Content Management: A Multimedia Database Architecture

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Abstract
This paper is presented to discuss Content Managements, A multimedia database Architecture; contents are information and experiences that are directed towards an end – user or audience. It can be expressed through some media such as speech, writing or any various arts. The work also examined the various types of multimedia contents their importance and characteristic as well as the organisation of multimedia content and multimedia content management technologies and tools. The multimedia database management system was also discussed, their characteristics and the multimedia database Architecture was also discussed also various related works were reviewed to further broaden the multimedia content management system.

Keywords: content management, multimedia, text, auditory, Architecture, element formatted text, unformatted text, structural content, hypertext, image, animation, data.

1.1 Introduction
It is clear and unavoidable nowadays, that the dissemination of information is paramount to our daily living we communicate with one another in one form and the other either by auditory that is mouth to mouth communication or in textual form as text messages on real time or in a printed copy as well as moving images displayed using communication and digital and electron technology or describing an event using chart and images in a story board or promoting an event using a billboard and showing an event in a digitized format on a webpage. All these various form of communication system combined to form a multimedia information system.

A media can be described as a text, voice or auditory, video and imagery the combination of textual, auditory, imagery and graphical content is referred to as a multimedia content.

A set of process and technology that support the collection, delivery, governance and overall management of information in any format that can be accessed, stored, manipulated and retrieved is referred to as content database management system or CDBMS.

A content management system on the other hand is an application that is used to manage web contents and digitized data content.

1.1 Statement of Objective.
This paper is presented to discuss content management a multimedia database architecture. While the various objectives are
   i.   To show that multimedia contents can serve as information bank for future information users

ii.   To show that multimedia database system can store multiple media contents in manner that the various media could be edited, manipulated, stored and retrieved for future use.

1.2 Significance of the study:

Content management is an essential area in information science, it provides for information storage that could be of help to information users in the future, content management helps to make information available and accessible due to the effective use of the database operation used and the information management technologies employed.

1.3 Statement of problem:

Most often, content management requires competent hands since the information are mainly digital contents, a good background of computer competence is critical. One major problem with multimedia content is lack of qualify hands. Multimedia data must be stored and managed according to the specific characteristics of available storage media. Multimedia information needs to be handled carefully since it can be corrupted beyond repair at any point in time.

2.0 Review of Related literature

Arjen P. et'al 1999 (Content and Multimedia Database Management Systems) states that since the introduction of multimedia in personal computer, it has become more common every day to digitized part of the multimedia data around us.

A major advantage of a digitized data over the shoeboxes is that, digitized data can be shared easily with one and others.

Voorhess. E'M et'al (2005) in their work experiment and evaluation in information retrieval emphasized that with the growth of web based resources, aggregate websites become increasingly useful in organizing links to resources based or audience or topics. The use of Meta data stored in database can allow web page to be built dynamically and efficiency.

2.1 Theoretical Framework.

Multimedia simply means multiple forms of media integrated together. Media can be text, graphics, audio, video, animation data etc.

An example of Multimedia is a blog that contains text regarding an owner along with an audio file of some of his music and selected video of its owner.

DVD, CD-ROM containing computer – aided learning instructions, animation or movies and games these can also been seen as interactive types of media.

The various elements of multimedia are

a. Text:

There are three types of text that a multimedia system can process, they include formatted text, unformatted text, and hypertext.

Formatted text: This is also known as rich-text. It enables documents comprising of strings of characters of various size shape and styles with tables, images and graphics to be inserted at some points within a document. e.g a text book produced by a word processing packages such as Ms- word.

Unformatted Text: This text is otherwise called plain-text consisting of strings a fined characters from limited character set. e.g ASCII. Normal alphabetic, numeric's, punctuation and control characters are represented by ASCII character set which is unformatted text.

Hypertext: Refers to documents that contains unformatted and formatted text as well as links to other parts of the documents accessible selecting the links.

Image/ Graphics: Graphics are visual presentation on some surface such as a canvas, wall, computer wall paper, or stone to brand, inform, illustrate or entertain e.g photographs, fine art, graphs, and diagram.

Images: An image can be two dimensional such as photograph, screen display or three dimensional such as a statue. They can be captured by a camera or digital or processed by a multimedia computer.

Audio / Sound: Voice and music for example are by nature analog, so which we record voice we have created an analog electric signal. They can be captured to the computer using a microphone and digitized and stored.

Video: A still image is a partial distribution of intensity that is constant with respect to time video on the other hand is a partial intensity pattern that changes with time.

Animation: Video may be generated by computer program rather than a video camera. This type of video content is normally referred to as computer animation or sometimes by the way it is generated an animated graphics.

Animation is the rapid display of a sequence of images of two-dimensional of 2-D or 3-D art work or model position in order to create an illusion of movement.

3.0 Discussion

3.1 What is Content Management?

Content Management is a set of processes and technologies that support the collection, delivery, governance and overall management of information in any format available either on a personal computer, in a network or in the internet. It could entail anything from managing a website's digital assets to storing documents such as branding, business, emails and directions

3.1.1 Description of a Content

In Wikipedia the free encyclopaedia in publishing art and communication, content is the information and experiences that are directed towards an end-user or audience. Content is something that is to be expressed through some media such as speech, writing, or any of various arts. e.g blog, video, photos and audience are some example of contents.

A content can be tangible, virtual, reviewed and expressional. It is the presentation of an idea to the benefit of an interested user group in form of a text, video, audio or a representation using a graph or an image.

3.2 Elements of Multimedia Content

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3.2.1 Characteristics of Multimedia Content
Different multimedia data can be rendered at the same time.
➢ Multimedia data can be retrieved from distributed networks.
➢ Multimedia Content can be distributed to various computers in a network.
➢ Multimedia Contents can be compressed and decompressed.

3.3 Importance of Multimedia Contents
The various importance of multimedia contents are status below.
i. They serve as good source of vital information
ii. promoter uses multimedia content to promote goods and services
iii. Users of data can fall back on multimedia content for retrieval of past information

3.5 Content Management System (CMS)
A content management system is an application that is used to manage web contents allowing multiple contributors to create, edit and publish contents a (CMS) is typically stored in a database and displayed in the presentation layer base on a set of template.

3.6 Organisation of Multimedia Contents
With the growth of web-based resources, aggregate websites becomes increasingly useful in organising links to resources based on audience or topic such list can be built on static web pages with the names and locations of the resources hard codes in the HTML. The use of the metadata stored in databases can allow these web pages to be built dynamically and more efficiency. Various software tools can be used to automatically extract and reformat the metadata information for web application.

3.7 Metadata

Metadata is a structured information that describe, explains, locates or otherwise makes it easier to retrieve, use or manage an information resources. It is the key to ensuring that resources will survive and continue to be accessible into the future.

Metadata is often called data about data or information about information.

A good example of Metadata is the cataloguing system found in libraries records for an example the author title, subject and location on the shelf of resources. Metadata can be used to refer to as machine understandable information in the field of information technology.

There are three Main types of Metadata namely descriptive metadata, structure metadata and administration metadata.

3.7.1 Structured and unstructured content

Information organization Refers to method of rendering large amount of information into a form that can be stored, retrieved and manipulated by users or computer system. An example of information organized is Digital Information Organization (DIO).

Organization of content means that all info must be tagged in some fashion, so that users can readily locate it later. This tagging may be as simple as documents little or as sophisticated as library of congress Meta category method. In either case, it is a good idea to develop a controlled vocabulary in a formed Meta data definition documents to find both the initial repository development and the acquisition of new materials.

Information Management:

Information management depicts a comprehensive approach to managing the flow of an information system's data from creative and initial storage to the time when it became obsolete and is deleted.

Classification of Information Resources

- ➢ Describe the way in which knowledge is organized in library classification system.
- ➢ Describe the principles of classification and subject analysis of the item at hand.
- ➢ Apply a classification system to materials held in library and information services. physical into processing
- ➢ Ensure the processing of the item is correct in terms of the addits of library stationary, label, ownership stamps and barcodes.
- ➢ Create and manage databases
- ➢ Analysis a body of information to which access is required.
- ➢ Select and develop a LIS database and collect and record information
- ➢ Maintain, monitor and evaluate the database and implement improvement.
- ➢ Review new systems to organize and access.

Web Content Organization

The web is regarded as a universal information space. The heart of such universal space lies in the standards that make it possible for different types of data to be communicated and understood by heterogeneous platform and systems. The (TCP/IP) allows different computer system to communicate with one another and understand different languages of networking.

By organizing information content, the content is represented by terms in natural or controlled language or both. The characteristic of its container (books, journals, film, memo etc) will be encoded in certain formats for computer storage and retrieval. The Machine Readable Cataloging (MARC) has been used to encode information about their collection.

Advantage and Disadvantage of Digital Information

The various Advantages of Digital info are:

➤ Everything can be stored
  With the help of virtual and expanded memory all information could be stored on a partitioned and allocated memory area.

➤ Large amount of Databases
  Since database no matter how large can assume a certain amount of megabyte it is obvious that the size of the database will determine the amount of memory space the database analyst would provide to accommodate the information or data available to that database.

Disadvantage of Digital Information

➤ Corruption beyond recognition
  Digital Information can be easily corrupted or altered, digital storage media has a shorter life spans, and it requires access technologies that are changing at an ever increasing space.

➤ Lack of tradition of best practice
  The digital information system does not follow traditionally accepted pattern in the print environment but the traditional process that are part of the traditional path from creation to archiving

Categorizing information based on Structured and Unstructured Content

Information can be categorized base on content into two types. Structured and unstructured content.

In Information organization, the ability to transform information from unstructured to a structured content is the key to effective information organization

Structured Content: Structured information is an information whose content is numerical and factual in nature, and is produced base on measurement, experimentation, survey etc. example such includes scientific dataset e.g properties formulae and structure of chemical substance.

In structured contents, values for most attributes or fields are usually in numerical or codified form. E.g name of a person, organization etc search and retrieval of resources in such content is usually on exact match. This means that an information resources either satisfies the query or does not satisfy the query. That is an information resources searched for a piece of structural content either possess the value or not such the query response returns either yes or no or a binary output of O or I.

Unstructured Content: In this content information value or often non-numerical and not produced based on measurement, experimentation or survey this includes textual content in resources like an email message, lectures and expert profile.

All these are usually available in multimedia format. Search and retrieval of unstructured resources is usually by best match that is to find documents which are most relevant to a given query e.g web searching, bibliographic database, searches and digital library etc.

3.8 MULTIMEDIA DATABASE MANAGEMENT SYSTEM

A multimedia database is database that hosts one or more primary media file types such as .txt (documents), .JPG (Images), .mp4 (videos), .mp3 (audio) etc. these can also be further categorized under three categories.

    i.   Dynamic media – that is video and sound bits which are time depended file format.

    ii.   Static media eg. Images, artworks and written documents which are time independent.

    iii.   Dimensional media these includes 3D games, computer aided design or computer aided drafted programs.

PROPERTIES OF MMDBMS

Going by the traditional database management system we can describe the purpose of a MMDBMS.

    a. Data persistency – as computer technologies develop from time to time and operating system and other programs changes, it is important MMDBMS are still able to process data even when the environment changes the ability of data object to survive through different transaction and program invocation.

    b. Data consistency – as constrains are imposed on transaction, it is expected that database consistency continue from one transaction to the other. Particularly in concurrent multi user operation, it is important to provide a consistent view of the data during concurrent database queries at specific point in time.

    c. Data security – measures should be provided to ensure that unauthorized persons don't have access to cause damage of modification on stored data. The security and integrity of data in case of error is one of the most important condition for MMDBMS. These property is achieved by use of the transaction concept.

    d. Database query and output- database stored different information (entries), which can be retrieve at any giving point in time by database queries. Database queries are formulated by use of database query languages like SQL in addition, each entry in a database include some status information such as entry modification. These information needs to be reproduced as exactly to ensuring the correct information about entries supplied. One must ensure that the query mechanism corresponds to **multimedia data format**.

Other properties of MMDBMS can include

    e. Data integration- for a program invocation to continue to perform, one must ensure that data items is not duplicated.

    f. Data recoveries – measures must be put in place to ensure that output of unsuccessful transaction does not affect the persistency of stored data.

    g. Data independent – databases and management function should be separated from the application program.

    h. Version control – different versions required different applications therefore management and organization need measures to keep their brands updated and unique from different organization and other management bodies in terms of simplicity and easy to use.

Characteristics of MMDBMS

The various characteristics of MMDBMS are:

    i.   Corresponding storage methods – multimedia data must be stored and managed according to the specific characteristics of the available storage media.

    ii.   Descriptive search method – query of multimedia data should be based on a descriptive and content oriented search e.g. picture of a lady on a black suit.

iii. Device independent interfaces – hide data of device control and other information on specific characteristics of available storage media (read only, write once and write many).

iv. View specific and simultaneous data access – allow consistent, multiple and simultaneous data access through different queries of several applications e.g. shared and editing.

v. Management of large amount of database – MMDBMS should be capable of handling and managing large amount of data needed for appropriate referencing mechanism.

vi. Relational consistency of data management – relations among data of one or different media must stay consistent corresponding to their specification.

MMDBMS manages the following:

- Attribute relation – support different presentation like audio, video, images etc.
- Component relation – include all part belonging to one data object.

vii. Real time data transfer
  - MMDBMS must perform real and life operation of continuous data on real time.
  - The data transfer of continuous data has a higher priority than other database management action.

viii. Long transaction – the transfer of large amount of data will take a long time and must be done in a reliable fashion

Distributed Multimedia Database Architectural Diagram
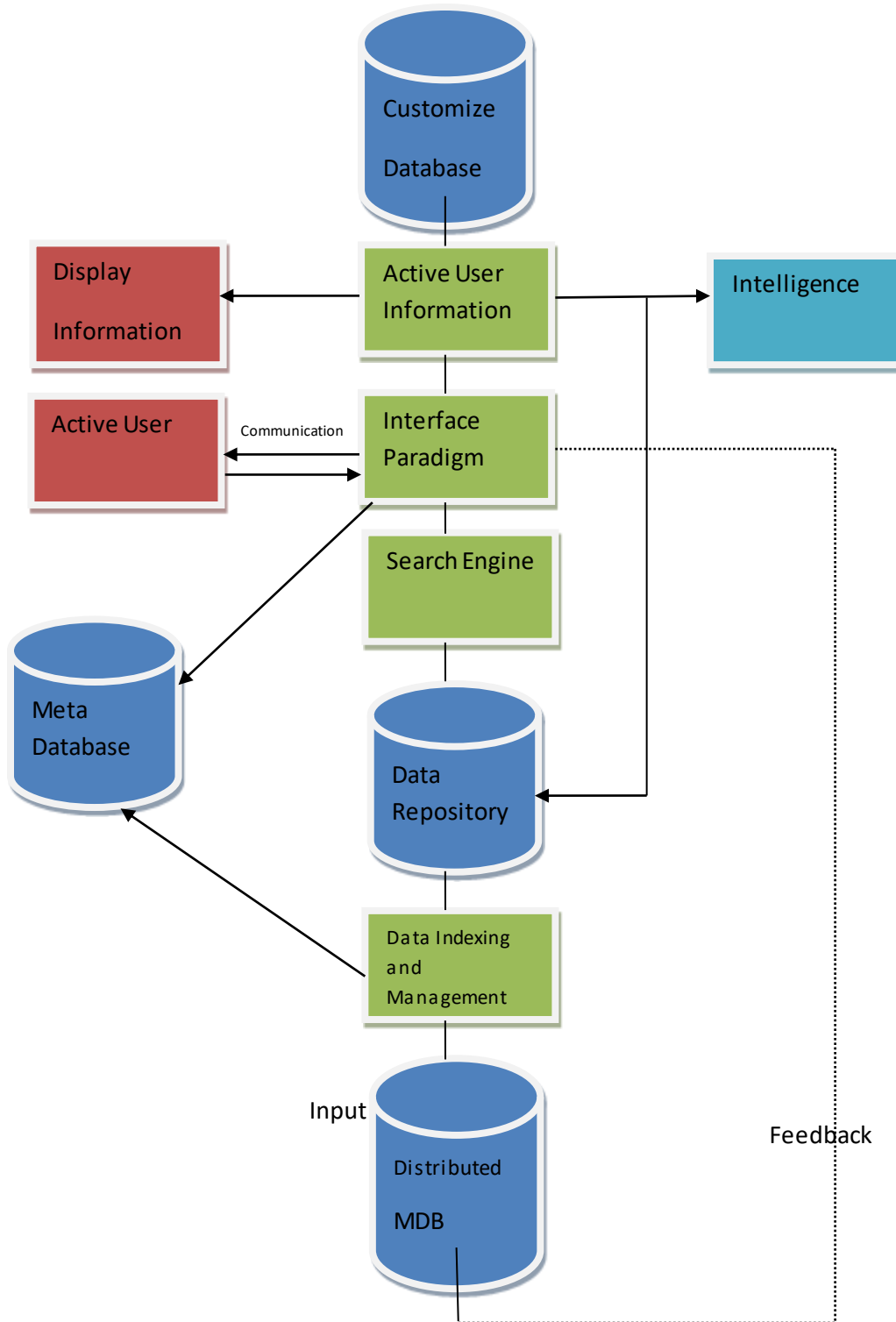
4.0 Findings

Architecture of a multi user database can become complex, it is not clear which architecture would be the best option for a multimedia database. A transaction involving multimedia data will in general be expected to take longer. Locks will have to be maintained for longer period. MDBMS has formal database architecture. It has a separate user view from the system view. It basically constitute a three layer architecture.

Interface, the interface between the user and the database in used for the following activities: Object-browsing composed, disposed object.

Composition: The object composition part of the multimedia database manages the multimedia object. Storage function of multi-media database involved clustering and indexing of multi-media data bases.

A distributed MMDBMS has a more complex structure due to the database not being stored logically at one place.

Functionalities of MMDBMS.

The functionalities of multi-media comprises of the following

- **i.** The operating system provides management interface for MDBMS to all local devices.
- **ii.** The MDBMS provide an abstraction of the stored data and their equivalent device, as is the case in DBMS without multi-media.
- **iii.** The communication system provides for the MDBMS abstraction for communication with entity at remote computers.

5.0 Conclusion

the increasing demand for a multimedia system cannot be over emphasize since the emergence of the internet, information are now available in a distributed format over the network e.g playing games watching videos and artistic computer aided design for either branding and promotion of goods and services are made possible as a result of the wide availabilities of the multimedia software system. Therefore integration of multiple media for information dissemination is key for quality broadcasting both in the telecommunication industry and in various animation houses. With the help of animated games, quality entertainment is provided for pleasure seekers and video conferencing as well as distance studies is made possible with emergence of the multimedia system.

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