# The Development of Digital Library System for Drug Research Information

## H.J. Kim, S.R. Kim, D.S. Yoo, S.H. Lee[a], O.K. Suh[a], J.H. Cho[a], H.T. Shin[a], J.P. Yoon[b]

Drug Information Research Institute, [a]College of Pharmacy, [b]Department of Computer Science,
Sookmyung Women's University

## Abstract

The sophistication of computer technology and information transmission on internet has made various cyber information repository available to information consumers. In the era of information super-highway, the digital library which can be accessed from remote sites at any time is considered the proto-type of information repository. Using object-oriented DBMS, the very first model of digital library for pharmaceutical researchers and related professionals in Korea has been developed. The published research papers and researchers' personal information was included in the database. For database with research papers, 13 domestic journals were abstracted and scanned for full-text image files which can be viewed by Internet web browsers. The database with researchers' personal information was also developed and interlinked to the database with research papers. These database will be continuously updated and will be combined with world-wide information as the unique digital library in the field of pharmacy.

## Keywords

Digital Library; Full-text image Database; Illustra; Pharmaceutical

## Introduction

The advancement of computer technology and the expansion of computer network has introduced digital library, a totally new concept in the library system. In the digital library system, it assumes information repositories scattered throughout the world as a virtual space available for gathering information and supports networking among various systems with heterogeneous characteristics. It provides multimedia information expressed as image, sound, and video to users in addition to text. It also should provide efficient information retriever interface, which can help users in retrieving accurate information they want from enormous amount of information available.

In many nations including the U.S., various research projects are currently underway in order to develop digital library with diversified functions which target various academic fields and media. These emphasize the importance of effective production, circulation and utilization of massive amount of information. From the very beginning, the steady attention has been given to researches on the development of digital library for medical and pharmaceutical fields because it has a direct relationship with the improvement of public health system. Our digital library system is the very first digital library in Korea with database on drug research information, a prototype of its kind. It was developed to provide pharmaceutical researchers and related professionals with prompt, accurate and comprehensive service in providing the original texts.

Our system is linked to the network, and pharmaceutical and medical researchers are assumed to be users of the system. Various primary resources necessary for research have been converted as the image database. Also, the abstract and bibliography of each paper have been included for ready retrieval.

## Organization and Functions of the System

### Organization

The database management system (DBMS) used in the development of our system is Illustra V. 3.2. Illustra can store and manage number, letter, text, video, image, and document as one by adding object-oriented function to preexisting relational model. It can provide more efficient language for questioning by managing complicated and various types of database in object-oriented manner. It also can improve efficiency of the system by supporting consistency. These are all possible by inserting object expansion module, DataBlade, and various DataBlade allows the system to efficiently manage data that are asked by specific application program. [5]

Our system used Web DataBlade and PLS text DataBlade. Web DataBlade supports web server Application Program Interface (API) and this way web and database are linked without using Common Gateway Interface (CGI). PLS text DataBlade used in the index and retrieval process supports natural language management process and illogical operator. [6][7] Figure 1 represents the organization of the system.
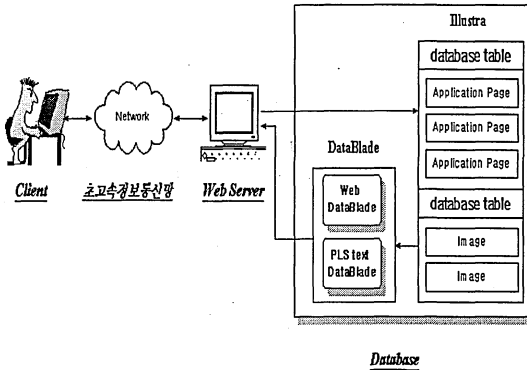
*Figure 2 - Organization of the System*

## Functions

Our system has the following 4 functions.

### Input of the Original Texts

There are two ways to digitalize original texts: converting to ASCII code by inputting original texts using keyboard and creating image file using scanner. The advantages and disadvantages of two methods have been reviewed extensively elsewhere. [3][9] Our system used the latter method because in the network of information super-highway the size of the image file, which is considered to be the biggest advantage of the image file, is not considered a big problem.

Collected original texts are saved as image file using scanner. The bibliography and abstract of each text are separately saved in the database and used to create index file.



*Figure 3 - Retrieval Interface Screen*

### Indexing

PLS text DataBlade module of Illustra creates index file for the bibliography and abstract. In the process of auto-indexing, disused words are eliminated and boolean, proximity, wildcard operator provided by PLS text DataBlade are applied in order to create an index.
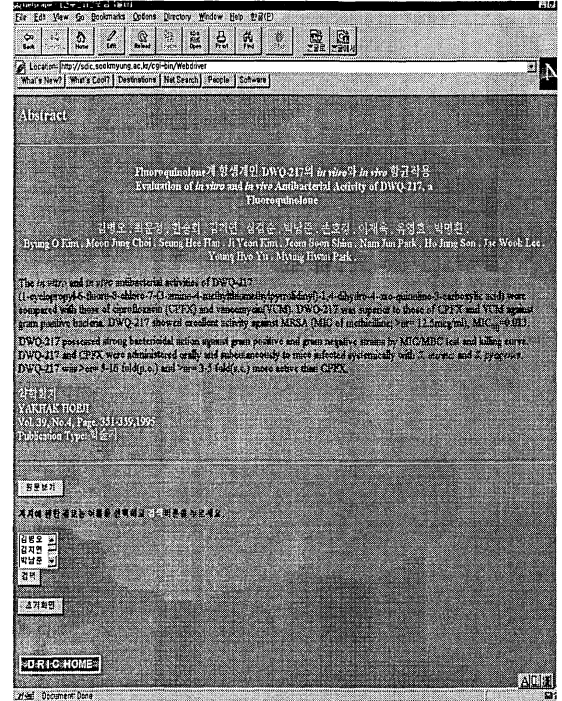


*Figure 4 - Bibliography and Abstract Output Screen*

### Retrieval

Our system provides keyword retrieval service and full-text retrieval service utilizing abstracts. Since our users are pharmaceutical and medical researchers and not lay people, it is more efficient to use keyword input method instead of retrieval interface using menu. The following list is an example of retrieval field provided for a text by our system and figure 2 is the picture of retrieval interface screen of our system.

- author
- title
- abstract
- name of journal, year, volume, issue number
- year published
- type of journal (academic journal, proceedings, research reports, etc.)

### Output

Retrieved texts are provided in three different ways according to request of the user. Figure 3 is the final screen displaying retrieved abstract and bibliography.

- title :         displays title in both Korean and English
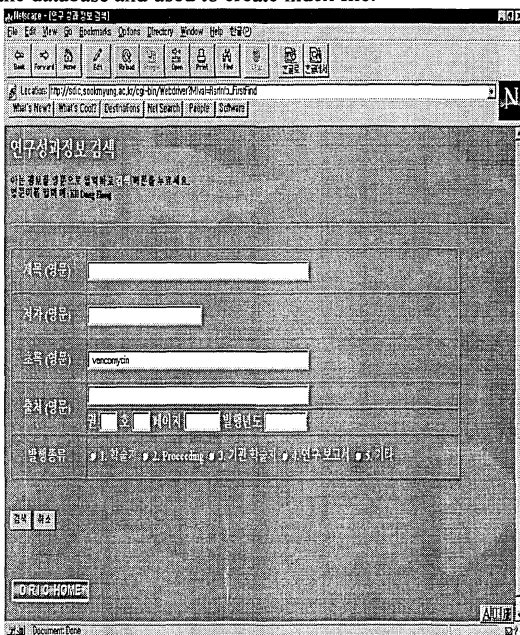- bibliography: displays detailed bibliography and abstract

- image file : displays image file of a retrieved text, able to display each page separately or whole text as a single image from image file

## Methodology in the System Development

In order to provide comprehensive research information in pharmaceutical and medical fields, we initially selected and collected 13 academic or institutional journals which are listed below.

- Pharmaceutical Society of Korea : Archives of Pharmacal Research
- Korean Society of Applied Pharmacology : The Journal of Applied Pharmacology
- Biochemical Society of the Republic of Korea : Journal of Biochemistry and Molecular Biology
- Korean Society of Pharmaceutics : Journal of Korean Pharmaceutical Science
- Korean Society of Hospital Pharmacists : Journal of Korean Society of Hospital Pharmacists
- Research Institute of Pharmaceutical Science, Sookmyung Women's University : Journal of Pharmaceutical Science
- Pharmaceutical Society of Korea : Journal of the Pharmaceutical Society of Korea
- Korean College of Clinical Pharmacy : Korean Journal of Clinical Pharmacy
- Society of Korean Ginseng : Korean Journal of Ginseng Science
- Division of Medical Chemistry, Korean Chemical Society : The Korean Journal of Medicinal Chemistry
- Korean Society of Pharmacognosy : Korean Journal of Pharmacognosy
- Korean Society of Pharmacology : The Korean Journal of Pharmacology
- Korean Society of Toxicology : The Korean Journal of Toxicology

In order to develop the system, Solaris 2.4, Sun sparc server 1000E, 32G storage array Raid-5, and main memory 128M were used. Collected journals were converted to gif image file with 300dpi resolution using scanner. Abstracts were converted to ASCII code using OCR program. Each bibliography was inputted into database using keyboard.

## Conclusion

Digital library for drug research information has provided an environment to develop comprehensive database of major journals representing pharmaceutical and medical fields. Because this system can be linked through either information superhighway or internet, users can readily retrieve drug research information they want from remote sites and download original texts from their home or office.

These functions of digital library allows researchers to avoid doing repetitive researches among researchers since vast amount of information is produced in this field. It also provides researchers with prompt and accurate information retrieval and smooth communication among themselves. Our system strives to be a professional digital library system with variety of functions in addition to providing original texts. Thus, we plan to continue to update information and improve the system by resolving existing problems of difficulty in handling Korean, utilizing various retrieval methods, and linking with other digital libraries.

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### Address for correspondence

Hyun Taek Shin
Pharm.D. College of Pharmacy
Sookmyung Women's University
53-12 Chungpa-dong
Yongsan-ku
Seoul 140-742 Korea
E-mail: shingo@sdic.sookmyung.ac.kr