

MULTIMEDIA DATA INTERFACE STANDARDS

File Formats for Multimedia Systems:

- (i) **Device-independent Bitmap (DIB):** This file format contains bit map, color, and color palette information.
- (ii) **RIFF device Independent Bitmap (RDIB):** Resource Interchange File Format (RIFF) is the standard file format defined for Microsoft Windows and OS/2. It allows a more complex set of bit maps than can be handled by DIB.
- (iii) **Musical Instrument Digital interface (MIDI):** This is the interface standard for file transfer between a computer and a musical instrument such as a digital piano. It is also, used for full-motion video and voice-mail messaging systems. It has the advantage of ready availability of MIDI device controller boards for personal computers.

RIFF Musical Instrument Digital Interface

A MIDI format within a RIFF envelope provides a more complex interface.

Palette File Format (PAL) An interface that allows defining a palette of 1 to 256 colours in a representation as RGB values.

Rich Text Format (RTF) This file format allows embedding graphics and other file formats within a document. This format is used by products such as Lotus Notes. This format is also the basis for the use of OLE.

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

Windows Metafile Format (WMF) This is a vector graphic format used by Microsoft Windows as an interchange format.

Multimedia Movie Format (MMM) This is a format used for digital video animation.

Apple's Movie Format This format was defined as the standard for file exchange by Quick Time enabled systems.

Digital Video Command Set (DVCS) This is the set of digital video commands simulating VCR controls.

Digital Video Media Control Interface Microsoft's high level control interface for VCR controls, including play, rewind, record and so on.

Vendor - Independent Messaging (VIM) Developed by a consortium of Vendors providing a standardized format for cross-product messages.

Apple's Audio Interchange File Format Apple's standard file format for compressed audio and voice data.

SDTS GIS Standard The Spatial Data Transfer Standard (SDTS) is designed to provide a common storage format for geographic and cartographic data.

VIDEO PROCESSING STANDARDS

INTELS DVI

DVI is an acronym of Digital Video Interface.

DVI standard is to provide a processor independent specification for a video interface. That video interface should accommodate most compression algorithms for fast multimedia displays. An example of custom-designed chip which supports DVI is Intel's i750 B. This chip is designed for enhancing low-end, software based PC video.

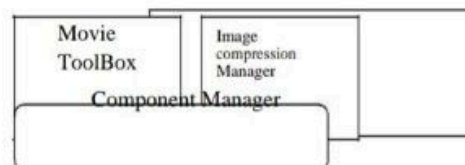
Advantages of the DVI Chip

- (i) It can operate software video processing real time.
 - (ii) It can share the processing with the host CPU.
 - (iii) It can handle additional vector-quantization-type algorithms in conjunction with host processing.
- DVI silicon chip relies on a programmable video processor. It gives potential to DVI chips to run a range of compression algorithms.

APPLE QUICK TIME

Quick Time standard is developed by Apple Computer. It is designed to Support multimedia applications. It is integrated with the operating system. Quick time refers to both the extensions to the Mac Operating system and to the compression/decompression functionality Of the environment. Quick Time is designed to be the graphics standard for timebased graphic data types.

Quick Time's definition has been extended to include (i) System Software, (ii) File Formats, (iii) Compression! decompression algorithms, (iv) Human Interface Standards. Figure Shows the components in the Quick Time Architecture.



Quick Time adjust automatically to the hardware being used by the user. MPEG is another competing standard which is comparatively higher-end, hardware-assisted standard. It can produce better resolutions at faster rates.

MICROSOFT AVI

A VI is an acronym for Audio Video Interleave Standard. It is similar to Apple's Quick Time. It offers low-cost, low-resolution video processing for the average desktop user. It is a layered product. A VI is scalable. It allows users to set parameter such as window size, frame rate, quality and compression algorithm through a number of dialog boxes. AVI-compatible hardware allows enhancing performance through hardware-accelerated compression algorithms such as DVI and MPEG. A VI supports several compression algorithms

Multimedia Databases

Images, sounds and movies can be stored, retrieved and played by many databases. In future, multimedia databases will become a main source of interaction between users and multimedia elements.

Multimedia storage and retrieval Multimedia storage is characterized by a number of considerations. They are:

- (i) massive storage volumes
- (ii) large object sizes
- (iii) multiple related objects
- (iv) temporal requirements for retrieval

Massive Data Volumes

A single multimedia document may be a combination of different media. Hence indexing of documents, films and tapes is more complex. Locating massive data volumes requires searching through massive storage files. Locating and indexing systems can be understood only by a few key staff personnel. Hence it requires a major organizational effort to ensure that they are returned in proper sequence to their original storage location.

Storage technologies

There are two major mass storage technologies used currently for storage of multimedia documents.

- (i) Optical disk storage systems.
- (ii) High-speed magnetic storage.

Advantages of Optical disk storage systems:

- (i) Managing a few optical disk platters in a juke box is much simpler than managing a large magnetic disk farm.
- (ii) Optical disk storage is excellent storage system for off line archival of old and infrequently referenced documents for significant periods of time.

Multimedia object storage

Multimedia object storage in an optical medium serves its original purpose, only if it can be located fast and automatically. A key issue here is random keyed Access to various components of hypermedia database record. Optical media provides very dense storage. Speed of retrieval is another consideration.

Retrieval speed is a direct result of the storage latency, size of the data relative to display resolution, transmission media and speed, and decompression efficiency. Indexing is important for fast retrieval of information. Indexing can be at multiple levels.

Multimedia document retrieval

The simplest form of identifying a multimedia document is by storage platter identification and its relative position on the platter (file number). These objects can then be grouped using a database in folders (replicating the concept of paper storage in file folders) or within complex objects representing hypermedia documents.

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The capability to access objects using identifiers stored in a database requires capability in the database to perform the required multimedia object directory functions. Another important application for sound and full motion video is the ability to clip parts of it and combine them with another set.

Indexing of sound and full-motion video is the subject of intense debate and a number of approaches have been used.

Database Management Systems for Multimedia Systems

Since most multimedia applications are based primarily on communications technologies, such as electronic mail, the database system must be fully distributed. A number of database storage choices are available.

The choices available are:

- * Extending the existing relational database management systems, (RDBMSs) to support the various objects for multimedia as binary objects.
- * Extending RDBMSs beyond basic binary objects to the concepts of inheritance and classes. RDBMSs supporting these features provide extensions for object-programming front ends and/or C++ support.
- * Converting to a full fledged object oriented database that supports the standard SQL language.
- * Converting the database and the application to an object-oriented database and using an object-oriented language, or an object-enabled SQL for development.

Multimedia applications combine numerical and textual data, graphics from GUI front-ends, CAD/CAM systems and GIS applications, still video, audio and full-motion video with recorded audio and annotated voice components. Relational databases, the dominant database paradigm, have lacked the ability to support multimedia databases. Key limitations of relational database systems for implementing multimedia applications stem from two areas: the relational data model and the relational computational model.

RDBMSs have been designed to manage only tabular alphanumeric forms of data (along with some additional data types stored in binary form such as dates).

RDBMS Extensions For Multimedia

Binary Large Object (BLOB) is a data type which has been adapted by most of the leading relational databases. BLOBs are used for objects such as images or other binary data types.

The relational database is extended to access these BLOBs to present the user 'with a complete' data set.

Extended relational databases provide a gradual migration path to a more object-oriented environment.

Relational database tables include location information for the BLOBs which may be stored outside the database on separate image or video servers. Relational databases have the strength of rigorous set management for maintaining the integrity of the database.

Object-Oriented Databases for Multimedia

In object databases, data remains in RMS or flat files. Object databases can provide the fastest route to multimedia support. Object programming embodies the principles of reusable code and modularity. This will ease future maintenance of these databases.

Object database capabilities such as message passing, extensibility, and the support of hierarchical structures, are important for multimedia systems.

We can develop the application fastest class definitions. ODBMSs are extensible. They allow incremental changes to the database applications.

Extensibility: Extensibility means that the set of operations, structures and constraints that are available to operations are not fixed, and developers can define new operations, which can then be added as needed to their application.

Object-oriented software technology has three important concepts. They are:

Encapsulation: It is the ability to deal with software entities as units that interact in pre-defined and controllable manner, and where the control routines are integral with entity.

Association: It is the ability to define a software entity in terms of its differences from another entity.

Classification: It is the ability to represent with a single software entity a number of data items that all have the same behavior and the same state attributes.

Object orientation helps to organize the software in a more, modular and re-usable manner.

Encapsulation allows for the development of open systems where one part of the application does not need to know the functioning of other part. It also provides autonomy; **Autonomy** means we can interface to a variety of external programs can be built in one class of objects and the storage of the data in another class of objects.

Database Organization for Multimedia Applications

Data organization for multimedia systems has some key issues. They are:

- (1) Data independence
- (2) Common distributed database architecture

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(3) Distributed database servers · (4) Multimedia object management.

Data Independence

Flexible access by a number of databases requires that the data be independent from the application so that future applications can access the data without constraints related to a previous application.

Key features of data independent designs are:

- 1.Storage design in independent of specific applications.
- 2.Explicit data definitions are independent of application program.
- 3.Users need not know data formats or physical storage structures.
- 4.Integrity assurance in independent of application programs.
- 5.Recovery in independent of application programs.

Distributed Data servers : Distributed database servers are a dedicated resource on a network accessible to a number of applications. The database server is built for growth and enhancement, and the network provides the opportunity for the growth of applications and distributed access to the data.

Multimedia Object Management

The object management system must be capable of indexing, grouping and storing multimedia objects in distributed hierarchical optional storage systems, and accessing these objects on or keyed basis.

The design of the object management system should be capable indexing objects in such a manner that there is no need to maintain multiple storage copies.

Transaction management for Multimedia Systems

Multimedia transactions are very complex transactions. We define a multimedia transaction as the sequence of events that starts when a user makes a request to display, edit, or print a hyper media document. The transaction is complete when the user releases the hypermedia document and stores back the edited versions or discards the copy in memory (including virtual memory) or local storage .

In most simple applications based on text and textual or numeric data a transaction managed generally by the server that provides the storage for the data.

Even these transactions becomes more complex when data has to be retrieved from multiple data servers that can be accessed simultaneously by a large number of users.

Conflicts arise when two users attempts to read from and write to same data record.

A multi-phase commit methodologies are used to address conflicts in relational database.

Multimedia Database	Conventional Database
A Multimedia database (MMDB) is a collection of related <u>multimedia data</u> .	A relational database management system (RDBMS) is a <u>database management system (DBMS)</u> that is based on the <u>relational model</u>
A Multimedia Database (MMDB) hosts one or more <u>multimedia data types</u> ^[3] (i.e. text, images, graphic objects, audio, video, animation sequences.	Each database is a collection of <u>tables</u> , which are called relations, hence the name "relational database"
Multimedia data consists of a variety of media <u>formats</u> or file representations including <u>TIFF, BMP, PPT, IVUE, FPX, JPEG, MPEG, AVI, MID, WAV, DOC, GIF, EPS, PNG</u> , etc.	relational model contains the following components: • Collection of objects or relations • Set of operations to act on the relations • Data integrity for accuracy and consistency
• Multimedia database consume a lot of processing time, as well as bandwidth.	Extremely fast retrieval times for multi-user, transactional environment. • Ease the use compared to other database systems
Examples of multimedia database application areas: • <u>Digital Libraries</u> • <u>News-on-Demand</u>	examples of relational database system • process control • internet service management • spacecraft control system

<ul style="list-style-type: none"> • <u>Video-on-Demand</u> • <u>Music database</u> • <u>Geographic Information Systems (GIS)</u> • <u>Telemedicine</u> 	<ul style="list-style-type: none"> • network management system
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