory accesses that are found in the faster memory.

* Indexed access.

→ Pertaining to the organization and accessing of the records of the storage structure through a separate index to the locations of the stored record.

* Index file.

⇒ A file in which records are arrased according to the value of key fields. An index is required that indicates the locations of each record on the basis of each key value.

* Index sequential access.

→ Pertaining to the organization and accessing of the records of a storage structure through an index of the key that are stored in arbitrarily partitioned sequential files.

* Index 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.

* 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.

* Internal fragmentation.

→ occurs when memory is divided into fixed size partition. If a block of data is assigned to one or more partitions, then there may be wasted space in the last partition. This will occur if the last portion of data is smaller than the last partition.

* 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.

* Interrupt handler.

→ 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.

* Job

→ A set of computational steps packaged to run as a unit.

* Kernel.

→ A portion of the operating system that includes the most heavily used portions of software. Generally, the kernel is maintained permentally in main memory. The kernel runs in a privileged mode and responds to calls from processes and interrupts from devices.

* 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 unavailible to processes executing in a less-privileged mode, and also enables executions of certain machine instructions that are restricted to the kernel mode. Also referred to as a system mode or Privileged mode.

* LIFO.

→ A queueing technique in which the next item to be retrieved is the item most recently placed in the queue.

* livelock

→ A condition in which two or more processes continuously change their state in response to changes in the other processes without

doing any useful work. This is similiar to deadlock in that no progress is made, but it differes in that neither process is blocked or waiting for anything.

* 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.

* logical record.

-> A record independent of its physical environment; portion 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.

* main memory.

→ memory that is internal to the computer system, is a program addressable, and can be loaded into registers for subsequent execution or processing.

* 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 can be read from or written to memory.

* memory partitioning.

→ The subdividing of storage into independent sections.

* multiprocessing.

→ A mode of operation that provides for parallel processing by two or more processors of a multiprocessor.

* multiprogramming.

→ A mode of operation that provides for the interleaved execution of two or more computer programs by a single processor. The same as mutitasking, using different terminology.

* multiprograming level.

→ The number of processes that are partially or fully resident in main memory.

* multi tasking.

→ A mode of operation that provides for the concurrent performance or interleaved execution of two or more computer tasks.

→ The same as mutiprogramming, using different terminology.

* Operating system.

→ Software that controls the execution of programs and that provides services such as resources allocation, shedulin1, input/output control and Data management.

* Page

→ In virtual storage, a fixed length block that has ~~virtual~~ virtual address and that is transferred as a unit between main memory and secondary memory.

* 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.

* Page frame.

→ A fixed size contiguous block of main memory used to hold a page.

* Paging.

→ The transfer of pages between main memory and secondary memory.

* Physical address.

→ The absolute location of a unit of data in memory.

* Preemption.

→ Reclaiming a resources from a process before the process has finished using it.

* 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 systems, the pipe is generalized to allow any item it the queue to be selected for consumption.

* Prepaging.

→ The retrivial of pages other than the one demanded by a page fault. The hope is that additional pages will be needed in the near future, conserving disk IO.

* Process.

→ A program in execution, A process is controlled and sheduled by the operating system.

* Process control Block

→ The manifestation of a process in an operating system. It is a Data structure containing information about the characteristic and state of process

* Process State

→ All the information that the operating system needs to manage a process and that the processor needs to properly execute the process. The process state includes the contents of the various processor registers, such as the program counter and data registers; it also includes information of use to the operating system. such as the priority of the process and whether the process is ~~waiting~~ waiting for the completion of a particular I/o event.

same as execution context.

* Processor

→ In a computer, a functional unit that interprets the executes instructions. A processor consist of at least an instruction control unit and an arithmetic unit.

* Program counter.

→ Instruction address register.

* Programmed I/O.

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

* 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.

* 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 Register are used only by The CPU, for control PurPoses.

* Relative address

→ An address calculated as a Displacement from a base address.

* Round Robin

→ A scheduling algorithm in which processes are activated in a fixed cyclic order; that is, all processes are in circular queue. A process that cannot proceed because it is waiting for some event returns control to the scheduler.

* 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 sheduled.

* secondary memory.

→ memory located outside the computer system itself; that is, it cannot be processed directly by the processor. It must first be copied into main memory. Examples include disk and tape.

* segment.

→ In virtual memory, a block that has a virtual address. The blocks of program may be of unequal length and may even be dynamically varying length.

* segmentation

→ The division of a program or application into segments as part of a virtual memory scheme.

* semaphore

→ An integer value used for signaling among process. only three operations may be performed on a semaphore, all of which are atomic; initialize, decrement and increment. Depending on the exact definition of the semaphore, the decrement operation may result in the unblocking of a process. Also known as a counting semaphore or a general semaphore.

* Sequential File.

→ A file in which records are ordered according to the values of one or more key fields and processed in the same sequence from the beginning of the file.

* Shell.

→ The portion of the operating system that interprets interactive user commands and job control language command. It function as an interface between the user and the operating system.

* 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 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.

* Starvation

→ A condition in which a process is indefinitely delayed because other process are always given preference.

* 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 operations.

* Swapping.

→ A process that interchanges the contents of an area of main storage with the contents of an area in secondary memory.

* SMP (Symmetric multiprocessing)

→ A form of multiprocessing that allows the operating system to execute on any available processor or on several available processor simultaneously.

* Synchronous operation

→ An operation that occurs regularly or predictably with respect to the occurrence of a specified event in another process. For example, the calling of an input/output routine that receives control at a preloaded location in a computer program.

* Synchronization

→ Situation in which two or more processes coordinate their activities based on a condition

* System bus.

→ A bus used to interconnect major computer components.

* Thread

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

* Thread Switch

→ The act of switching processor control from one thread to another within the same process.

* Time sharing

→ The concurrent use of a device by a number of users.

* Time slice

→ The maximum amount of time that a process can execute before being interrupted.

* 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.

* Trojan horse

→ secret undocumented entry point into a program, used to grant access without methods of access authentication.

* User mode.

→ The least privileged mode of execution. In certain regions of main memory and certain machine instruction cannot be used in this mode.

* virtual address

-> The address of a storage location in virtual memory

* 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 into real addresses. The size of virtual storage is limited by the addressing scheme of computer system and by the amount of secondary memory available and not by the actual number of main storage locations.

* virus

-> Secret undocumented routine embedded within a useful program. Execution of the program results in execution of the secret routine.

* weak semaphore

→ A semaphore in which all processes waiting on the same semaphore proceed in an unspecified order.

* word

→ An ordered set of bytes or bits that is the normal unit in which information may be stored, transited or operated on within a given computer. Typically, if a processor has the fixed-length instruction set, then the instruction length equals the word length.

* worm

→ Program that can travel from the computer to computer across network connection. may contain virus or bacteria.

Assignment-2

Page No. 33
Date / /

* Bankers's Algorithm

Process	Allocation			max			Available (work)			need (max-allocate)		
	A	B	C	A	B	C	A	B	C			
P_0	0	1	0	7	5	3	3	3	2			
P_1	2	0	0	3	2	2						
P_2	3	0	2	9	0	2						
P_3	2	1	1	2	2	2						
P_4	0	0	2	4	3	3						

=>

Process	Allocation			max			Available			need (max-allocation)		
	A	B	C	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2	7	4	3
P_1	2	0	0	3	2	2				1	2	2
P_2	3	0	2	9	0	2				6	0	0
P_3	2	1	1	2	2	2				0	1	1
P_4	0	0	2	4	3	3				4	3	1

=> need $\leq$ work => work $\neq$ work + Allocation

P_0 7 4 3 $\leq$ 3 3 2 <- X condition fails

P_1 1 2 2 $\leq$ 3 3 2 condition true

W = work + allocation

= 3 3 2 + 2 2 0

= 5 3 2

P_2 need ≤ work

$600 \leq 532$ Condition false

P_3 need ≤ work

$011 \leq 532$ Condition true

$w = w + \text{allocation}$

$= 532 + 211$

$= 743$

P_4 need ≤ work

$431 \leq 743$ $\Rightarrow w = w + \text{allocation}$

$= 743 + 002$

$= 745$

P_0 need ≤ work

$743 \leq 745$ $\Rightarrow$ work = w + allocation

$= 745 + 010$

$= 755$

P_2 need ≤ work

$600 \leq 755$ $\Rightarrow$ work = w + allocation

$= 755 + 302$

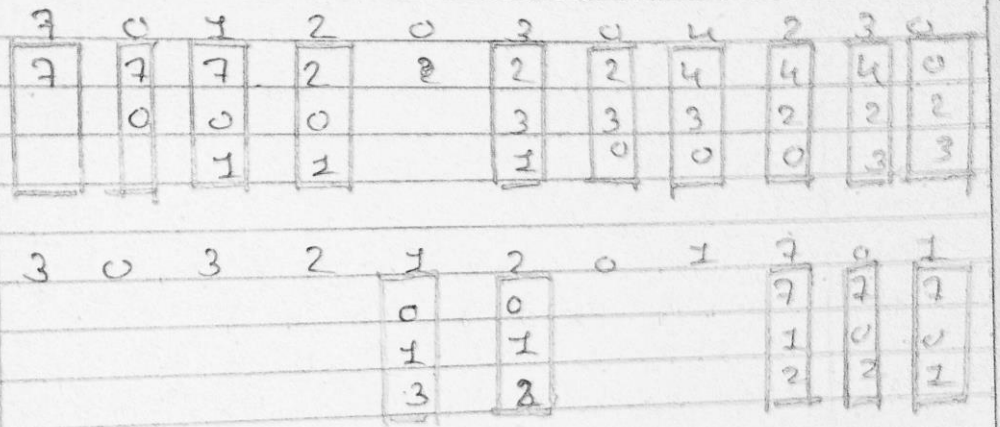
$= 1057$

Safe sequence is → $\langle P_1, P_3, P_4, P_0, P_2 \rangle$

Page No. 35
Date 1. 4

* FIFO

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



Page fault = 15

no of frames = 3.

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

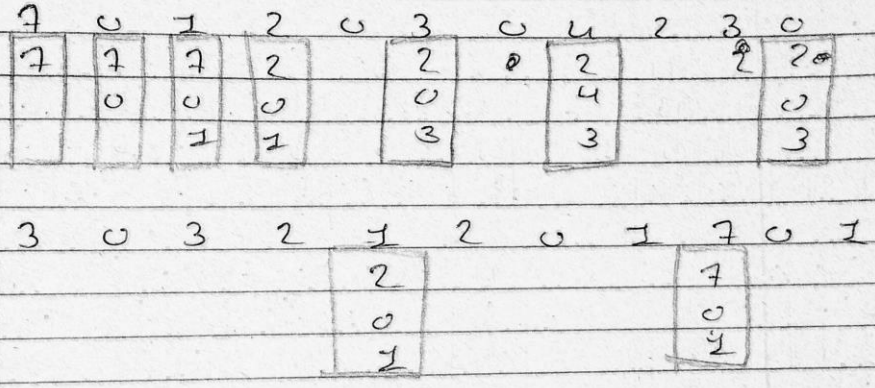
0	3	0	3	2	1	2	0	1	7
0					1		1		1
3					3		0		0
2					2		2		7

0 1

=> No. of frames = 3
Page fault = 12

* optional

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



no. frames = 3
Page fault = 9

=> 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 frames = 3

=> 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	3
7	7	7	7		3		3						
	0	0	0		0		0						
		1	1		1		4						
			2		2		2						

Page fault = 6
No. of frames = 4