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Structuring of Textual Data and its Processing with Database Management Systems in the Development of Computer Assisted Testing Systems for Students

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Abstract: This study considers one of the approaches to solving the task of structuring textual information and its further processing by the data base management systems with the purpose of applying this approach to the development of the computer assisted testing system for students. Import of the tests stored in a form of Microsoft Word template into the corresponding database tables with their subsequent processing in the database environment is one of the main tasks to be solved with the use of computer assisted testing system. Based on the results of the solution of the problem, a software product for import of Microsoft Word documents into the MySQL representations for structuring unstructured data has been developed.

Key words: Introduction of structuring data, data base management systems, Microsoft Word, computer assisted testing system, Borland Delphi, MySQL, object linking and embedding

INTRODUCTION

In today's world, people are constantly faced with a large amount of information which must be organized and brought into a convenient and conventional form. This can be accomplished by structuring information. Traditionally, information structuring operations provide for the allocation of individual units to be submitted in the form of tables which are further used for its processing in the Data Base Management Systems (DBMS) environment. Structured tables are widely used in the solution of a large class of problems in various fields of human activity.

This study outlines a method of structuring textual information which can be applied to computer testing and training. This method features several advantages over other methods which include fast processing, instant results, etc. Therefore, this research may be relevant to and useful for educational activities.

The purpose of this study is to describe an approach to accomplishing the tasks of structuring data and its further processing using a database. This approach is used in the development of the Computer Assisted Testing System for Students (CATS). One of the main problems that have to be solved by CATS is the import of tests templates stored in Microsoft Word documents into the corresponding database tables and their subsequent processing using DBMS.

MATERIALS AND METHODS

To implement this task an Object-Oriented Programming Language (OOPL), Borland Delphi 7 was used. The test interface was designed by means of this language.

OOPL Borland Delphi is one of the most popular and effective tools for the development of complex software applications capable of integrating the MS office applications into OOPL Borland Delphi projects (Kornyakov, 2005). The OOPL Borland Delphi environment provides an opportunity to access objects by accessing their methods and receiving and setting their properties. Starting with the Delphi 5 these functions have been supplemented by a set of components that research with MS Office applications.

The development of Component Object Model (COM) technology continues in its subset- Object Linking and Embedding (OLE) automation technology. Its advantage is that it allows the use of COM not only for compiler type languages but also for interpreters and provides a link to the methods being used in the runtime stage. Delphi IDE supports the activation of server automation methods. For example, the files that become accessible to the program only do so after the file has been opened (Faronov, 2008).

Analysis: To develop an interface for importing test patterns data stored in MS Word and their processing in the DBMS, it is necessary to solve a series of subtasks using OOPL Borland Delphi 7, namely:

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- Create a connection to MS Word
- Open an existing MS Word template
- Import the existing MS Word template into DBMS
- Edit the MS Word documents
- Complete the research with the template and when finished, disconnect from the server

The 1st step: Connection to MS Word by the Borland Delphi 7 tools is carried out as follows:

Algorithm
Initially the variable "var Application: variant" is announced;
Then, it is necessary to create an OLE object "Word.Application" and assign it to the variable
begin
Application: = Create ole object ('Word.Application');
end;
This procedure is called "creating a server instance" (Kornyakov, 2005)

The 2nd step: Open an existing document (MS Word test pattern) after creating a server instance to import it into the database.

Opening a MS Word document: Opening an existing document in MS Word is carried out by the open method. The description of the open method (file name, read only, add to recent files, pass word document, pass word template, revert write pass word document, write password template format, encoding, visible) (Kornyakov, 2005) is shown in Table 1. For example, to open a new MS Word document "c:\test.doc", open method is applied as follows:

Application.Documents.Open (c:\test.do'c)

The 3rd step: The sets of objects (OLE objects) are called "collections". A collection is similar to a dynamic array. It contains a set of objects usually of the same type (Darakhvelidze, 2003). Access to an element is carried out either by its ordinal number or by the name. For example, all of the opened test patterns are a collection.

Reference to the document: Item method is used to refer to the opened document by import form as an element of a collection. Form is the most important visual component. The resulting form is a window in MS operating systems which is a central part of almost any application (Hoffman, 2003). For example, a reference to a document can look like this:

Application. Documents. Item

To research with a document, it is necessary first to activate it to prepare it for editing or other operations. Activation of MS Word documents is executed by the activate method. Activation of documents by file name is executed as follows:

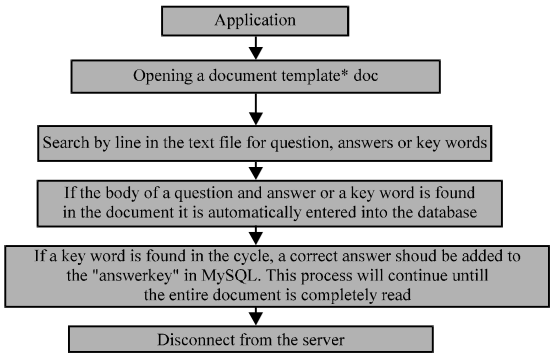


Fig. 1: Process of importing a document into a database

Table 1: Open method

Methods	Meaning
File name	This parameter specifies the file name including the path
Read only	If true, open the document as read-only
Add to recent files	If true, resolve to add the name of the file. Add it to the list of recently opened files
Password document	Password of document which is being opened
Password template	Password of the template which is being opened
Revert	Option provided to open a file with a name which is currently opened
Write password document	The password for the document which is being saved
Write password template	The password for the template which is being saved
Format	A file converter which is necessary for opening the document
Encoding	Encoding to view a document
Visible	Visible opening of the document

Application.Document ("C: \ test.doc"). Activate

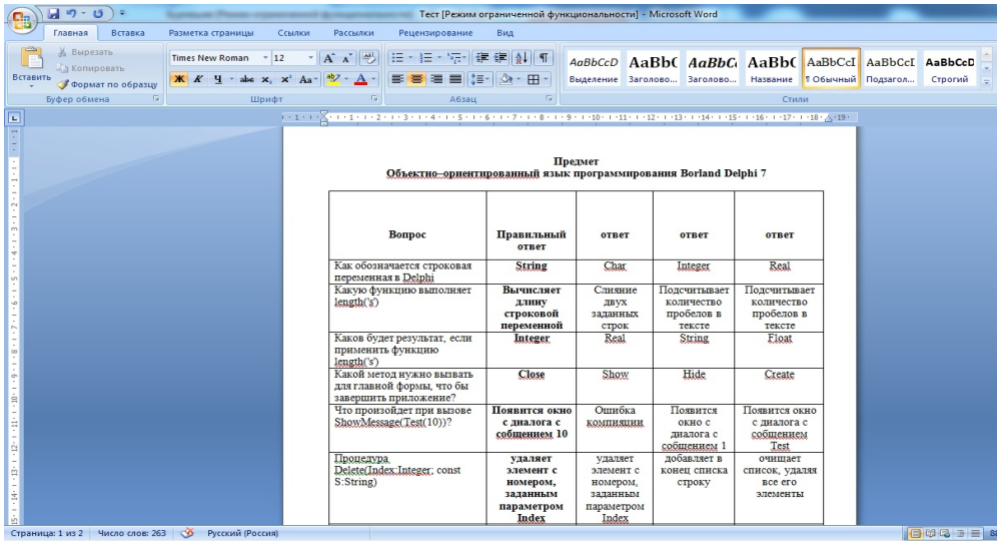
It is possible to refer to the active document using the active document property. Closing the active document is carried out as follows:

Application. Active document. Close

The 4th step: To import MS Word documents into a MySQL database management system, a corresponding algorithm should be created. Let's consider the hierarchy of OLE methods and the properties of the OLE object. In its simplest form (Fig. 1).

RESULTS AND DISCUSSION

In the software product, the object of the application contains a collection of tests templates (a collection of questions, answers and keywords) and if while reading the document, the key words "correct answer" is found, the correct answer will be automatically added into the field "answerskey". This process continues until the



Предмет
Объектно-ориентированный язык программирования Borland Delphi 7

Вопрос	Правильный ответ	ответ	ответ	ответ
Как обозначается строковая переменная в Delphi	String	Char	Integer	Real
Какую функцию выполняет length('s')	Вычисляет длину строковой переменной	Слияние двух заданных строк	Подсчитывает количество пробелов в тексте	Подсчитывает количество пробелов в тексте
Каков будет результат, если применить функцию length('s')	Integer	Real	String	Float
Какой метод нужно вызвать для главной формы, что бы завершить приложение?	Close	Show	Hide	Create
Что произойдет при вызове ShowMessage(Test(10))?	Появится окно с диалога с собщением 10	Ошибка компиляции	Появится окно с диалога с собщением 1	Появится окно с диалога с собщением Test
Процедура Delete(Index:Integer; const S:String)	удаляет элемент с номером, заданным параметром Index	удаляет элемент с номером, заданным параметром Index	добавляет в конец списка строку	очищает список, удаляя все его элементы

Fig. 2: Template tests in MS Word

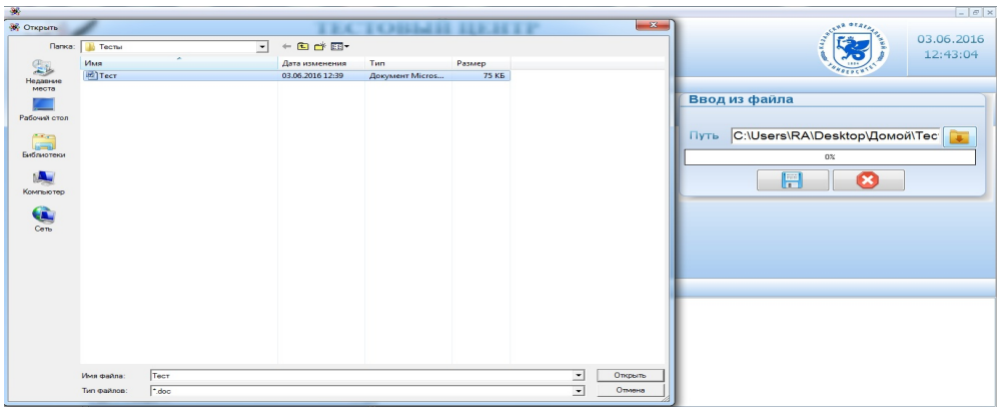


Fig. 3: MS Word file import database

entire file is completely read. After all necessary steps have been taken the program disconnects from the server and completes the import of information from the document into the database. The description of the OOPL Borland Delphi 7 code for data import from MS Word documents into MySQL databases is shown Fig. 2 and 3:

Alogrithim:

// If, when reading, the document keyword "correct answer" is found then it is automatically added to the 'answerskey' field
if (MSWord.ActiveDocument.Range(a,b).tex = 'keyword') or (MSWord.ActiveDocument.Range (a, b).text = 'key word') then
then
begin
a: = a+7
k: = kQL+1
panswerskey: = trim (MSWord.ActiveDocument.Range (b+1, b+2). text)
if panswerskey = "then panswerskey: = trim (MSWord.Active Document.Range (b+2, b+3). text)
//Add a new record to the table
MS Word. Active document.Range (c, j). Select
MS Word. Active document.Range (c, j) .copy
//Insert OLE object
Temp-OLE.PCATSe
OLE: = FindComponent (Temp-OLE') as TOLEContainer
with OLE do begin
//Create a thread associated with the blob field
Save to stream (ff as TStream)
Try except
on E: Exception do
begin
end
q1. sql. Clear
q1. sql. text: = 'Insert into vopros (vopros, idlanguage, idunderthemes, answerskey) values (:b,'+q2.fieldbyname ('id') asstring+punderthemes + panswerskey+)'
q1. parameters. parse SQL (q1.sql.text, true)
q1. parameters.parambyname ('b') Load From Stream (ff, ftblob)
q1.execsql
except
end
//Destroy Feed
OLE. Close
Temp-OLE. Close
ff.Free
ff: = Tmemory Stream. Create end

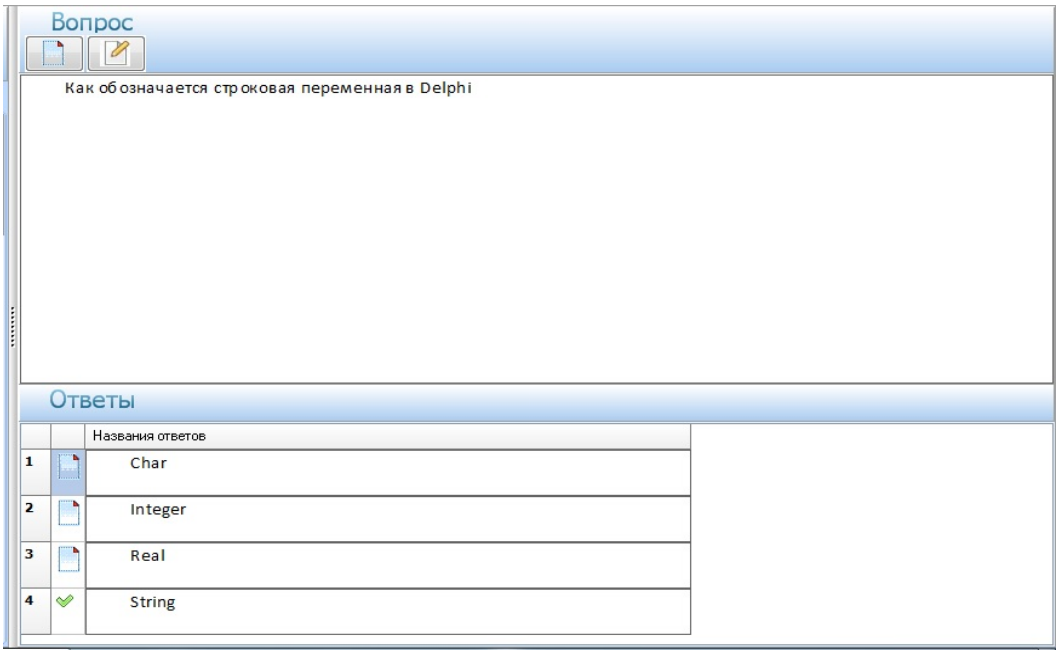


Fig. 4: Results of tests template import

A practical result of this report is the development of a new software tools providing the import of Microsoft Word documents into MySQL databases. The basic steps necessary for structuring data and post-processing databases are shown below: template MS Word tests subsequent selection of the template to import into the database (Fig. 3) and view of the results (Fig. 4).

CONCLUSION

Based on the approach presented in this study, test structuring has been carried out and an interface providing software tools for the import of test templates, through which a software product runs and compares each sample with a keyword in table has been developed. As a result, classification in the system will be revealed.

Delphi provides many opportunities for programmers to create applications that can interact with external programs such as Word, Excel, Internet Explorer, Outlook and others using Windows mechanisms for data sharing and their subsequent structuring.

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