

# XML-based Retrieval System for E-Learning Contents using mobile device PDA

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## ABSTRACT

Web is greatly contributing in providing a variety of information. Especially, as media for the purpose of development and education of human resources, the role of web is important. Furthermore, E-Learning through web plays an important role for each enterprise and an educational institution. Also, above all, fast and various searches are required in order to manage and search a great number of educational contents in web. Therefore, most of present information is composed in HTML, so there are lots of restrictions. As a solution to such restriction, XML a standard of Web document, and its various search functions is being extended and studied variously. This paper proposes a search system able to search XML in E-Learning or various contents of non-XML using mobile device PDA.

## 1. Introduction

As the amount of information increases due to development of Internet and generalization of web, most of present information consists of HTML, so there is a limit to searching various information with only limited set of tag of HTML. For a solution to such limit, various search functions are being extended and studied by proposing W3C (World Wide Web Consortium) as a standard of next-generation web document. Internet got to be used as important media of learning and education due to the rapid growth of Internet. Especially, various contents in the field of E-Learning enabled students to share new learning environment and resources. [1]

However, in order to provide efficient cyber environment, I intend to design and embody XML-based cyber learning system that can, maintaining learning situation of learners, store and search existing massive contents in XML data type able to utilize them.

This paper, in Chapter 2, describes a study related to XML and introduction of E-Learning, and compares XML-related inquiries, and, in Chapter, discusses system configuration, lecture contents DTD and search using XQuery.

## 2. Related study

### 2.1 XML

XML (eXtensible Markup Language) is a language of standardized text type which was proposed in W3C (World Wide Web Consortium) and whose structured documents can be transmitted, exchanged and searched on web. This includes an additional function for the user to define new tag for coping with the limit of HTML (Hyper Text Markup Language) generally used in Internet and for solving complexity of SGML (Standard Generalized markup Language).[2]

### 2.2 E-Learning system

Most recently, in the development of education and human resources using web, a term of E-Learning began to apply. B-Learning can be said to be not only a kind of an education pursuing a distribution-type open learning space by maximizing interaction based on Internet B-Business, but also a kind of rapidly expanding E-Business. [3]

Web, created by the rapid development of Internet and digital technology, is a very powerful skill enabling us materials and information without any restriction by time and space. It not only combines the world into one space and enables bi-directional interaction, but also is becoming dynamic, economic and democratic teaching-learning media which have recent information. Internet meets the demand of learners, provides a learners-centered education and the opportunity of various training, and, as a learning type based on web, is being called variously E-Learning, web-based learning, web-based education, distribution training, high-dimensional distribution learning, remote learning, online learning, long-distance learning, learning outside the classroom, etc. [4]

E-Learning is characterized by non-contact communication between teachers and learners, and contents used in E-Learning various multimedia such as includes text, image, audio, moving images, etc. Accordingly, an information search method that considered the features of E-learning as well as search technology of general multimedia information are required.

### 2.3 Summary of XML data search

General documents are two-dimensional and mutually independent, but in case of such document as XML, its logical structure is indicated, so meaning information as well as document structure is included. Such information, from the point of information search, provides the user with a new type of information search function by giving various methods of having an access to a document, and can be used in raising reliability compared with existing irregular search. [5] Usually, search of XML document is conducted by structure search in the unit of Element and Attribute, and the search type is represented by set of elements corresponding to conditions.

The contents of XML can be searched by using LOM (Learning Object Metadata) proposed as the standard of E-Learning system of IEEE LTSC, SCORM (Sharable Content Object Reference

Model) of ADL, DC (Double Core) composed of 15 elements which assists the storage and search of online resources that came from meta data of IMS (Instructional Management System) of IMS Project, and meta data of DC Education giving educational meaning to DC.

The basic unit that composes XML document is Element. Therefore, in addition to the search based on the unit of document, search of Element unit must be possible. Also, logical inclusion relation between Elements and a query on Attribute value must be supported. The search of XML document having such a structural features can be classified into content search, structure search, mixing search formed by content and structure mixing and additional Attribute search. Content search is to search a document or Element related to query language given to the user and includes simple search, weight search, wild card search, restriction search, etc. Structure search means the logical search of a document includes the search for parents, children, grandchildren and brothers as well as search mixed with those. Mixing search can be classified into search using content and structural information, search using content and Attribute and search using Attribute and structural information. Attribute search is one for Attribute that can appear in Element in which Attribute name and value are given and the document or Element corresponding to those is looked for. Content search, structure search and Attribute search can be available through each index, and mixing search can be available by combining those search.[6]

#### 2.4 Comparison of XML related query language

XML related query language includes XQL (XML Query Language), XML-QL, XPath, XQuery, etc which support structure-based search that reflected the structural features of XML document and content-based search. XQL is a universal query language proposed by W3C in 1998 and indicates, using path expression, input Node which becomes the subject of a query and expresses an inquiry by using filter operator by ([ ]), comparison operator (=, !=, \$lt\$, \$gt\$,...), etc. indicating other conditions. XML-QL is XML query language proposed from W3C to extract from many XML documents, change data among relation type database, object-oriented database or XML data, or integrate data from various sources. Xpath enables the user to get Nodes corresponding to information on element, attribute, comment, processing, instruction of XML document for which address has to be designated. Also, XQuery, as query language based on Quilt, can express a query for not only the existing query language such as XQL, XML-QL, Xpath, but also structured and semi-structured document using features of the query language such as SQL/OQL, and can express a query for various data source including related database and objective database. [7] Therefore, in this paper, by characteristics of E-Learning, comparison will be made on the basis of XQuery, query language for efficiently searching a great number of various lecture contents.

### 3. System design and Implementation

#### 3.1 System introduction

O/S : Win2003 Server

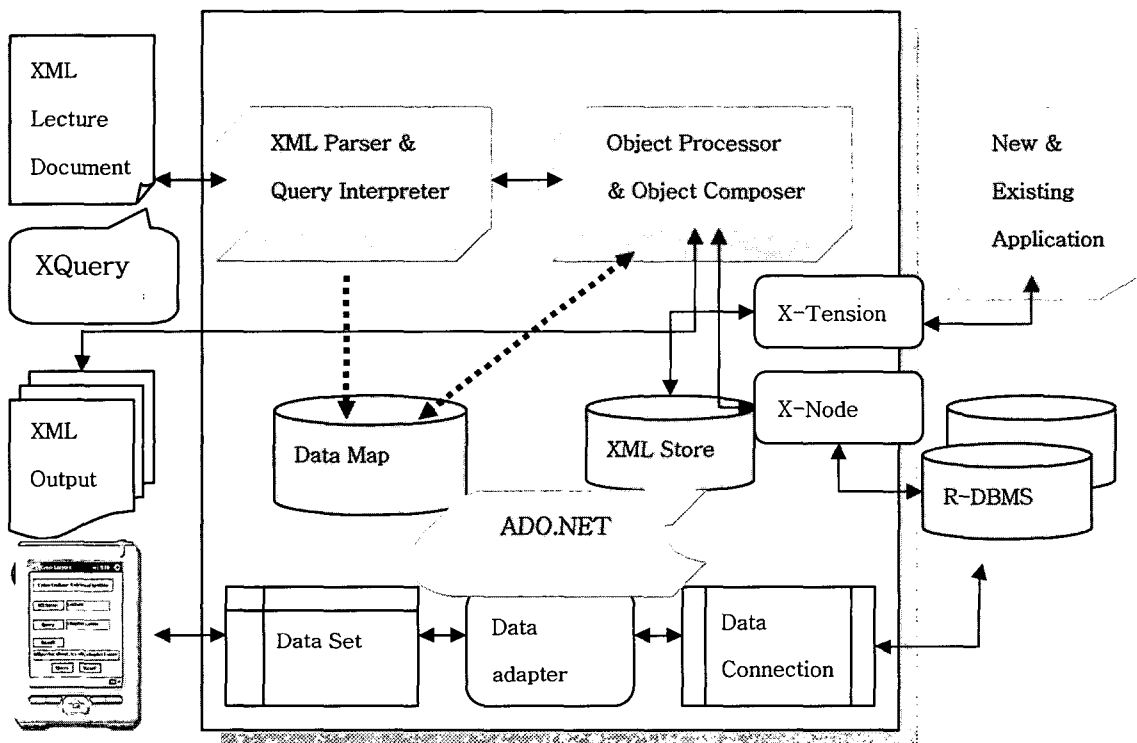
Relational Database: MS-SQL Server 2000

Native XML Database : Tamino XML Server 4.2.1

Web Server : Apache HTTP Server 2.0.48

Application Tool: Windows CE Pocket PC 2002

Application Language: Embedded Visual Basic 3.0



<Figure 1> System Structure

If lecture contents XML document is stored, XML document conducts parsing of document and grammar verification within X-Machine. XML document for which grammar verification was finished is stored in XML Storage by Object Processor. In the above system XQuery is used as query language. XQuery is XML data query language having additional extension function such as data arrangement in addition to basic Xpath function that was made on the basis of Xpath Specification. If XML data is asked by using XQuery, Query Interpreter within X-Machine analyzes such request and the result is to be given in a type of XML. X-Node provides the function of integrating lecture contents data source such as Oracle9i and RDBMS into XML. X-Tension also makes it possible to add user-defined function to Server as extended module. [8]

### 3.2 Lecture contents DTD

As classes are being given, the contents are posted on Web by their being separated by each Chapter. The information of each Chapter consists of subject code, subject name, Chapter number, Chapter subject, lecture contents, practice materials and reference materials. Lecture contents may be posted several times and practice and reference materials were made to be selectable.

```
<!ELEMENT sfop_lecture (sfop_ch_lecture_code, sfop_ch_lecture_name, sfop_ch_head, sfop_ch_title,
sfop_ch_exercise*, sfop_ch_ref?, sfop_ch_contents+)>
<!ELEMENT sfop_ch_lecture_code (#PCDATA)>
<!ELEMENT sfop_ch_lecture_name (#PCDATA)>
<!ELEMENT sfop_ch_head (#PCDATA)>
<!ELEMENT sfop_ch_title (#PCDATA)>
<!ELEMENT sfop_ch_exercise (#PCDATA)>
<!ELEMENT sfop_ch_ref (#PCDATA)>
<!ELEMENT sfop_ch_contents EMPTY>
<!NOTATION Power_Point SYSTEM "http://yb.woto.net/program/POWERPNT.EXE">
<!NOTATION Hwp SYSTEM "http://yb.woto.net/program/HWP.EXE">
<!NOTATION Moving_Image SYSTEM "http://yb.woto.net/program/WMPLAYER.EXE">
<!NOTATION e_Board SYSTEM "http://yb.woto.net/program/GbtPlayer.exe">
<!NOTATION e_Image SYSTEM "http://yb.woto.net/program/ACDSee32.exe">
<!ATTLIST sfop_ch_contents
SRC CDATA #REQUIRED
TYPE NOTATION(Power_Point|Hwp|Moving_Image|e_Board|e_Image) #IMPLIED>
```

Virtual classes are being given, the contents are posted on Web by lecture unit (by Chapter). The information of Chapter may include Chapter number, Chapter subject, educational contents, and practice example and materials (including utility). Since programming and other practice examples for computer language education composes most of source parts, program elements were defined for such parts. In addition, it also includes other quotation (Power point, Hangeul, Word, Excel...), moving picture or image, and actual cyber lecture (lecture by electronic blackboard, power point lecture by a baton), etc.

Following picture is lecture contents schema, which can store various multimedia contents that is Non XML and enables the user to search for them.

### 3.3 Multimedia lecture contents Schema

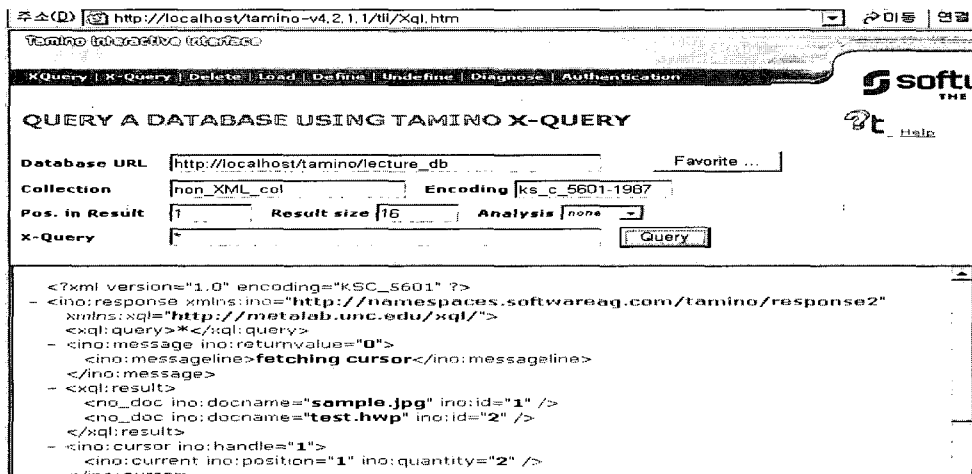
```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs = "http://www.w3.org/2001/XMLSchema"
xmlns:tsd = "http://namespaces.softwareag.com/tamino/TaminoSchemaDefinition" >
<xs:annotation>
<xs:appinfo>
```

```

<tsd:schemaInfo name = "non_XML">
  <tsd:collection name = "non_XML_col"/>
  <tsd:doctype name = "non_doc">
    <tsd:nonXML/>
  </tsd:doctype>
</tsd:schemaInfo>
</xs:appinfo>
</xs:annotation>
</xs:schema>

```

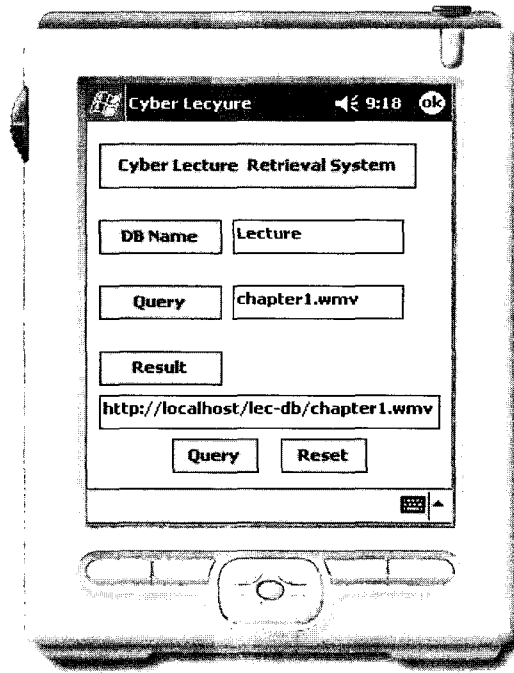
### 3.4 Non-XML data search embodiment that use X-Query



<Figure 2> Search result that use X-Query

X-Query search language embodied in <Figure 2> is a screen searched using XQL and Xpath 1.0 standard published by W3C as node and a recommendation. In case of search of XML or non-XML document and when document structure is searched in a node unit, search for non-XML data was performed that was stored by using XQL-based independent query formula on the basis of Xpath 1.0.

### 3.5 Non-XML data search embodiment in PDA that use ADO.NET



<Figure 3> Search Result

Database MS-SQL search that use ADO.Net embody . Because ADO.NET uses XML by data exchange means optimizing in rain connection oriented environment, Firewall exceed and connect to database in all-important case and design as can do free data exchange between Component .

## 4. Conclusion

This paper, Proposed system about XML in PDA and cyber lecture contents search of non-XML base using X-Query and ADO.NET that offer XQuery and Tamino.

In this paper, I described an efficient search for various multimedia including pictures, moving image, cyber lecture contents Instead of text-centered lecture contents.

It is required that it must be designed for learners to easily search it on Web, and also various indexing technique for efficient search and a study of various search skills for voice recognition which integrated natural language must be performed.

## 5. Reference

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