

OS Assignment

* Base address

An address that is used as the origin in the calculation of address in the execution of a 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 only takes on only values 0 and 1.
- Binary Semaphore always only one process or thread to have access to a shared critical resource at a time.

* Block

A collection of contiguous records.

that are recorded as a unit
the units are separated
by the interblock gaps.

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

* B-tree

A technique for organizing indices in order to keep access time to a minimum it stores the data keys in a balanced hierarchy that continually and realigns itself as items are inserted and deleted thus all nodes always have a similar 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 located between the Processor and main memory. The Cache acts as buffer for recently used memory locations.

* CPU

→ The part of a Computer that fetches and executes instructions. It consists of an arithmetic and logic unit, a control unit and registers often simply referred to as Processor.

* Cluster.

→ A group of interconnected whole 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.

* Concurrent

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

* Consumable Resources

→ A resource that can be created or destroyed when a resource is acquired by a process. The resource ceases to exist. Examples are interrupts, signals, messages and information.

* 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 by different programs without any 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 some other resource that will not become available because it is being held by another process that is in similar state.
- This state is also known as circular wait since all process are waiting for another.

* Demand Paging

→ the transfer of Page from main memory to Secondary memory at the moment of need

* Device driver.

→ A module that deals directly with the I/O module.

* 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 position by means of address that indicate physical location of data.

* Direct memory access.

→ A form of I/O which is a special module called a data module that controls

Exchange of the data between the main memory and I/O device the Processor sends request for transfer of a block of data. The DMA module is interrupted.

* Disable Interrupt

→ A condition usually created by the operating system during which the Processor will ignore the interrupt request signal of the specified class.

* Disk allocation table

→ A table that indicates which block of Secondary Storage are free and available for allocation of files.

* Distributed os.

→ A common operating system that is shared by a network of computers. The operating system provides support for interprocess communication and the prevention of deadlock.

* Dynamic allocation.

→ Process that assigns here is absolute address to a computer program during execution so that the program may be executed from different area of main storage.

* Enable interrupt.

→ A condition usually created by OS during which the processor will respond to.

interruption Signals of a Application Class.

* External fragmentation

→ Occurs when memory is divided into variable size of Partition Corresponding to the blocks of data assigned to the memory As Segments are moved into and out of the memory gaps will occur between occupied Partitions of the memory.

* file

→ A Set of Related Records Created as Units

* field

→ defined logical data that are Part of Record.

→ An Elementary Record may Contain a date item or



a pointer or a link.

* file allocation table

→ A table that indicates the physical location on secondary storage of the space allocated to a 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.

* file organisation

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

- * first in first out.
 - A queuing technique in which the next item to be retrieved is the item which was first inserted and so on.

- * first come first serve
 - Same as fifo.

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

- The Selection of a storage location for item of data by calculating the address as a function of contents to the data.
- This technique complicates the storage allocation and results in a rapid random interval.

* Hit Ratio

- In a two level memory the fraction of memory access that are found in the faster memory.

* Indexed Access.

- Partitioning to the organization and access of the records of storage structure through a separate index to the location of stored records.



* Indexed file

- > A file in which records are accessed depending to the value of key fields.
- > An index is required that indicates the location of each row on the basis of each key value.

* Indexed Sequential access

- > Pertaining to the organization and accessing of the records of a storage of the record structure through the keys that are stored in the arbitrary Partitioned Sequential file.



- * Induced Sequential files.
 - A file that can in which records are ordered according to the values of key field.
 - The main file is supplemented with an index file that contains a partial list of key values. This index provides lookup facility to quickly reach the desired record.
- * Instruction Cycle.
 - The time Period during which an instruction is fetched and Executed in memory when a Computer is given instructions in the machine language.



* Internal fragmentation.

- Occurs When memory is divided into fixed number of Partitions.
- 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 when the last Partition of data is smaller than the last Partition.

* Interrupt.

- * Suspension of a Process such as the Execution of Computer Programs caused by an Event to the Process and performed in a Such a Way the Process can be Resumed.

* Interrupt handler

→ It is generally part of the operating system when an interrupt occurs the control is transferred into corresponding handler which takes some action.

* Job

→ A set of steps packed into form as a same unit.

* Kernel

→ Portion of operating system that includes most heavily used portions of the software. Generally it is maintained permanently into the device's main memory.

→ The kernel runs in the privileged mode and responds to the most recent calls from device.

* Kernel Mode

→ A Privileged mode of Execution reserved for the kernel of operating System typically kernel mode allows access to regions of main memory that are not available to process executing in less Privileged mode.

→ it also enables execution of certain machine instructions that are restricted to the kernel mode also referred as system mode or kernel mode.

* LIFO

- A queuing 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 other process without doing any useful work.
- This situation is similar to the deadlock of different process where in that also no progress is made, it differs in that neither process is blocked or waiting.

* Logical Address

- A reference to a memory location independent of the current assignment of data to the 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 of Partitions of logical Record may be located in the different Physical record or several record or Parts of logical Records stored as a part of many be located into the one Physical Piece of record.

* Main Memory

→ Memory that is internal to the Computer System is Program that can be loaded into registers for subsequent execution or processing.

* Malicious Software

→ Any software that is designed to cause or harm other people's operating system or to steal any data from them is known as malicious Software.

→ In some cases it spreads itself to the other computers via Email or infected disks types of this includes viruses, trojan horse, worms.



* Memory Cycle time

→ The time it takes to read one word, this is the inverse of the rate which words can be read or written to the memory.

* Memory Partition

→ The Subdivision of storage into independent Sections.

* Micro kernel

→ A Small Privileged operating System Core that Provides Process, Memory management and kernel management Services to Perform Some of the Functions traditionally associated with the operating System Kernel.



* Multi Processing

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

* Multi Programming

→ 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.

* Multi Tasking

→ A mode of operation that provides for concurrent execution for two or more interleaved processes the same as multi programming

* Mutual Exclusion

→ Condition in which there is a set of processes only one of which is able to access a given resource to perform a given function at any time.

* Operating System

→ Software that Controls the Execution of Program and that Provides Services Such as Resource Allocation and 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 Present in the 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 word or byte in memory block of secondary storage.

* Pipes

→ A circular buffer allowing two processes to communicate on the producer consumer model thus it is a fifo written by one process and consumed by another process.

→ In some systems the pipe is generalized to allow any item in the queue for consumption.



* Preemption

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

* Paging

→ The retrieval of pages other than the demanded by a page fault.

→ The hope is that the additional pages will be loaded in the user buffer conserving disk I/O.

* Process

→ A program in execution a process is controlled and scheduled by an operating system.

* Process Control block

→ It is a data structure containing information about the characteristics and the states of the process.

* Process Migration

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

* Process state

→ All the information that the operating system needs to manage a process and that a 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 info of uses in operating system such as the priority of the process and whether the process is waiting for any I/O Event or not.
Same as Execution Context.

* Program Counter (PC)

- Instruction address register.

* Processor

- In a Computer a functional unit that Interacts and Executes information.

→ A Processor consists of atleast an instruction Control Unit and an arithmetic unit.

* Programmed I/O

→ The term of I/O in which the Processor issues an I/O Command to an I/O module and then it must wait for the operation to complete before proceeding any further.

* Real time System

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

* Real time tasks

→ 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 correctly within the 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 registers are used by the CPU for Control Purposes.

* Relative address

→ An address that is calculated as displacement from a base address.

* Remote Procedure call

→ A technique by which two programs on different machines interact using Procedure Call Return Syntax and Semantics. Both Called and Calling Program belong to the if the Partner Program. were running on the same machine.

* Response time

→ In a data system the Elapsed time between the end of transmission of Enquiry message and the beginning of a response messages.



* Round Robin

- > A scheduling algorithm in which the processes are activated in a fixed order that is all process are in circular queue.
- > A process that cannot proceed because it is waiting for an event to occur.

I/O Event

* Scheduling

- > To select jobs or tasks about are to be dispatched in some operating systems other units of work such as input output 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 are disks and tapes.

* Segment

- In Virtual memory a block that has a virtual address
- The blocks of a Program may be of unequal length and may be of even dynamically varying length

* Segmentation

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

* Semaphore

→ An integer value used for signaling among processes. Only three actions must be performed on a semaphore all of which can be atomic.

→ Depending on the exact definition of the semaphore, the decrement operation may result in the blocking of the process also called Counting Semaphores and General Semaphores.

* Sequential file

- A file in which records are ordered according to the values of one or more key fields and processed in some sequence from start of the file.

* Session

- A collection of one or more processes that represent a single interaction user application or operating system function.
- All keyboard and mouse input is directed to foreground session and then it is displayed on the screen.

* Shell

- The portion of operating system that interprets interactive user commands

→ it functions 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 top.
- This means that the next item is appended on the top of the list. That is the next item appended to the list is put on the top.
- 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 processes are always given preference.

* Strong Semaphore

- A semaphore in which all processes waiting on the same semaphore are queued and will be eventually processed in the same order as they are executed the FIFO operations.

* Swapping

- A process that changes the contents of an area of main storage with the contents of area in secondary memory.

Numericals

| Process | Allocation | | | Max Available | | |
|----------------|------------|---|---|---------------|---|---|
| P ₀ | A | B | C | A | B | C |
| P ₁ | 0 | 1 | 0 | 7 | 5 | 3 |
| P ₂ | 2 | 0 | 0 | 3 | 2 | 2 |
| P ₃ | 3 | 0 | 2 | 9 | 0 | 2 |
| P ₄ | 2 | 1 | 1 | 2 | 2 | 2 |
| | 0 | 0 | 2 | 4 | 3 | 3 |

Need table

| | A | B | C |
|----------------|---|---|---|
| P ₀ | 7 | 4 | 3 |
| P ₁ | 1 | 2 | 2 |
| P ₂ | 6 | 0 | 0 |
| P ₃ | 0 | 1 | 1 |
| P ₄ | 4 | 3 | 1 |

P₀ 743 \leq 332 \leftarrow Condition fail.

P₁ 122 \leq 332 \leftarrow Condition true

$$W = 332 + 200 \\ = 532.$$

P₂ Need \leq work \leftarrow Condition false

P₃ Need \leq work \leftarrow tree

$$615 \leq 532 \\ = 532 + 211$$

$$= 743$$

P₄ Need < Work W = 7h3 + 002

$$431 < 7h3 \quad = 745$$

P₀ Need < Work

$$7h3 < 745 \quad W = 7h5 + 010 \\ = 755$$

P₂ Need < work W = 755 + 302

$$600 < 755 \quad = 1057$$

Safe Sequence = $\langle P_1, P_3, P_4, P_0, P_2 \rangle$

* Fifo

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

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 0 |
| 7 | 7 | 7 | 2 | | 2 | 2 | 4 | 4 | 4 | | | |
| 0 | 0 | 0 | | 3 | 3 | 3 | 2 | 2 | | | | |
| 1 | 1 | | | 1 | 0 | 0 | 0 | 3 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 0 | 1 | 7 | 0 | (|
| 0 | 0 | | 7 | 7 | 7 | |
| 1 |) | | 1 | 0 | 0 | |
| 3 | 2 | | 2 | 2 | 1 | |

Page fault = 15

No. of frames = 3

* LRU

7, 0, 1, 2, 0, 3, 0, h, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 0 | 1 | 2 | 0 | 3 | 0 | h | 2 | 3 | 0 | 3 | 0 | 3 | 2 |
| 7 | 7 | 7 | 2 | | 2 | | 4 | h | 9 | 0 | | | | |
| 0 | 0 | 0 | | | 0 | | 0 | 0 | 3 | 3 | | | | 3 |
| | | | 1 | 1 | 3 | | 3 | 2 | 2 | 2 | | | | 2 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 0 | 1 | 7 | 0 | 1 |
| 1 | | 1 | | | |
| 0 | | 0 | | | |
| 2 | | 7 | | | |

No. of frames = 3

Page fault = 12

* Optimal

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 1 |
| 7 | 7 | 7 | 2 | | 2 | | 2 | | 2 | | 2 | | 2 |
| 0 | 0 | - | | 0 | | 4 | | 0 | | 0 | | 0 | |
| | 1 | 1 | | 3 | | 3 | | 3 | | 3 | | 1 | |

2 0 1 7 0 1
 7
 0
 1

No of 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