I&R SYSTEMS ON THE INTERNET/INTRANET CITES AS THE TOOL FOR DISTANCE LEARNING

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Abstract: This article considers the Internet/Intranet information systems as the tool for distance learning. Author considers the model of the 3-tier WEB based information system, the idea of the language for implementing and customized solution, which includes the original language and processor for fast prototyping and implementing small and middle sized Internet/Intranet information systems.

Keywords: I&R Systems, client-server architecture, distance learning

ACM Classification Keywords: I&R Systems

Introduction

The distance learning takes an important place in the world. The useful tools for implementing such systems are small and middle Internet/Intranet based I&R systems.

This article considers the problems of designing, implementing and classifying these I&R systems. Author proposes the conceptual model of architecture of the system and describes the original tools those were created for prototyping, implementing and maintaining small and middle WEB based I&R systems.

Problems and Goals

Now there is an expansion of the tasks those are related to the designing, implementing, developing, supporting and maintaining Internet/Intranet based I&R systems. These tasks are related to the developing and supporting access to various databases using standard protocols for supporting the data transport layer (search engines, I&R systems, etc.). There are large amount of systems those solve the task of integrating I&R system with the database management systems and allow prototyping of the resulting documents. The sample of such systems is Oracle WWW. Unfortunately lot of these systems is oriented for one particular operation system. The sample is Microsoft Peer WEB server. Other systems require specific software on the server and client sides. The sample is Lotus Notes.

The important problems and aims of the designing, maintaining and supporting Internet/Intranet based small and middle I&R systems are following.

1. Choosing of the method of the representation of the information (the information architecture of the system)

2. The user interface of the system

3. The tools those allow prototyping and maintaining the user interface and whole system using the model of information representation, which has been selected.

The conceptual model and tools for prototyping, supporting and maintaining middle and small Internet/Intranet based I&R systems are described below.

Information Architecture

The information architecture includes two following key aspects.

1. The functional interaction with end user.

2. The methods of categorizing of information (the main method and the alternative methods

From functional prospective interaction user with I&R system can be considered as searching information; constructing queries and browsing the results.

Generally there are two main types of searching, which are the full-text search and the categorical search. The sequential browsing of the articles (insight, learning) is a degenerate search, which implies switching to the next document in the document's list by default.

According to the approach [Wurman Richard Soul, 1996] it is possible to consider five following methods of structuring information inside I&R system (LATCH-model) using following criteria.

1. L – Location (by the geographical location)
2. A – Alphabetical (by the lexicographical order)
3. T – Time (by the time of the events)
4. C- Category (by the category of the object)
5. H – Hierarchy (By the hierarchy of objects. For example moving from little to largest, depending on changing thickness, color, etc.)

Taking a decision as to the main and alternate methods of structuring of information is a first step in designing information architecture of the I&R system. These methods should take into account the features of human work during obtaining the creative solutions. They includes iterative cycle for generation of the hypothesis, verification, decomposing the problem for components, various methods for solving each particular task, spontaneous switching from one method of solving to another method. The history of the Internet I&R systems proves this thesis. Some those systems have been started like a specialized list of Internet resources. For example Yahoo has been started like a list of useful resources on the user's homepages. Other systems were started like a full text searching systems (Lycos, AltaVista). Now all providers of such services allow both searching methods as the complimentary methods.

User Interface of I&R System.

Now only basic set of interface elements is defined. This set includes only "atoms" (edit control, text box, and tree or list box) for constructing graphical user interface. The items for designing and implementing the high level paradigms of the interfaces like encyclopedia, textbook, I&R system only become to be formalized and standardized. From one hand these metaphors are based upon various paper editions those gave us such metaphors as the contents, the indexes, the tables of the illustrations so on. From other hand it is based upon new metaphors those were given us by the IT technologies. The best sample is an evolution of the hypertext systems. The programmer must fill the gap between these metaphors and basic elements by mean constructing various shields those allow experts in the particular areas to organize the information.

Choosing of the information architecture is an important problem. But beside of this problem there are needs of supporting I&R products, keeping these products in the actual state, the relations between developers of the system and the system users. For example it is reasonable to inform the user about known bugs, available patches and extensions of the system.

Lack of standards for information metaphors complicates joining information arrays and the interactions between different I&R systems. New interface elements came during solving particular tasks from the real life. The examples are the meta-tags in HTML page, the formats of the hypertext I&R systems like WinHelp so on. But generally the sphere of actions is still open in this area.

Conceptual Model of the I&R System

The analyzing of existing I&R systems gives the base for defining the conceptual model of the I&R system. The following statements describe the requirements for this conceptual model.

*   The information inside system must be represented by the linear set of the information articles
*   Each article must be included in one or more index sequences those are the links and represent the hierarchies.
*   Each article id and the path in the hierarchy must represent the addressing method for particular article.
*   The UI must be determined using frames.
*   Navigation must be depend on the method of the article's addressing (the frame state or the article body)
*   Full text search must allow the following

- determining the query conditions using the regular expressions;

- stating the limitation of the searching range

- browsing list of articles those were found.

- The possibilities for providing the feedback to the authors and to automatic notification about the system's sate changes must be allowed for the registered users.

Tools for Prototyping and Maintaining I&R Systems

The tools for prototyping, implementing and maintaining of the small and middle I&R Internet/Internet based systems have been developed taking into account the conceptual model of I&R system, which is described in the chapter above. The 3 tier client-server based solution has been used for the implementation of the software package, which allows prototyping and supporting of the hypertext documents using the tabular text data. The transport layer protocol is the HTTP protocol. The server part of the system also uses the CGI convention for the HTTP servers. The client side has no restrictions. Any standard WWW-client (Microsoft Internet Explorer, Netscape Navigator, Lynx so on), which supports HTML 2.0 standard for the hypertext document representations can be used.

The functional interactions between system components are represented on the picture 1.
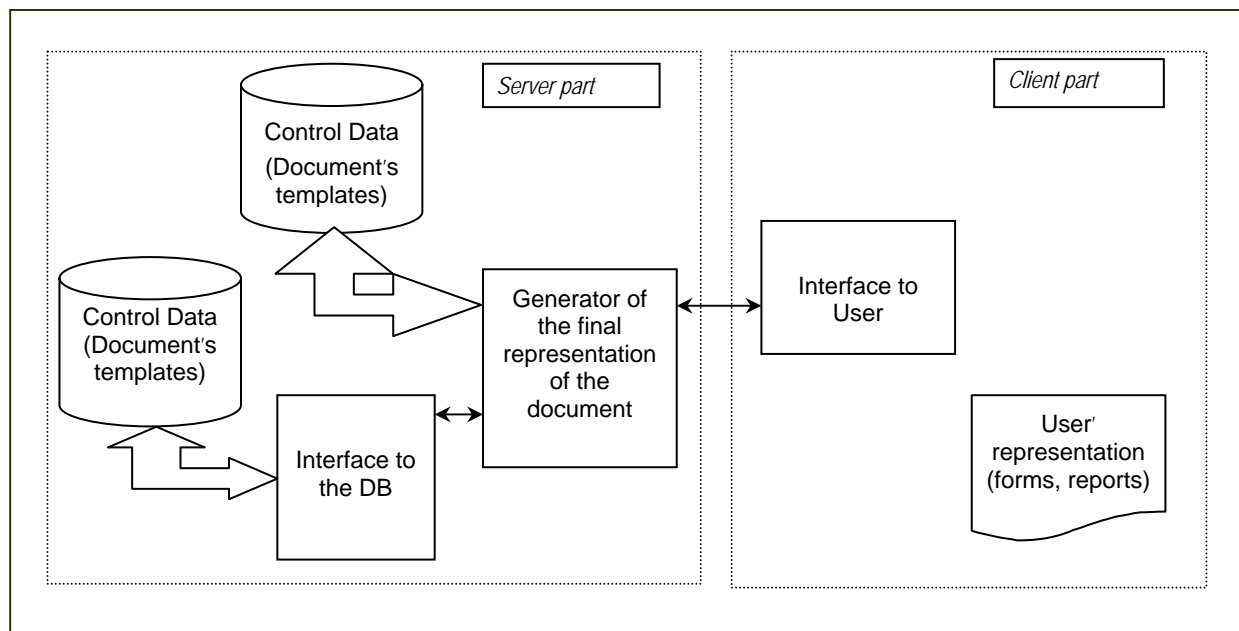
Picture 1

This system has a 3-tier architecture. The first layer is an interface with the database. The second layer is a business rules of the data mussing. The third layer is and client application's interface.

On each step of the processing the generator of the final representations of the documents constructs the resulting document. This document is going to be delivered to the user using the standard WWW server and HTTP protocol. Then the client part allows browsing and printing of the resulting document. Usually this functionality is allowed by the standard WWW client.

System data structures.

All main data structures are represented by the text files.

The input data for the processor of the document templates are the following.

1. The document template.

2. The tabular data those are used during constructing the resulting document.

The program on the document template description language delivers the necessary for constructing resulting document information to the documents template processor. The tabular data can be also inverted and indexed for optimizing an access and allowing filtering of the corteges using the key.

The result of executing is a text document that corresponds to the requirements of [T.Berners-Lee, D. Connoly, 1995]. This document is constructed basing upon the tabular data and can be browsed using any standard WWW browser, which supports the HTML 2.0 or higher as an input language.

Work languages of the system

The system supports two internal programming languages for operating benefits. These languages are

1. The language of description of the document template
2. The language of the tabular data representation.

The language of description of the document template

The main goal of the document templates description language is allowing parameterization of the final document representation that is based upon the tabular data those are kept on the server.

The current state of the execution system is determined by the triplet <the current operator of the language; the current data table; the number of the record in the current data table>.

The macro command is the operator of the language of description of the document templates, which invokes changing of the parameters of the execution system (new table is opened; new part of the output text has been generated, etc.)

The macro values are the objects of the incoming program. These objects are connected to the particular input data of the particular current table.

The macro function is the operator of the language, which does not change the state of the execution system. It generates only the data those do not directly based on the data from the current table.

Using of the macro is using of the macro function, macro value or the macro function in the text of the program.

The language of description of the documents templates is implemented as the language of using of the macro. The program on this language is a document template. The document is represented by the superposition of the constant parts and using of the macros. The constant part is unchanged and does not depend on the input data. The macro represents the variable part. The representation of this part may be changed depending on the content of the input tables and input parameters of the execution system.

There are three following functional groups of the operators, macro variables and functions of the language.

1. The operators those conduct the process of the program executing and include the operators of branching and of cycling.
2. The operators those support the database layer interaction. These facilities allow to set the current table, set the current record, extract the particular domain value.
3. The auxiliary operators and macro functions those support the interaction with operation environment like access to the CGI interface parameters and to the system environment variables. Also these operators and functions include the data conversion functions.

The language of the tabular data representation.

This language allows the tabular representation of the source data. This representation has an internal format, which is specific for the particular system. Each table is represented by one file, which contains all corteges of the table. The attribute is the number of the domain in the cortege.

Conclusion

This article

- Introduces the conceptual model of information representation, which covers a big number of the encyclopedia-like systems those provide the standardized toolset of searching and browsing facilities. Embedded facilities for providing the feedback for the end user and announcing of the user simplify support of various life stages of the I&R system. The set of information metaphors has been considered. This set includes the basic high-level definitions of the I&R systems' interface items. These items allow description, fast prototyping and implementation of these systems.

- Considers the key features of the software package that has been developed and implemented. The package implement the I&R system's model, which has been discussed above. The distinguishing features of these tools are below.
    1. The package provides flexible and simple mechanism for support interaction between HTTP server and data, which have a tabular presentation.
    2. The package allows a cross-platform data transfer. The formats of templates of the text documents and the formats of the tabular data do not depend on the choice of the operation system. It is also possible to transfer the processor of the text document templates between various operation systems.
    3. The set of the resulting documents can be easily extended by mean ether changing the tabular data or extending the set of document templates.

Some intermediate project were already implemented using the conceptual model of the I&R system and the software package those have been discussed above. These projects were published as small and middle WWW sites in Internet and Intranet networks.

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USING ELEMENTS OF SEMANTIC PARSING IN E-LEARNING ENVIRONMENTS

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Abstract: Possibilities for using semantic parsing to estimate the correspondence of text materials to teaching aims, correspondence of test task to theoretical materials and other problems arising during the distance course designing and educational process itself in e-learning environments.

Keywords: semantic parsing, e-learning environments, distance courses, teaching aims.

ACM Classification Keywords: K.3.1 Computer and Education: Computer uses in education

Introduction

A lot of researches are devoted to the possibilities of applying artificial intelligence tools in educational systems. The analysis shows that much attention is paid to semantic analysis. In particular there are many tools that use semantic analysis in automated assessment of student's complete answer to some question. Investigations conducted by the Modeling and Software Department of Kryvyi Rih Technical University show that possibilities of semantic analysis application in educational environments are considerably wider. In particular at the stage of distance courses design using semantic parsing it is possible to estimate the correspondence of text materials to teaching aims, correspondence of test tasks to theoretical materials used. During the process of training the elements of semantic parsing can be used for estimation of richness of messages content. The present article is devoted to the realization of these and other possibilities.