

DISTRIBUTED MULTIMEDIA & DATABASE SYSTEM

① Distributed Database Management System (DDBMS) -

A distributed DDBMS is a centralized application that manages a distributed database as if it were all stored on the same computer. The DDBMS synchronizes all the data periodically, and in cases where multiple users must access the same data, ensures that updates and deletes performed on the data at one location will be automatically reflected in the data stored elsewhere.

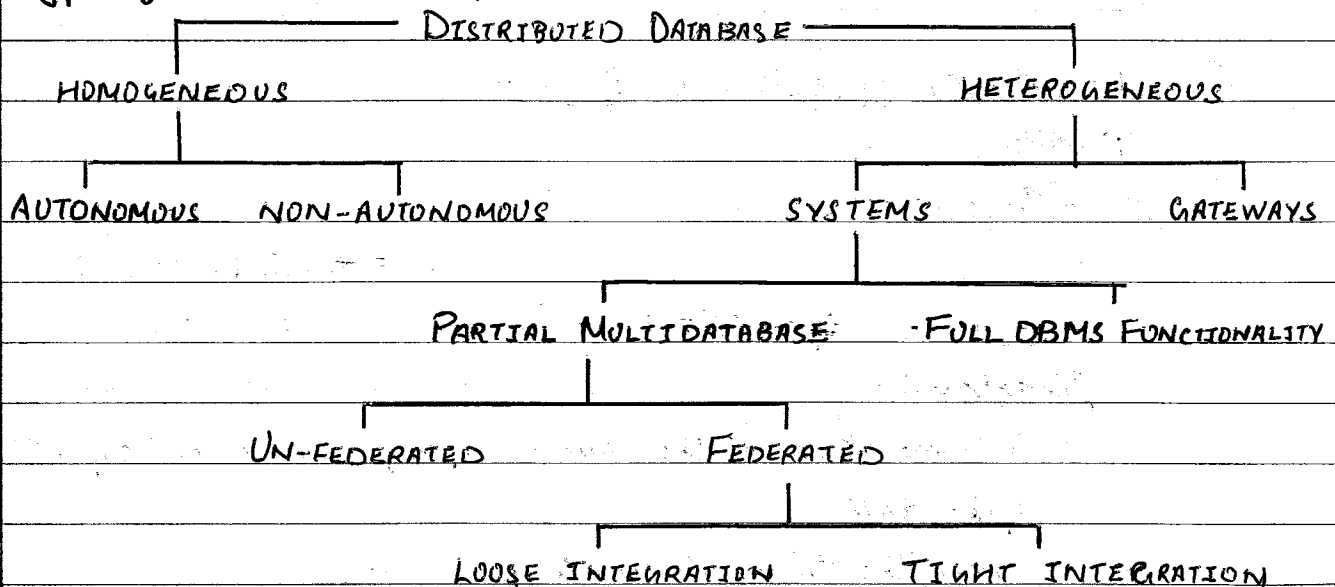
Advantages of DDBMS -

• Showing and availability of data, reliability and fast query processing

Disadvantages of DDBMS -

• Great potentiality of bugs, high software development cost and increased processing overheads.

② Types of distributed database -



→ Homogeneous - The same DBMS ~~used~~ is used at each node.

- Autonomous - Each DBMS works independently, forming message back and forth to share data updates.

- Non-Autonomous - A central, or master, DBMS coordinates database access and update across the nodes.



- Heterogeneous - Potentially different DBMS's are used at each node
 - Gateways - Simple paths are created to other databases, without the benefits of one logical database.
 - Systems - supports some or all the functionality of one logical database
 - Full DBMS functionality - supports all of the functionality of distributed database.
 - Partial-Multidatabases - supports some features of a distributed database
 - Unfederated - Requires all access to go through a central coordinating module.
 - Federated - Supports local databases for unique data requests.
 - Loose Integration - Many schemas exist, for each local database, and each local DBMS must communicate with all local schemas.
 - Tight Integration - One global ~~the~~ schema exists that defines all the data across all local databases.

DISTRIBUTED MULTIMEDIA -

① Characteristics of Multimedia Data -

(1) Continuous -

- Refers to the user's view of the data.
- Video: a image array is replaced 25 times per second.
- Audio: the of amplitude value is replaced 8000 times per second.

(2) Time-based -

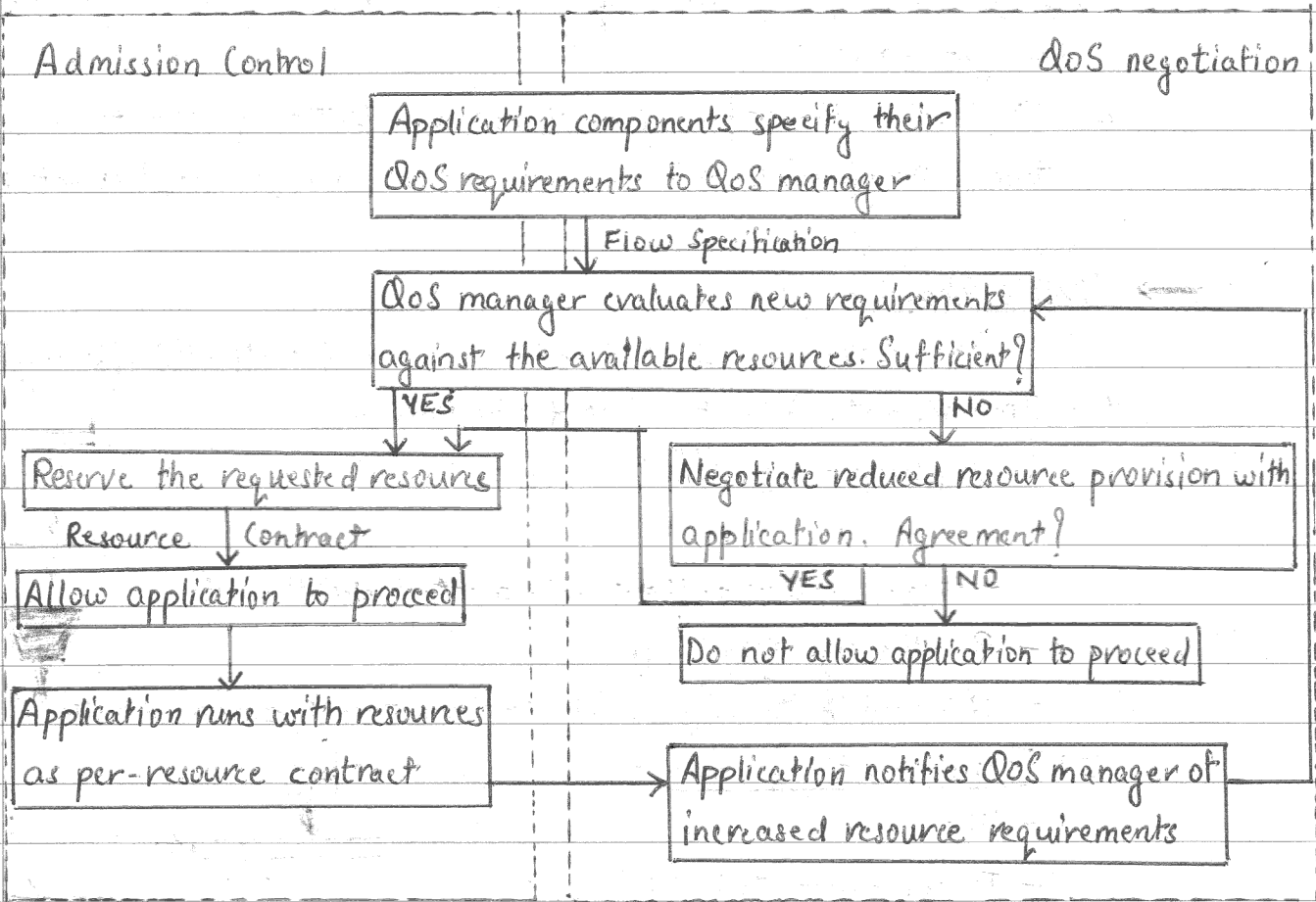
- The time at which the values are played or recorded after the validity of the data.
- Hence, the timing should be preserved.

② Quality of service management -

The management and allocation of resources to provide such guarantees is referred to as quality of service management.

If there is a system component responsible for the allocation and scheduling of these resources. That component is referred to as the quality of service (QoS) manager.

The QoS manager's two main subtasks are quality of service negotiation and admission control.



QoS MANAGER'S TASK

→ Quality of service negotiation -

To negotiate QoS between an application and its underlying system, the application must specify its QoS requirements to the QoS manager. This is done by the transmission of a set of parameters. They are -

- (1) Bandwidth - The rate at which a multimedia stream flows.
- (2) latency - The time required for an individual data element to move through a stream from the source to the destination.

Jitter is the first derivative of the latency.

- (3) loss rate - Data loss due to unmet resource requirements, or a rate of data loss that can be accepted.

→ Resource requirement specification

→ Use of Usage of resource requirements specification -

- (1) To describe the characteristics of a multimedia stream in a particular environment. Eg - video conference (Bandwidth \rightarrow 1.5 Mbps, delay \rightarrow 150ms, loss rate \rightarrow 1%)
- (2) To describe the capabilities of resources to transport a stream. Eg - a network may provide \rightarrow Bandwidth: 64Kbps, delay: 10ms, loss rate: 1/1000.

→ Traffic Shaping -

It is a term used to describe the use of output buffering to smooth the flow of data elements. Two algorithms -

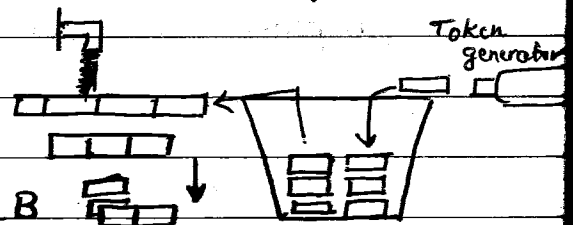
(1) leaky bucket algorithm -

- Completely eliminate burst
- A stream will never flow with a rate higher than R
- B is the size of the buffer
- B bound the time for which an element will remain in buffer



(2) Token bucket algorithm -

- Allow larger burst
- Tokens is generated at fixed rate of R
- the tokens are collected in a bucket of size B
- Data of size S can be sent only if at least S tokens are in the bucket
- Ensure that over any interval t , the amount of data is not larger than $Rt + B$



→ Flow specification - A collection of QoS parameters

→ RFC 1363 -

- (1) Bandwidth - Maximum transmission unit and maximum transmission rate.
Token bucket size & rate determines the burstiness of the stream.
- (2) Delay - Minimum delay that an application can notice and the maximum jitter it can accept.
- (3) loss rate - Total number acceptable no. of losses over a certain interval.
Maximum no. of consecutive losses.



→ The RFC 1363 flow specification -

	Protocol Version
BANDWIDTH:	Maximum transmission unit
	Token bucket rate
	Token bucket size
DELAY:	Maximum transmission rate
	Minimum delay noticed
LOSS:	Maximum delay variation
	Loss sensibility
	Burst Loss sensibility
	Loss interval
	Quality of service guarantee

→ Admission Control -

It regulates access to resources to avoid resource overhead and to protect resources from requests that they cannot fulfil.

Bandwidth reservation - Reserve some portion of resource bandwidth exclusively

Statistical multiplexing - Reserve minimum or average bandwidth

- Handles burst that cause some service drop level occasionally
- ~~the~~ Hypothesis → a large number of streams that aggregate bandwidth required ~~elements~~ remains nearly constant regardless of the bandwidth of individual streams.

CASE STUDY OF DISTRIBUTED SYSTEM -

- ① Amoeba
- ② Mach
- ③ Chorus