DESIGN OF METADATA MANAGEMENT SYSTEM FOR RETRIEVAL OF VIDEO DATA

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ABSTRACT ... Currently for the development of internet and network technology, since request of service for the large volume multimedia data has been more increased, multimedia users want the convenience and accuracy of multimedia service system about storing and retrieving of the multimedia contents. To satisfy the request of users, metadata management for the diverse information of multimedia contents is very important. However, the metadata management for the multimedia contents is difficult because the metadata standards are different each other for the type of multimedia data and service. In this paper, we propose the integration metadata management system structure which extends previous metadata management system based on text for the multimedia contents metadata which are expressed differently each other according to the multimedia data or service type.

KEY WORDS: XML Metadata, Metadata Management System, Multimedia Service, Multimedia Database

I. INTRODUCTION

Recently, the technological development of internet techniques and computer process abilities gives a possibility of high-capacity multimedia data process. The users can easily access and use the multimedia contents with the various pictures, video and audio contents. For example, the VoD (Video on Demand) service, remote education and the electronic library and digital broadcasting are typical examples for the multimedia service [1].

In this environment, users have requested more convenient and accurate multimedia service such as storing and retrieving of media data. For the satisfaction of these requirements, the TV-Anytime forum established TV-Anytime metadata standard for support audio-visual service [3]. And the MPEG (Moving Picture Experts Group) which is video or audio compression research group of the international Standards Organization (ISO/IEC) established MPEG-7 standard, which support content-based retrieval.

Metadata standards were defined to describe the multimedia contents such as video and audio data. These metadata standards are expressed by XML grammar.

In the actual application, metadata is managed using the XML document created by XML grammar.

However, these applications have difficulty in integrating and managing of various metadata standards because there are various standards for multimedia service types and data formats.

In this paper, we propose an integration management system structure to manage multimedia contents and metadata which is expressed by different standards. It is extended based on text base metadata management system.

The composition of this paper will be as follows:

Chapter II introduces the previously proposed systems for management of various documents using XML and multimedia metadata management.

Chapter III explains the details and functions for each module of metadata management system structure and how the metadata integration management system works.

Finally, Chapter IV shows the conclusion and future study.

II. RELATE RESEARCH

Multimedia contents have various metadata for a lots of metadata creator. For example, when a book document published by each other different companies the information of the book can be differently used as different price units and types. Also, when an word "CA" is existed, in the American "CA" indicates the "California" but in the Canada, the word indicates the country "Canada". That is, a metadata can be variously expressed by manager such as metadata creator and metadata provider [4].

Currently, lots of methods are developed to solve the heterogeneous problem for the metadata such as schema integration and schema mapping [5].

In the domestic research, XMF [6] defined integration schema and rules by XMF-ML arbitration language against the heterogeneous characteristic and it used to XML-QL. In this case, the processor need to how to define new rule and language [4]. Also, in digital broadcasting, the methods to manage efficiently multimedia contents and metadata have been researched [6].

MAF (Multimedia Application File Format) which was proposed in the MPEG-A has the metadata properties of the MPEG-7 type and implements a system which has function of the Creation, Exchange, Modification, Search and Play using these properties [7].

III. SYSTEM DESIGN

3.1 System Overview

In this section, we propose a system structure which manages a integrated metadata. The property of the system is as follows.

Through the web, we can gather multimedia contents that have a different kind of metadata standard according to the service group. When heterogeneous metadata are income in the system, they are transformed into a uniform metadata and then the transformed metadata is stored in the system.

User conducts the query for the multimedia content regardless of multimedia content type or service type. So, the system scans metadata repository to find the metadata and multimedia content. And the system returns the result to the user. Figure 1 shows conceptual diagram of the proposed metadata integration management system.
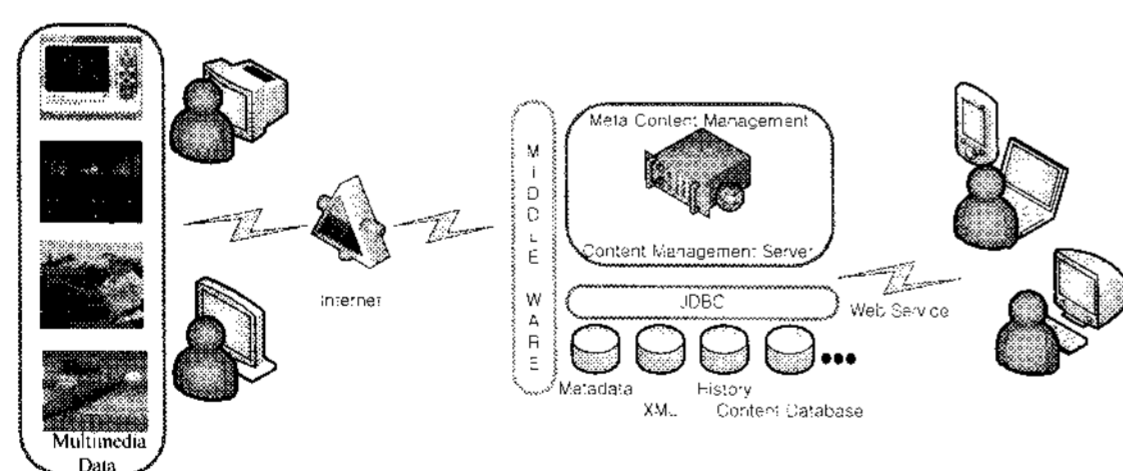

Figure 1: Conceptual Diagram

3.2 System Structure

In this paper, we propose the metadata integration management system which contains sub-systems such as the Metadata Acquisition management System, Meta-Content Management System and Repository Management System. Figure 2 shows the whole system structure.
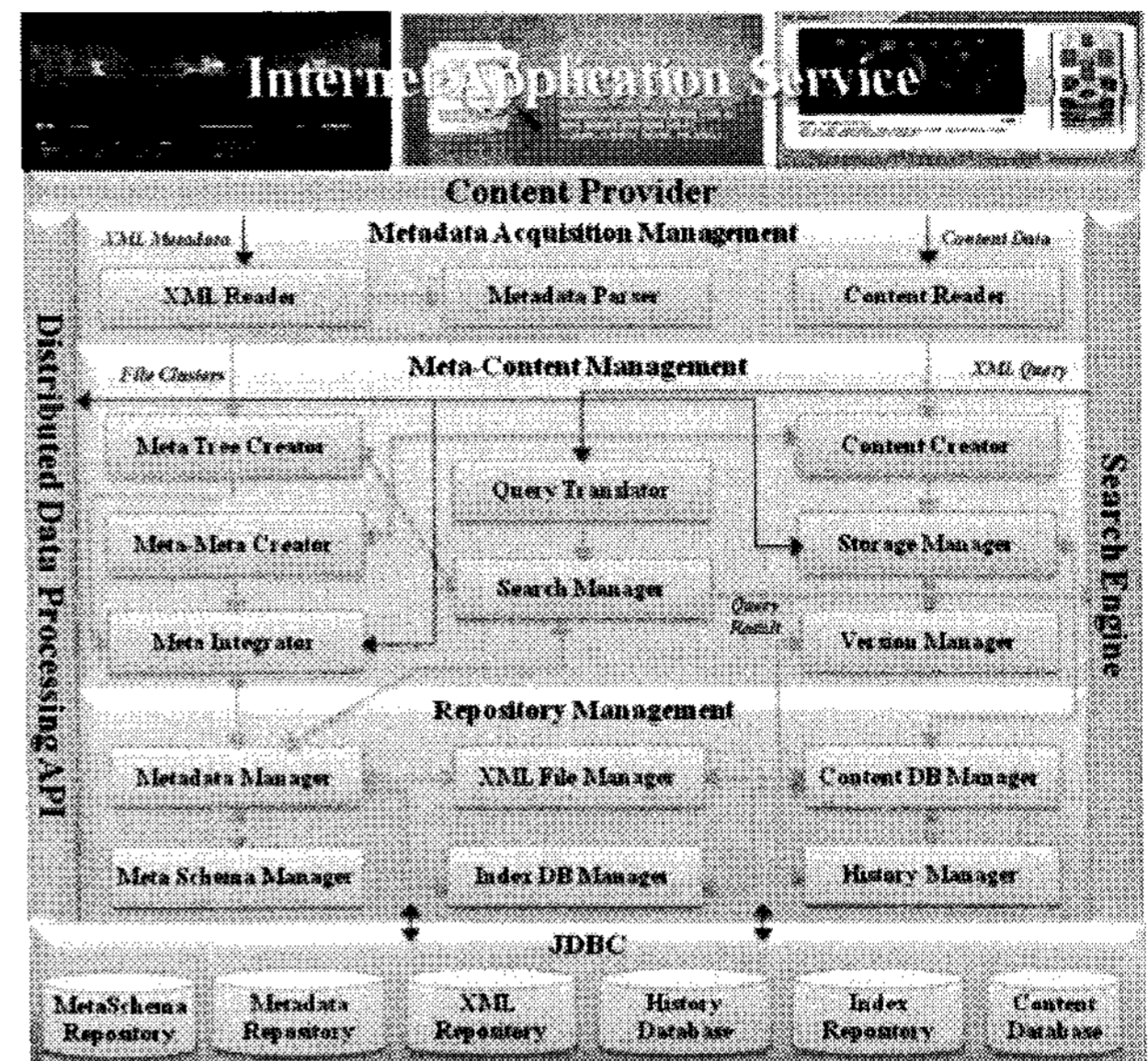

Figure 2: System Structure

In Figure 2, the Metadata Acquisition Management System acquires a metadata file based on XML and multimedia content from Content Provider.

Meta-Content Management System creates an instance which stores an acquired content. The acquired XML metadata file is transformed into a uniform metadata by parsing and is stored into the Metadata Repository. Repository Management System performs storing task for real multimedia data and integrated metadata.

3.3 System Modules

In this part, we will explain such modules and detail function of sub-system.

3.3.1 Metadata Acquisition Management System

- **XML File Reader:** Reads the XML Metadata file from external system.
- **Metadata Parser:** Processes the validation of the XML file and then extracts the elements and values.
- **Content Reader:** Reads the multimedia contents from external system.

3.3.2 Meta-Content Management System

- **Meta Tree Creator:** Creates the DOM tree through the validation of the XML file.
- **Meta-Meta Creator:** Creates object instance to manage the inputted metadata.
- **Meta Integrator:** Creates integrated XML metadata files after analysis for the metadata and metadata tree.
- **Query Translator:** Performs check and analysis of the query which is inputted from external.
- **Search Manager:** Performs request query from internal or external.

- **Content Creator:** Performs connector tasks to store content link information or inputted content.

- **Storage Manager:** Performs connector tasks from accomplish reception content or content link information for saving with external distribution storing of system.

- **Version Manager:** Manages version information for the content and metadata.

3.3.3 Repository Management System

- **Metadata Manager:** Performs the task which store and delete and modify the metadata.

- **Meta Schema Manager:** Manages metadata table schema.

- **XML File Manager:** Manages inputted XML original file from external system.

- **Index DB Manager:** Manages index key and created index constitution information about attributes from database tables.

- **Content DB Manager:** Store, deletion and modification through complete analysis content and content link information to database.

- **History Manager:** Manages and stores after the modification of data to manage of complete modification version of content.

IV. CONCLUSION AND FUTURE WORK

In this paper, we proposed a system structure which manages multimedia content and a uniform metadata for the various multimedia data with different types.

Our future research is to implement integrated metadata management system. We will also research applications using the system through analysis of various metadata standards of the multimedia data.

V. REFERENCE

[1] Seong Min Rho, Een Jun Hwang. 2003. Design and Implementation of Multimedia Retrieval a System. *The Korean Institute of Information Scientists and Engineers* (KIISE), Vol. 30, No. 5, pp.494-506

[2] Chill Song, JongHo Nang 2007 Algorithms for Indexing and Integrating MPEG-7 Visual Descriptors. *The Korean Institute of Information Scientists and Engineers*(KIISE), Vol.34, No.1, pp.1-10.

[3] Keung Ouc Kang, 2000, TV-AnyTime Forum, TTa Journal, Vol. 80.

[4] Sung Joon Ryu, Jae Moon Hwang, Tae Hoon Kim, Young Kwang Nam. 2004. Integrated Information Retrieval with Metadata Interface for Heterogeous Distributed XML Documents. *The Korean Institute of Information Scientists and Engineers*(KIISE), Vol.31, No.11, pp.1505-1518.

[5]Ram, S. and Ramesh, V. 1999. Schema Integration: Past, Current and Future, in A. Elmagarmid, M. Rusinkiewica, and A. Sheith, editors, Management of Heterogeneous and Autonomous Database System, *Mogen Kaufmann Publishers*, pp.119-155.

[6] Hyo Seop Shin, 2003. A Method of Storing and Querying of XML Data for Embedded Systems in Digital TV Broadcast Environment. Vol.19, Part.3.

[7]Youngmo Gang, Joohyoun Park, Hyunggin Bang, Jongho Nang, Hyungchul Kim, 2006. A design and Implementation of Multimedia Retrieval System on MAF(Multimedia Application File Format), *The Korean Institute of Information Scientists and Engineers*(KIISE), Vol.33, No.9, pp.574-584

[8] Gnther O, Voisard A, 1998. Metadata in geographic and environment data management, in Sheth A, Klas W (eds) Multimedia Data Management: Using Metadata to Integrate and Apply Digital Media. McGraw Hill: 57-87.