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C0MP 419E

MULTIMEDIA TECHNOLOGIES

INDIVIDUAL CAT ASSIGNMENT

a) Explain THREE functions of a multimedia operating system (3marks)

**File Management**

Is one of the most visible services of an operating system. Computers can store information in several

different physical forms.

For convenient use of the computer system, the operating system provides a uniform logical view of

information storage. The operating system abstracts from the physical properties of its storage devices

to define a logical storage unit, the file. Files are mapped, by the operating system, into physical devices.

A file is a collection of related information defined by its creator. Commonly, files represent programs

and data. Data files may be numeric, alphabetic or alphanumeric. In general, a file is a sequence of bits,

bytes, lines or records whose meaning is defined by its creator and user. It is a very general concept

The operating system implements the abstract concept of the file by managing mass storage device,

such a s types and disks. Files are normally organized into directories to ease their use.

**Process Management**

A process is the unit of work in a system. Such a system consists of a collection of processes, some of

which are operating system processes, those that execute system code, and the rest being user

processes, those that execute user code.

In general, a process needs certain resources such as CPU time, memory, files, I/O devices etc. to

accomplish its task. These resources are given to the process when it is created. In addition to the

various physical and logical resources that a process obtains when it is create, some initialization data may be passed along.

**Memory Management**

Memory is central to the operation of a modern computer system. Memory is a large array of words or bytes, each with its own address. Interaction is achieved through a sequence of reads or writes of

specific memory address. The CPU fetches from and stores in memory. In order for a program to be

executed it must be mapped to absolute addresses and loaded into memory. As the program executes,

it accesses program instructions and data from memory space is declared available and the next

program may be loaded and executed.

In order to improve both the utilization of CPU and the speed of the computer’s response to its users, several processes must be kept in memory. There are many different algorithms depends on the

particular situation. Selection of a memory management scheme from a specific system depends upon many factors, but especially upon the hardware design of the system. Each algorithm requires its own.

hardware support.

Discuss THREE protocol layers of multimedia technology networks (3marks)

**Transmission Control Protocol (TCP)**

Early implementations of video conferencing applications were implemented on top of the TCP

protocol. TCP provides a reliable, serial communication path, or virtual circuit, between processes

exchanging a full-duplex stream of bytes. Each process is assumed to reside in an internet host that is

identified by an IP address. Each process has a number of logical, full-duplex ports through which it can

set up and use as full-duplex TCP connections.

**Real-time Transport Protocol (RTP)**

RTP is an end-to-end protocol providing network transport function suitable for applications

transmitting real-time data, such as audio, video or simulation data over multicast or unicast network

services. It is specified and still augmented by the Audio/Video Transport Working Group. RTP is

primarily designed to satisfy the needs of multi-party multimedia conferences, but it is not limited to

that particular application.

**User Datagram Protocol (UDP)**

UDP is a simple extension to the Internet network protocol IP that supports multiplexing of datagrams

exchanged between pairs of Internet hosts. It offers only multiplexing and check summing, nothing else.

Higher-level protocols using UDP must provide their own retransmission, packetization, reassembly,

flow control, congestion avoidance, etc.

c)Briefly explain TWO conflicting goals that must be considered during the scheduling of multimedia tasks (2marks)

An uncritical process should not suffer from starvation because time critical processes are executed.

Multimedia applications rely as much on text and graphics as on audio and view. Therefore, not all

resources should be occupied by the time critical processes and their management processes.

Time critical process must never be subject to priority inversion. The scheduler must ensure that any

priority inversion (also between time-critical processes with different priorities) is avoided or reduced as

much as possible.

d)Discuss FIVE major functions of multimedia DBMS(5marks)

**Version Control**

Organization and management of different versions of persistent objects which might be required by

applications

**Integrity control**

Ensures consistency of the data base state from one transaction to another through constraints imposed

on transaction

**Integration**

Ensures that data items need not be duplicated during different program invocations requiring the data.

**Data Independence**

Separation of the database and the management functions from the application programs

**Concurrency control**

Ensures multimedia database consistency through rules, which usually impose some form of execution

order on concurrent transactions.

d)Discuss the FOUR basic stages of multimedia project development (4marks)

**Planning and Costing**

The needs of a project are analyzed by outlining its messages and objectives. A plan that outlines the

required multimedia expertise is prepared. In this stage, a multimedia project is brought up after

thorough analysis is done. Planning on what music, video and writing skills which are a requirement are

done at this stage.

A graphical template, structure, and navigational system are developed and a time estimate and a

budget is prepared. A short prototype or proof-of-concept is prepared

**Design and Production**

The planned tasks are performed to create a finished product. The product is revised, based on the

continuous feedback received from the client.

In this stage, various sub-stages are to be carried out:

 Data gathering

 Navigation map structure design

 Media content design

 Interface designing

 Storyboarding

 Integration

**Testing**

The program is tested t ensure that it meets the objectives of the project, works on the proposed

delivery platforms and meets the client requirements

This stage ensures that the product is free from bugs. It also ensures that the application meets the

objectives of the project.

**Delivery**

Here the final project is packaged and delivered to the end user.

This stage has several steps such as:

 Implementation

 Maintenance

 Shipping and marketing

e) Explain FOUR characteristics of a real time system (4marks)

**Time Constraint**

Timing constraints decides the total correctness of the result in real-time systems. The correctness of

results I real-time system depends mostly on how the result should be obtained within the time

constraint.

**Correctness**

The correctness of the computations not only depend upon the logical correctness of the computation

but, also upon the time at which the result is produced. If the timing constraints of the system are not

me, system failure is said to have occurred

**Embedded**

These are integrated systems which are formed by the combination of computer hardware and software

for a specific function. Real time systems are embedded for a specific function.

**Concurrency**

It refers to the execution of multiple instruction sequences at the same time. It occurs in an operating

system when multiple process threads are executing concurrently. There are several different tasks

going on within where it responds accordingly to every task. This makes real-time systems concurrent.

Discuss FOUR states of multimedia process management (4marks)

i)In the initial state, no process is assigned to the program. The process is in the idle state.

ii If a process is waiting for an event, i.e., the process lacks one of the necessary resources for

processing, it is in the blocked state.

iii) If all necessary resources are assigned to the process, it is ready to run. The process only needs the

processor for the execution of the program.

iv) A process is running as long as the system processor is assigned to it.

f) Discuss FIVE Disk scheduling algorithms in multimedia file system (5marks)

**CSCAN**

In SCAN algorithm, the disk arm again scans the path that has been scanned, after reversing its direction.

So, it may be possible that too many requests are waiting at the other end or there may be zero or few

requests pending at the scanned area.

Algorithm:

1. Let request array represents an array storing indexes of tracks that have been requested in

ascending order of their time of arrival. ‘head’ is the position of disk head

2. The head services only in the right direction from 0 to size of the disk

3. While moving in the left direction do not service any of the tracks

4. When we reach at the beginning (left end) reverse the direction

5. While moving in the right direction it services all tracks one by one

6. While moving in right direction calculate the absolute distance of the track from the head

7. Increment the total seek count with this distance

8. Currently serviced track position now becomes the new head position

9. Go to step 6 until we reach at right end of the disk

10. If we reach at the right end of the disk, reverse the direction and go to step 3 until all tracks in

request array has not been serviced.

**LOOK**

This is an advanced version of SCAN which gives slightly better seek time than any other algorithm in the

hierarchy. The LOOK algorithm services request similarly as SCAN algorithm meanwhile it also “looks”

ahead as if there are more tracs that are needed to be serviced in the same direction. If there are no

pending requests in the moving direction the head reverses the direction and start servicing requests in

the opposite direction.

Algorithm:

1. Let request array represents an array storing indexes of tracks that have been requested in

ascending order of their time of arrival. ‘head’ is the position of disk head

2. The initial direction in which head is moving is given and it services in the same direction

3. The head services all the requests one by one in the direction head is moving

4. The head continues to move in the same direction until all the request in this direction are not

finished

5. While moving in this direction calculate the absolute distance of the track from the head

6. Increment the total seek count with this distance

7. Currently serviced track position now becomes the new head position

8. Go to step 5 until we reach at last request in this direction

9. If we reach where no requests are needed to be serviced in this direction reverse the direction

and go to step 3 until all tracks in request array have not been serviced.

**Shortest Seek Time First (SSTF)**

This algorithm chooses the next request to service by selecting the pending request that will incur the

smallest seek delay.

Selects the request with the minimum seek time from the current head position. Also called Shortest

Seek Distance First (SSDF) – it is easier to compute distances.

It is biased in favor of the middle cylinders request. SSTF scheduling is a form of SJF scheduling and may

cause starvation of some requests.

Algorithm:

1. Let request array represents an array storing indexes of tracks that have been requested “head”

is the position of disk head

2. Find the positive distance of all tracks in the request array from head

3. Find a track from requested array which has not been accessed/serviced yet and has minimum

distance from head

4. Increment the total seek count with this distance

5. Currently serviced track position now becomes the new head position

6. Go to step 2 until all tracks in request array have not been serviced

**First Come First Serve (FCFS)**

Handles I/O requests sequentially in the order they arrive in the disk queue. It is fair to all process and

approaches random scheduling performance fi there are many processes or requests.

Algorithm:

1. Let request array represents an array storing indexes of tracks that have been requested in

ascending order of their time of arrival. ‘head’ is the position of disk head

2. Let us one by one take the tracks in default order and calculate the absolute distance of the

track from the head

3. Increment the total seek count with this distance

4. Currently serviced track position now becomes the new head position.

5. Go to step 2 until all tracks in request array have not been serviced

**SCAN**

In SCAN algorithm the disk arm moves into a particular direction and services the requests coming in its

path and after reaching the end of disk, it reverses its direction and again services the request arriving in

its path. This algorithm works as an elevator and hence also known as elevator algorithm. As a result,

the requests at the midrange are serviced more and those arriving behind the disk arm will have to wait.

Algorithm:

1. Let request array represents any array storing indexes of tracks that have been requested in

ascending order of their time of arrival. ‘head’ is the position of disk head

2. Let direction represent whether the head is moving towards left or right

3. In the direction in which head is moving service all tracks one by one

4. Calculate the absolute distance of the track from the head

5. Increment the total seek count with this distance

6. Currently serviced track position now becomes the new head position

7. Go to step 3 until we reach at one of the ends of the disk

8. If we reach at the end of the disk, reverse the direction and go to step 2 until all tracks in

request array has not been serviced.