

**MULTIMEDIA ARCHITECTURE**

# MULTIMEDIA SYSTEM ARCHITECTURE

Multimedia encompasses large variety of technologies and integration of multiple architectures

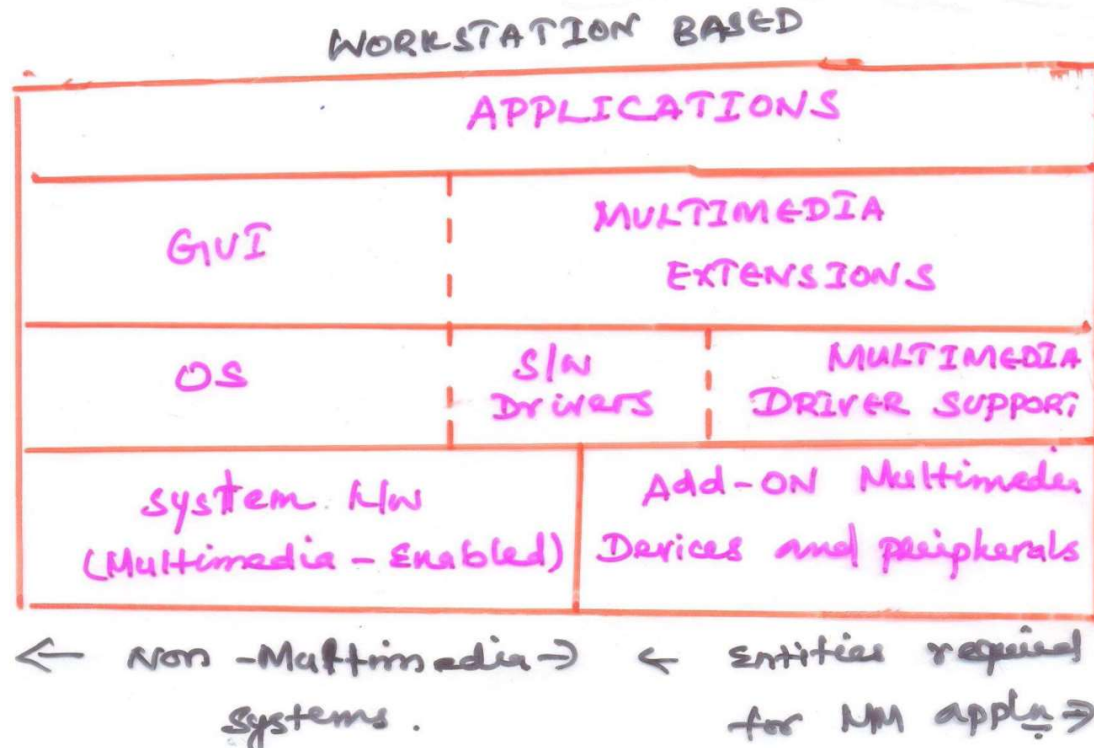
Multimedia systems integrate with standard user interface systems  
Microsoft windows, X windows or Presentation manager

System can operate **with or without special hardware** for multimedia

Hardware interfaces are needed for video animation and compression boards

Standard **device independents APIs and file formats** allow a wide range of applications published by various developers to publish applications.

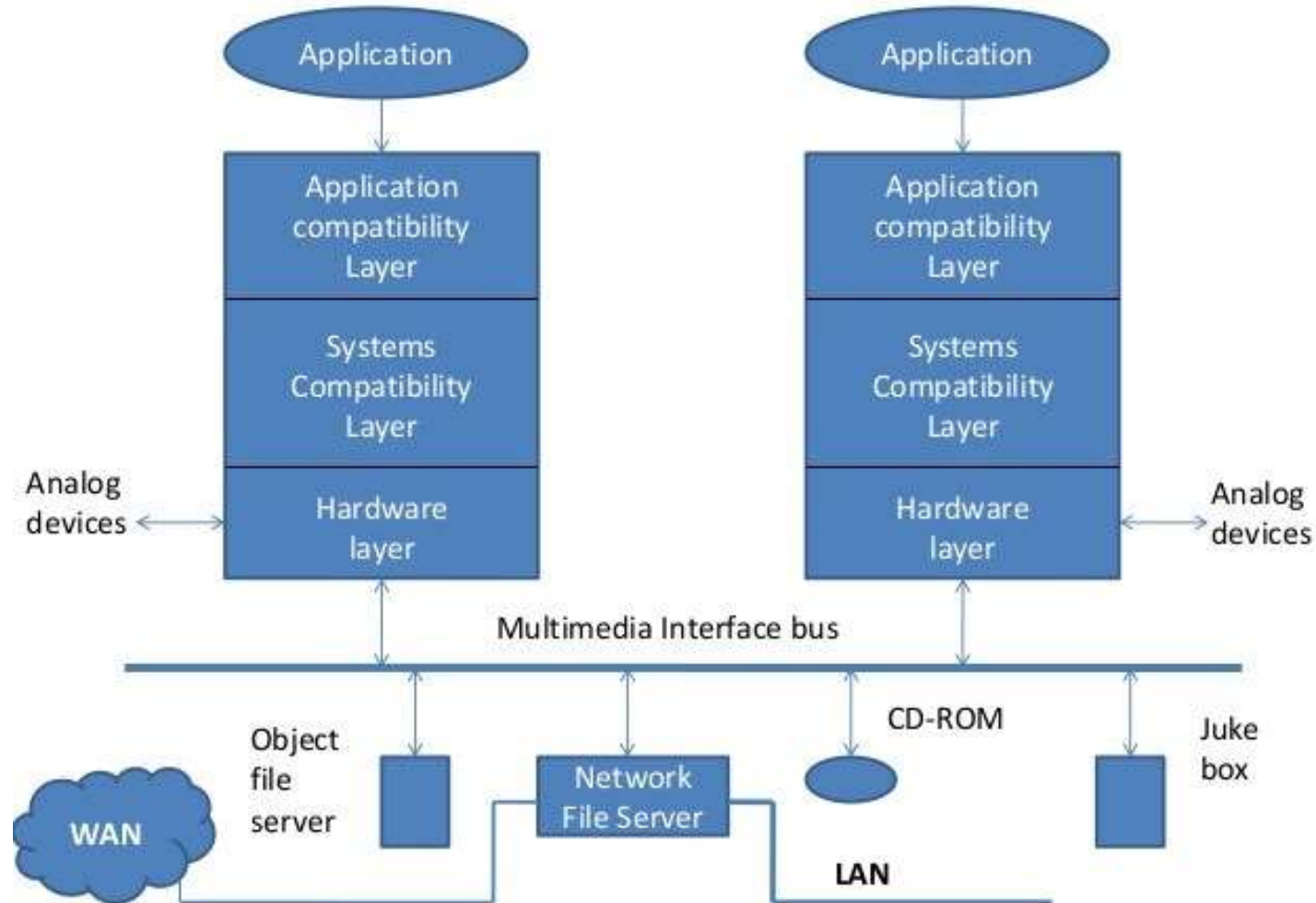
# WORKSTATION BASED ARCHITECTURE



- RHS of the figure represents new architectural entities required for supporting multimedia applications.
- The add-on multimedia devices and peripherals includes scanners, video cameras and sound equipments along with device controllers and encoding hardware
- Software device driver: interfaces application to the device.
- GUI designed for windows require control extensions to support full motion video

# MULTIMEDIA ARCHITECTURE BASED ON INTERFACE BUS

Fig: Multilevel architecture based on interface bus



# MULTIMEDIA ARCHITECTURE BASED ON INTERFACE BUS

Interactive Multimedia Association (IMA ) has a task group that defines the architectural framework for multimedia.

The task group has two areas of concentration:

- Desktops
- Servers

Desktop focus is to define the interchange formats that allow multimedia objects to be displayed on any workstation or PCs

Server focus is for defining the class libraries for multimedia objects that enables distributed multimedia applications across multivendor platforms

Architecture of IMA is based on **defining interfaces** to a multimedia interface bus.

Interface bus would be **the interface between systems and multimedia sources** providing streaming I/O services, including filters and translators.

# NETWORK ARCHITECTURE FOR MULTIMEDIA SYSTEMS

Multimedia systems have special networking requirements because of

- Large volume of data such as images and video messages

Increasing demands on the network, requirements of different applications and need to optimize network resource leads to task based approach in networking.

## Task Based Multi-level Networking

Ethernet and Token ring (broadcast networks) – uniform solution for all tasks.

Emergence of Groupware technologies - customizing the network to a task

Tasks can be broken down into following types based on data volume, source and speed:

- Data transfer for text
- Data transfer for images
- Data transfer for audio and video clips
- Data duplication to user workstations
- Data replication among servers

# NETWORK ARCHITECTURE FOR MULTIMEDIA SYSTEMS

## Text Transfer:

- Least demanding among various transfer types
- Volumes are smaller
- Small and potentially low cost network service can provide adequate performance of text transfers.

## . Image Transfer:

- More demanding due to high volume of data
- A black and white image even after compression is very large.
- Gray scale image after compression is also very large.
- TCP/IP with ethernet configuration is found suitable

# NETWORK ARCHITECTURE FOR MULTIMEDIA SYSTEMS

## Audio & video clips:

- More intense than imaging because of the third dimension- “time”
- Momentary pause has to be taken care
- A 10-Mbits/sec network was used to stream the data
- Requires more expensive components both at workstations and at servers
- Distribute the network bandwidth for more demanding applications - this approach is called multilevel networking.



# NETWORK ARCHITECTURE FOR MULTIMEDIA SYSTEMS

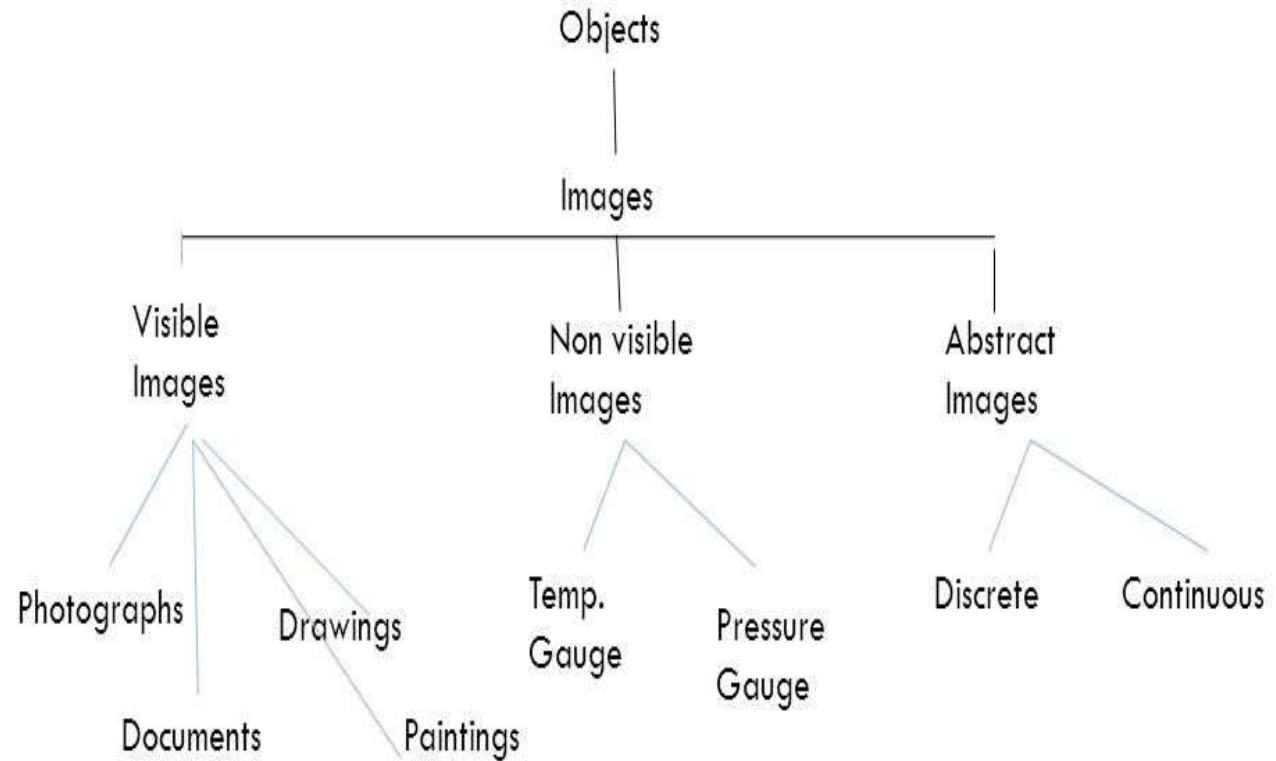
## Duplication

- Duplication – process of duplicating an object that the user can manipulate
- This is based on data transfers between servers within a network
- Imaging objects are duplicated on the host or at workstations for short duration while the user works with a specific document
- The object is discarded after use. No synchronization between source and duplication
- Disadvantage as image/object keeps changing

## High speed server to server:

- it can achieved by the process of replication.
- Replication is defined as the process of maintaining two or more copies of the same object in a network
- Periodically resynchronize to provide faster and more reliable access to data.

# DEFINING OBJECTS FOR MULTIMEDIA SYSTEMS



## Basic objects

- Text
- Images
  - Visible
  - Non-visible
  - Abstract
- Audio and voice
- Full motion and Live video

# DEFINING OBJECTS FOR MULTIMEDIA SYSTEMS

Visible images - drawings (blueprints, engg drawings, town layouts), documents (scanned or images), paintings (scanned or created using paint application), photos, still frames using video camera

Compression information should also be stored- needed for decompression

Information about resolution, orientation of image is also stored

Non-visible images are those that are not stored as images but as displayed as images – temp, pressure gauges and other metering displays

Abstract images – computer generated images based on some arithmetic calculations – eg: fractals

# MULTIMEDIA DATA INTERFACE STANDARDS

Earliest and simplest video processing standards used were:

- **Intel's DVI** (Digital Video Interface)
  - Processor-independent specification for video interface
- **Apple's Quicktime**
  - Designed by Apple computers, to support multimedia applications
  - Capable of handling various formats of digital videos, pictures, sounds, panoramic images.
  - Video file formats - QuickTime movie (mov), MPEG-2,4 , AVI, 3GPP
  - Audio file formats - iTunes audio, MP3, WAV, AMR.

## **Microsoft AVI** (Audio Video Interleave)

- Offers low-cost, low-resolution video processing
- Suitable for average desktop users

# MULTIMEDIA DATA INTERFACE STANDARDS

Device independent Bitmap (DIB) – bitmap, color and color palette info

RIFF Device independent Bitmap (RDIB) – Resources Interchange File Format(RIFF) – standard in Windows – more complex bitmaps than DIB

Musical Instrument Digital Interface(MIDI) – interace standard between computer and musical intrument

RIFF Musical Instrument Digital Interface – MIDI within RIFF envelope – more complex

Palette Rich Format (PAL) – palette of 1 to 256 colors (RGB values)

Rich Text Format (RTF) – embedding graphics and other file formats within a document

Waveform Audio File Format (WAVE) – digital file representation of digital audio

# MULTIMEDIA DATA INTERFACE STANDARDS

Windows Metafile Format (WMF) – vector graphic format in Windows

Multimedia Movie Format (MMM) – used for digital video animation

Apple's Movie Format - standard for file exchange by Quicktime enabled systems

Digital Video Command set (DVCS) – digital video commands simulating VCR controls

Digital video Media Control Interface (DV-MCI) – Microsoft high level control interface for VCR controls

Vendor Independent Messaging (VIM) – developed by vendors for cross-product messages

Apple's Audio Interchange File Format - compressed audio and voice data

SDTS GIS standard – Spatial Data Transfer Standard – for geographic data