

Department of Computer Science

Gujarat University



Certificate

Roll No: 25

Seat No: _____

This is to certify that Ms. PARMAR MOHINI HITESHBHAI student of MCA Semester – III has duly completed her term work for the semester ending in December 2020, in the subject of OPERATING SYSTEM towards partial fulfillment of her Degree of Masters in Computer Applications.

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Date of Submission

Internal Faculty

Head of Department

Department Of Computer Science Rollwala Computer Centre Gujarat University

MCA -III

Subject: - OPERATING SYSTEM

Name :- PARMAR MOHINI HITESHBHAI

Roll No.: - 25

Exam Seat No.: - _____

Assignment 1

Glossary

- * **base address.**
 - An address that is used as the origin in the calculation of address in the execution of a computer program.

- * **batch processing.**
 - Pertaining to the technique of executing a set of computer programs such that each is completed before the next program of the set is started.

- * **binary semaphore.**
 - A semaphore that takes on only the values 0 and 1. A binary semaphore allows only one process or thread to have access to a shared critical resource at time.

- * **block.**
 - A collection of contiguous records that are recorded as a unit; the units are separated by interblock gaps.
 - 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 hierarchy that continually realigns itself as items are inserted and deleted. Thus, all nodes always have a similar number of keys.

* busy waiting

→ The repeated execution of a 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 interposed between the processor and main memory. The cache acts as a buffer for recently used memory locations.

* Central processing unit (CPU)

→ That portion of a 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.

* client

→ A process that requests services by sending messages to server processes.

* 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 thread that take place within a common interval of time during which they may have to alternately share common resources.

* consumable resources.

- A resource that can be created and destroyed. When a resource is acquired by a process, the resource access cease to exists. Example of consumable resources are interrupts, signals, messages and information in I/O buffer.

* database

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

* deadlock.

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

* deadlock avoidance.

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

* deadlock detection, prevention

- A technique in which requested resources are always granted ^{that} so that a deadlock will not occur. Prevention is achieved by assuring that one of the necessary conditions for deadlock is not met.

* deadlock detection.

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

* demand paging.

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

* device driver.

→ An operating system module (usually in kernel) that deals directly with a device or I/O module.

* direct Memory access (DMA)

→ A form of I/O in which special module, called a DMA module, controls that 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 operating system, during which the processor will ignore interrupt request signals of a specified class.

* disk allocation table

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

- * dispatch.
 - To allocate time on a processor to jobs or tasks that are ready for execution.
- * 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 deadlock.
- * dynamic relocation.
 - A process that assigns new absolute addresses to a computer program during execution so that the program may be executed from a different area of main storage.
- * enabled interrupt
 - A condition usually created by the operating system during which the processor will respond to interrupt request signals of a specific class.
- * encryption
 - The conversion of plain text or data into unintelligible form by means of a reversible mathematical computation.

* execution context

→ Same as process state.

* external fragmentation.

→ Occurs when memory is divided into variable-size partitions corresponding to the block of data assigned to the memory. As segments are moved into and out the memory, gaps will occur between the occupied portions of memory.

* field.

→ Defined logical data that are part of a record.

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

* file

→ A set of related records treated as a unit.

* file allocation table (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 user and application in the use of files, including file access, directory maintenance and access control.

- * file organization.
 - The physical order or record in a file, as determined by the access method used to store and retrieve them.

- * first come first serve (FCFS)
 - Same as FIFO.

- * first in first out (FIFO)
 - A queuing technique in which the next item to be retrieved is the item that has been in queue for the longest time.

- * frame.
 - In paged virtual storage, a fixed length block of main memory that is used to hold one page of virtual memory.

- * hash file
 - A file in which records are accessed according to the values 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 (ex. the cache).

* 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 record.

* 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.

* Indexed sequential access:

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

* 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 facility to quickly reach the vicinity of 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.

* Job

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

* interrupt handler.

→ A routine, generally part of the operating system. When an interrupt occurs, control is transferred to the corresponding interrupt handler, which takes some action in response to the condition that caused the interrupt.

* Job control language (JCL)

→ A problem oriented language that is designed to express statements in a job that are used to identify the job or to describe its requirement to an operating system.

* kernel

→ A portion of the operating system that includes the most heavily used portion 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 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 unavailable to process executing in a less-privileged mode, and also enables

Execution of certain machine instructions that are restricted to the kernel mode. Also referred to as system mode or privileged mode.

- * last in first out (LIFO)
 - A queuing technique in which the next item to be retrieved is the item most recently placed in the queue.
- * lightweight process.
 - A thread.
- * livelock.
 - A condition in which two or more processes continuously change their state in response to change in other processes) without doing any useful work. This is similar to dead lock in that no progress is made, but it differs in that neither process is blocked or waiting for anything.
- * logical address
 - A reference of 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. Positions 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 program addressable and can be loaded into registers for subsequent execution or processing.

* Malicious software

→ Any software designed to cause damage to or use up the resources of target computer. Malicious software is frequently concealed within or masquerades as legitimate software. In some case it spreads itself to other computers via email or infected disks. Type of malicious software include viruses, Trojan horse, worms and hidden software for launching denial-of-service attacks.

* Message

→ A block of information that may be exchanged between processes as a means of communication.

* 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.

* memory partitioning.

→ The subdividing of storage into independent sections.

* microkernel

→ 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 the operating system kernel.

* multilevel security

→ A capability that enforces access control across multiple levels of classification of data.

* multiprocessing.

→ A mode of operation that provides for parallel processing by two or more processors that have common access to main of a multiprocessor.

- * multiprocessor.
 - A computer that has two or more processors that have common access to a main storage.
- * multiprogramming.
 - A mode of operation that provides for the interleaved execution of two or more computer programs by a single processor. The same as multitasking, using different terminology.
- * multiprogramming level
 - The ~~number~~^{num} of processes that are partially or fully resident in main memory.
- * 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.
- * mutual exclusion
 - A condition in which there is a set of processes, only one of which is able to access a given resource or perform a given function at any time.

* operating system.

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

* 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.

* page fault.

→ Occurs when the page containing a referenced word is not in main memory. This cause 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 memory.

* 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 in the queue to be selected for consumption.

* preemption.

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

* prefetching.

- The retrieval of pages other than one demanded by page a fault. The hope is that the additional pages will be needed in the near future, conserving disk I/O.

* privileged instruction.

- An instruction that can be executed only in a specific mode usually by a supervisory program.

* privileged mode.

- Same as kernel mode.

* process.

→ A program in execution. A process is controlled and scheduled by the operating system. Same as task.

* Process control block.

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

* process descriptor.

→ Same as process control block.

* process image

→ All of the ingredients of a process, including program, data, stack and process control Block

* process migration.

→ The transfer of a sufficient amount of the state of a process from one machine to another from the process to execute on the target machine.

* process Spawning.

→ The creation of a new process by another process.

* process state.

→ All of 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 for the completion of a particular I/O event. Same as execution context.

* process switch.

→ An operation that switches the processor from one process to another by saving all the process control block, registers and other information for the first and replacing them with the process information for the second.

* processor.

→ In a computer, a functional unit that interprets and executes instructions. A processor consists 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 an I/O module and must then wait for the operation to be complete before proceeding.

* race condition.

→ Situation in which multiple processes access and manipulate shared data with the outcome dependent on the relative timing of the processes.

* real address.

→ A physical address in main memory.

* real-time system.

→ An operating system that must schedule and manage real-time tasks.

* real-time task

→ A task that is executed in connection with some process or functions or a 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.

- * record.
 - A group of data elements treated as a unit.

- * 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 purposes.

- * relative address.
 - An address calculated as a displacement from a base address.

- * remote procedure call (RPC)
 - A technique by which two programs on different machines interact using procedure call/return syntax and semantics. Both ~~are~~^{the} called and calling program behave as if the partner program were running on the same machine.

- * resident set
 - The portion of a process that is actually in main memory at a given time.

* response time:

- In a data system, the elapsed time between the end of transmission of an enquiry message and the beginning of the receipt of a response message, measured at the enquiry terminal.

* reusable resource:

- A resource that can be safely used by only one process at a time and is not depleted by that use. Processes obtain reusable resource units that they later release for reuse by other processes. Examples of reusable resources include processors, I/O channels, main and secondary memory, devices, and data structures such as file, databases and semaphores.

* 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 can not process because it is waiting for event (i.e. termination of a child process or an output/input operation) 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 scheduled.

* 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 & tape.

* Segment

- In virtual memory, a block that has a virtual address. The block of a program may be of unequal length and may even be of ~~the~~ dynamic varying lengths.

* Segmentation

- The divide of a program or application into segments as part of a virtual memory scheme.

* Sequential file

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

* Semaphore:

- An integer value used for signaling among processes. 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 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.

* Server:

- A process that responds to request from clients via message
- In a network, a data station that provide facilities to the other stations; for example, a file server, a print server, a mail server.

* Session

- A collection of one or more processes that represents a single interactive user application or operating system function. All keyboard and mouse input is directed to the foreground session and all output from the foreground session is directed to display screen.

* Shell

→ The portion of the operating system that interprets interactive user commands. It functions as an interface between the user and the operating system.

* Spin lock

→ Mutual exclusion mechanism in which a process executes in an infinite loop waiting for the value of a lock variable to indicate availability.

* Spooling

→ The use of secondary memory as buffer storage to ~~use~~ reduce processing delays when transferring data between peripheral equipment and the processor of a computer.

* 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 time item appended to the ~~top~~ 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. The method is characterized as last in first out.

* Starvation.

→ A condition in which a process is indefinitely delayed because other processes 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 (P) operations (FIFO order).

* Swapping.

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

* Symmetric multiprocessing. (SMP)

→ A form of multiprocessing that allows the operating system to execute on any available processor or on several available processors 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 pre-coded 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 component.

* System mode

→ It is same as kernel mode.

* task

→ It is same as process

* thrashing

→ A phenomenon in virtual memory schemes, in which the processor spends most of its time swapping pieces rather than executing instruction.

* 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 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.

* time slicing

→ A mode of operation in which two or more processes are assigned a quota of time on the same processor.

* trace

→ A sequence of instruction that are executed when a process is running.

* translator lookaside buffer (TLB)

→ A high speed cache used to hold recently referred referenced page table entries as part of a paged virtual memory scheme. The TLB reduces the frequency of access to main memory to retrieve page table entries.

* 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.

* trap door.

- Secret undocumented entry point into a program, used to grant access without normal methods of access authentication.

* trusted system.

- A computer and operating system that can be configured to implement a given security policy.

* trojan horse

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

* user mode

- The least-privileged mode of execution. Certain regions of main memory and certain machine instructions 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 the computer system and the amount of secondary memory available and not by the actual number of main storage location.

- * virus

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

- * weak semaphore

- A semaphore in which all processes while waiting on the same semaphore processed in an unspecified order (i.e. the order is unknown oreterminate).

* word

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

* Working set

- The working set with parameter Δ for a process at virtual time $t, w(t, \Delta)$ is the set of pages of that process that have been referenced in the last Δ time units. Compare resident set.

* worm,

- program that can travel from computer to ~~but~~ computer across network connections. May contain virus or malware.

* relative address

- An address calculated as a displacement from a base address

* ~~set~~ rendezvous

- In message passing a condition in which both the sender and receiver of a messenger are blocked until the message is delivered.

- * remote procedure call (RPC)
 - A technique by which two programs on different machines interact using procedure call/return syntax and semantics. Both the called and calling program behave as if the partner program were running on the same machine.
- * Program Status Word (PSW)
 - A register or set of registers that contains condition codes, execution mode and other status information that reflects the state of a process.
- * nonprivileged state
 - An execution context that does not allow sensitive hardware instructions to be executed, such as the halt instruction and I/O instructions.
- * Nonuniform memory access (NUMA) multiprocessors.
 - A shared memory multiprocessor in which the access time from a given processor to a word memory varies with the location of the memory word.
- * mutex
 - Similar to a binary semaphore. A key difference between the two is that the process that locks the mutex must be the one to unlock it.

* monolithic kernel

- A large kernel containing virtually the complete operating system, including scheduling, file system, device drivers, and memory management. All the functional component of the kernel have access to all of its internal data structure and routines. Typically, a monolithic kernel is implemented as a single process, with all elements sharing the same address space.

* monitor.

- A programming language construct that encapsulate variables access procedures, an initialization code within an abstract data type. The monitor's variable may only be ~~be~~ accessed via its access procedure and only one process may be ~~be~~ actively accessing the monitor at any time. The access procedure are critical sections. A monitor may have a queue of processes that are waiting to access it.

* mailbox

- A data structure shared among a number of processes that is used as a queue for message. Message are send to the mailbox and retrieve from the mailbox rather than passing directly.

* Locality of reference

→ The tendency of a processor to access the same set of memory location respectively over a short period of time.

* hashing

→ The selection of a 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.

* Gang Scheduling

→ The scheduling of a set of related threads to run on a set of processors at the same time on a one-to-one basis.

* disk cache

→ A buffer usually kept in main memory that functions as a cache of disk blocks between disk memory and the rest of main memory.

* demand paging

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

Assignment : 2

Numericals.

* Banker's Algorithm.

Process	Allocation			max	Available	Need.	(Work) (Max Allocation)
	A	B	C	A B C	A B C	A B C	
P ₀	0	1	0	7 5 3	8 8 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.
	A B C	A B C	A B C	A B C
P ₀	0 1 0	7 5 3	8 8 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

$$\Rightarrow \text{Need} \leq \text{Work} \Rightarrow \text{Work} = \text{Work} + \text{Allocation}$$

$$P_0 \quad 7 \ 4 \ 3 \leq 3 \ 3 \ 2 \quad \text{condition fails}$$

$$P_1 \quad 1 \ 2 \ 2 \leq 3 \ 3 \ 2 \quad \text{condition true}$$

$$\begin{aligned} W &= \text{Work} + \text{Allocation} \\ &= 332 + 200 \\ &= 532 \end{aligned}$$

P₂ 600 ≤ 532 condition false

P₃ 011 ≤ 532 condition true

$$\begin{aligned} W &= \text{work} + \text{allocation} \\ &= 532 + 211 \\ &= 743 \end{aligned}$$

P₄ 431 ≤ 743 condition true

$$\begin{aligned} W &= \text{work} + \text{allocation} \\ &= 743 + 002 \\ &= 745 \end{aligned}$$

P₀ 743 ≤ 745 condition True

$$\begin{aligned} W &= \text{work} + \text{allocation} \\ &= 745 + 010 \\ &= 755 \end{aligned}$$

P₂ 600 ≤ 755 condition True

$$\begin{aligned} W &= \text{work} + \text{allocation} \\ &= 755 + 342 \\ &= 1057 \end{aligned}$$

The safe sequence of the processes are following

$\langle P_1, P_3, P_4, P_0, P_2 \rangle$

* FIFO

→ 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1,
 7, 0, 1
 [3 page frame is available]

Ans:

7 0 1 2 0 3 0 4 2 3 0

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

3 0 3 2 1 2 0 1 7 0 1

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

page fault = 15 , page frame = 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 8 0

7	7	7	2		2		4	4	4	0
0	0	0	0		0		0	0	3	8
1	1	1	1		3		3	2	2	2

3 0 3 2 1 2 0 1 7 0 1

1	1	1
3	0	0
2	2	7

No. of page frame = 3

No. of page fault = 12

* 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

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

3 0 3 2 1 2 0 1 7 0 1

2		7	
0		0	
1		1	

No. of page frame fault : 3
No. of page faults = 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		3	6	6
0		0		0	0	3

Page fault : 6 No. of page frame : 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	0
1	1	1	2	1	4
				2	2

Page fault: 6

No of page frames: 4

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
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R O L L N O : 23

N A M E : Devangi B Pabari

S U B J E C T :Operating System

NO.	TITLE	PAGE NO.	DATE	SIGN
1	Basic salary of a person is input through the keyboard. His dearness allowance is 40% of basic salary and house rent is 20% of basic salary. Write a program to calculate the gross pay.	1	10/12/2020	
2	The distance between two cities is input through the keyboard. (in km). Write a program to convert this distance into metres, feet, inches and centimeters and display the results.	2	10/12/2020	
3	The length and breadth of a rectangle and radius of a circle are entered through the keyboard, calculate the perimeter and area of rectangle and area and circumference of the circle.	3	10/12/2020	
4	If a five digit number is entered through the keyboard, calculate the sum of its digits.	4	10/12/2020	
5	The file /etc/passwd contains info about all users. Write a program which would receive the logname during execution, obtain information about it from the file and display the information on screen in some appropriate format. (Hint : use cut) eg. Logname : , UID : , GID : , Default working directory : , Default working shell :	5	10/12/2020	
6	The script will receive the filename or filename with its full path, the script should obtain information about this file as given by "ls -l" and display it in proper format. eg. Filename : , File access permissions : , Number of links : , Owner of the file : , Group to which belongs : Size of file : , File modification date : , File modification time :	6	10/12/2020	
7	If cost price and selling price of an item are entered through the keyboard, write a program to determine whether the seller has made profit or loss. Also determine how much profit/loss is made.	7	10/12/2020	
8	Check whether the entered no. is odd or even.	8	10/12/2020	
9	Check whether the entered no. is prime or not.	9	10/12/2020	

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10	Check whether the entered year is a leap year or not.	10	10/12/2020	
11	The script receives two file names as arguments, the script must check whether the files are same or not, if they are similar then delete the second file.	11	10/12/2020	
14	Write a shell script to display the date with the format :- 25th October 2005 is a Tuesday.	12	10/12/2020	
15	Write a shell script to display the appropriate message like : Good Morning / Good Afternoon / Good Evening	13	10/12/2020	
16	Write a shell script to display the menu driven interface :- 1) list all files of the current directory 2) print the current directory 3) print the date 4) print the users otherwise display "Invalid Option".	14	10/12/2020	
17	Create a menu driven calculator which asks for two integers and perform basic arithmetic operations.	15	10/12/2020	
18	Find the factorial of any number.	16	10/12/2020	
19	Display the fibonacci series upto some number.	17	10/12/2020	
20	Two numbers are entered through the keyboard, find the power, one number raised to another.	18	10/12/2020	
21	Write a script which has the functionality similar to head and tail commands.	19	10/12/2020	
22	Write a script which reports name and size of all files in a directory. whose sizes exceed 1000. The filenames should be printed in the descending order of their sizes. The total no. of files must be reported.	20	10/12/2020	
24	Print the prime nos. from 1 to 300.	21	10/12/2020	
25	Program must display all the combinations of 1, 2, and 3.	22	10/12/2020	
26	Write a script for renaming each file in the directory such that it will have the current shell PID as an extension. The shell script should ensure that the directories do not get renamed.	23	10/12/2020	
27	A file called wordfile consists of several words. Write a shell script which will receive a list of filenames, the first of which would be wordfile. The shell script should report all occurrences of each word in wordfile in the rest of the files supplied as arguments.	24	10/12/2020	
28	Write a shell script which deletes all the lines containing the word "unix" in the files supplied as arguments to it.	25	10/12/2020	
29	The word "unix" is present in only some of the files supplied as arguments to the shell script. You script should search each	26	10/12/2020	

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	of these files in turn and stop at the first file that it encounters containing the word unix. The filename should be displayed on the screen.		
30	The word "unix" is present in only some of the files supplied as arguments to the shell script. You script should search each of these files in turn and stop at the first file that it encounters containing the word unix. The filename should be displayed on the screen.	27	10/12/2020
31	The script displays a list of all files in the current directory to which you have read, write and execute permissions.	28	10/12/2020
32	The script receives any number of filenames as arguments. It should check whether every argument supplied is a file or directory. If it is a directory it should be reported. If it is a filename then name of the file as well as the number of lines present in it should be reported.	29	10/12/2020
33	A script will receive any number of filenames as arguments. It should check whether such files already exist. If they do, then it should be reported, if not then check if a subdirectory "mydir" exists or not in the current directory, if it doesn't exist then it should be created and in it the files supplied as arguments should be created.	30	10/12/2020
34	Accept the marks of 5 subjects and calculate the percentage and grade.	31	10/12/2020
35	Print armstrog nos. from 1 to 500.	32	10/12/2020
36	Accept the measure (angles) of a triangle and displa the type of triangle. (eg. acute, right, obtuse)	33	10/12/2020
37	Display all the numbers from 1 to 100 which are divisible by 7.	34	10/12/2020
38	Find the largest and smallest of 3 different numbers.	35	10/12/2020
39	Find HCF and LCM of a given no.	36	10/12/2020
40	Display the dates falling on Sundays of the current month.	37	10/12/2020
41	Write a shell script to list the students according to their choice of games ... Eg. Cricket : Aamir Football : Ajay Tennis : Sharukh, Salman	38	10/12/2020
42	Write a shell script to generate summary from the sales.dat file. Sales made by 3 salesman by selling 3 products are entered in a file. Add atleast 10 records. The format is as shown below: Salesman:Product1:Product2:Product3	39	10/12/2020

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Sample data:

Mr. Abhishek Sharma:21:29:12

Mr. Akash Srivastava:11:15:28

Mr. Abhilash Dwivedi:31:04:13

Calculate the followings :

- Total sales of the company
- Highest sold product
- Best salesman (who sold the most)
- Worst salesman (who sold the least)

43	<p>Create a file “medals.dat” which contains the details of medals won by each country in Olympics. The data in the file may be as given below :</p> <p>(Country name is Primary key.)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">Country</td><td style="width: 20%;">Gold</td><td style="width: 20%;">Silver</td><td style="width: 20%;">Bronze</td></tr> </table> <hr style="border-top: 1px dashed #000; margin: 5px 0;"/> <p>India 21 12 15 Pakistan 12 10 08 USA 10 14 19 Srilanka 00 09 07 and so on.....</p> <ul style="list-style-type: none"> • Write a shell script which will ask the user to enter the Country name, further modify the no. of medals for that country. • Delete all the countries who get zero Gold medals. • Calculate the total no. of medals won by each country. • Find the country with highest Gold medals. 	Country	Gold	Silver	Bronze	40	10/12/2020
Country	Gold	Silver	Bronze				

44	<p>Write a shell script to generate summary from a file : “student.dat” with following format :</p> <p>Student_no : student_name : gender : marks1 : marks2 :marks3</p> <p>Each field must be separated by a delimiter ‘-‘</p> <p>Process the following queries:</p> <ul style="list-style-type: none"> • Calculate the total marks of each student • Calculate the percentage of marks for each student • Count the total number of male and female students • Count the total number of students who pass and those who fail. 	41	10/12/2020
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45	<p>A reputed MCA institute of Gujarat has students from various states. A sample file “students.dat” is shown as under :</p>	42	10/12/2020
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State	M	F
Gujarat	18	12
Maharashtra	12	04
M.P.	08	04
U.P.	05	00
Rajasthan	07	00

Total Male candidates are 50 and Female are 20. Write a shell script to generate a Statewise Candidate Distribution Report as under :

STATEWISE CANDIDATES LISTING

%FEMALE	STATE TOTAL	%MALE
30	GUJARAT	36
16	MAHARASHTRA	24

..... and so on.....

46 Write a Shell script to generate summary from a file "books.dat" which contains the following details :

Field	Description
No	Numeric (4) – uniquely identifies each book.
Title	Alphanumeric(30) – title of the book
Author	Character(20) – Author of the book
Publisher	Character(20) – Publisher (PHI , TMH,BPB...)
Edition	Numeric (2)

Sample Data:

**b1001 Programming in Java Balaguruswamy
Second**

**b1002 Computer Networks Tanenbaum Pearson Fifth
b1003 Operating Systems Chaudhari Jaico First**

After creating the file do the followings :

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	<ul style="list-style-type: none"> • Your script must replace all the BPB publisher with TMH. • List the titles with the name ‘Java’. • List the books written ‘Balaguruswamy • List the books which are not the first edition 														
47	<p>Create a file “election.dat” which contains the Election details for a specific city.</p> <table> <thead> <tr> <th>Field</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Idno</td><td>Numeric - Unique</td></tr> <tr> <td>Name</td><td>Character – Voter’s Name</td></tr> <tr> <td>Sex</td><td>Character – M / F</td></tr> <tr> <td>Age</td><td>Numeric</td></tr> <tr> <td>Ward</td><td>Numeric – Ward no. / Division no. of the city.</td></tr> </tbody> </table> <p>Sample data:</p> <p>e101 - abhishek - M - 35 - 44 e102 - ashutosh - M - 97 - 14 e103 - anamika - F - 21 - 50</p> <p>Suppose the same file is to be modified after 4 years. Write a shell script to simulate this process.</p> <p>Your program must update the age of all People (Add 4 years to age). In case if the age exceeds 99 then delete the record from the file, assuming that the person is dead.</p> <p>Display the election.dat and final output of your program.</p>	Field	Description	Idno	Numeric - Unique	Name	Character – Voter’s Name	Sex	Character – M / F	Age	Numeric	Ward	Numeric – Ward no. / Division no. of the city.	44	10/12/2020
Field	Description														
Idno	Numeric - Unique														
Name	Character – Voter’s Name														
Sex	Character – M / F														
Age	Numeric														
Ward	Numeric – Ward no. / Division no. of the city.														
48	<p>In a college, students are allowed to select any one elective subject during his studies. Create two files by entering the data as mentioned below (you may skip the heading line if required) :</p> <p>File : elective.dat</p> <table> <thead> <tr> <th>Code</th><th>Game</th></tr> </thead> <tbody> <tr> <td>101</td><td>AI</td></tr> <tr> <td>102</td><td>Computer Graphics</td></tr> <tr> <td>103</td><td>Parallel Processing</td></tr> </tbody> </table>	Code	Game	101	AI	102	Computer Graphics	103	Parallel Processing	45	10/12/2020				
Code	Game														
101	AI														
102	Computer Graphics														
103	Parallel Processing														

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104 Data Mining

File : students.dat

RollNo. Name Code

1	Sonal	101
2	Madhu	101
3	Mahim	103
4	Esha	104

Write a shell script to list the students according to their choice of electives ...

Eg. AI :- Sonal, Madhu

Computer Graphics: -

Parallel Processing :- Mahim

Data Mining :- Esha

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Create two files: subjects.dat and students.dat containing the subject details and the student details.

Sample data is as shown below:

subjects.dat

Course_id-Semester_id-Subject_id-Subject_name

CS-1-1-FCO

CS-1-2-FOP

CS-1-3-SL

CS-2-1-DS

CS-2-2-DBMS

CS-3-1-OS

CS-3-2-JAVA

faculty.dat

Faculty_id:Semester_id:Subject_id

F1-2-1

F2-3-2

F3-1-3

F1-1-1

Write a shell script to list the faculties and their respective subjects. Sample Output will be :

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	F1 :FCO, DS F2 : JAVA F3 : SL		
50	<p>Create two files employee.dat and departments.dat and add atleast 10 records in the following format :</p> <p>employee.dat</p> <p>emp_id:department_id:birthdate</p> <p>e101:M1:11-01-1960</p> <p>e102:C1:21-03-1973</p> <p>e103:M2:21-03-1973</p> <p>e104:C1:21-03-1973</p> <p>e105:B1:08-10-1965</p> <p>e101:M1:11-11-1964</p> <p>departments.dat</p> <p>departmend_id:department_name</p> <p>B1:Botany</p> <p>C1:Chemistry</p> <p>M1:Mathematics</p> <p>M2:Management</p> <p>Write a shell script to do the followings:</p> <p>1) List all the employee_ids department-wise</p> <p>2) List the employee_ids born after 1970</p> <p>3) List the employee_ids according to birthdate in sorted order</p>	47	10/12/2020

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