

# The Join Programming Technology for Visual Query Module in Red Tide Data Management System Based on Visual Basic and MATLAB

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**Abstract:** MATLAB is created by Mathwork Inc. U.S.A. It is a favorite maths tool software. It has powerful abilities to dispose matrix and plot, so it is widely used in the world by engineers. Visual Basic (called VB) is a computer language based on the Windows operating system. Because of its ability to design interface conveniently and high-powered database programming, it has become a very powerful Windows programming language. In order to exert more strongly the advantage of the two language, the author explores the join programming technology of using VB and MATLAB. Be combined with the exploitation process of the visual query module in red tide data management information system, the paper introduces the method of calling MATLAB function in the development environment of VB 6.0 by using ActiveX automatization technique. Using the programme technology, the visual interface of VB programme and the Matlab powerful ability to plot are integrated adorably.

**Keywords:** red tide data management system; join programming technology; ActiveX; database; SQL

## 1 Introduction

VB (VisualBasic) is a Microsoft-based launched WINDOWS operating system easily to learn and use the procedure development platform, as it effectively avoided the C++ programming excessive red tape and the shortcomings of the abstract, at the same time can achieve the majority of Windows - Purpose, coupled with its powerful database access features convenient and efficient interface design capabilities, thus it becomes a very viable Windows programming language<sup>[1]</sup>.

MATLAB is launched by the U.S. MathWorks company in 1984, now it has become very popular among a vast number of engineering and technical personnel favor of mathematical tools. As MATLAB provides a lot of functions, the toolboxes and its powerful data-processing and graphics capabilities<sup>[2]</sup>, particularly when related to the matrix and vector form of issue, the superiority of its language than C or Fortran language is particularly prominent, Matlab has become the internationally recognized one of the most outstanding applications of science and technology.

The use of VB in the development of applications, if combined with strong Matlab mathematical calculation and graphics, VB will greatly enhance the efficiency of the design process and shorten the development cycle programming. Therefore, the mix use of VB and Matlab

programming is of great significance. In the actual development and application procedures, the general hope that the development cycle is shorter and often choose Visual Basic as a development tool. However, in these applications and often need to draw in some intuitive thematic map, which happens to be the most competent Matlab. Therefore, this type of application development, the most ideal solution is that VB in the graphical user interface development and other aspects of the advantages and Matlab in math processing and graphics combine the advantages of<sup>[3]</sup>, so that procedures designed to reduce the difficulty And greatly improve the efficiency of procedures designed to shorten the development cycle.

But it is regrettable that Matlab only for the use of C and Fortran programming language interface<sup>[4]</sup>, the majority of the VB programmers, is a great inconvenience. In order to play a full integration and VB MATLAB and the respective advantages, this paper will explain how to use VB structure main program, and through ActiveX technology in VB6.0 call and operation of Matlab, thus achieving the two languages mixed programming.

## 2 The basic principle

### 2.1 The concept of ActiveX

As in VB can not directly call Matlab, I use ActiveX technology to solve this problem<sup>[5]</sup>. The so-called ActiveX is a Microsoft Windows-based operating system

This work was supported by a grant from the National High Technology Research and Development Program of China (863 Program) (No.2005AA635200)

component integration agreement, which followed by a number of executable code ActiveX standardized components, such as a \*. exe, \*. dll files or \*. ocx. ActiveX allows applications or control of another application components or parts of the operation, use it, developers and end users will be able to come from different merchants ActiveX components seamlessly integrated in their application, thus completing a specific purpose. This is not only shorten the development time of the procedure, but also effectively avoid the duplication of low-level development. In the process of accession to ActiveX components, will develop and become part of the environment and for applications to provide new features. ActiveX components to retain some control of the VB general attributes, events and methods, the methods and its unique attributes greatly enhance the flexibility of the design process.

### 2.2 Matlab and ActiveX interface

Matlab language support ActiveX components embedded, it can use ActiveX technology and applications for any other interface, such as VB, Access and so on. This makes Matlab language to other software integration advantages and further enhance their functions. Automation makes Matlab ActiveX control and can be controlled by the application of other components. When the Matlab controlled by the other components, Matlab performance for the automation server <sup>[6]</sup>(Automation server); Matlab control when the other components, it is for the performance of automated customer (Automation client). Matlab provides an automatic target, its external name is Matlab.Application, it supports COM technology and other procedures through the COM be a function of technology to provide targeted support for the automation interface guide, by calling the interface functions can be controlled and targeted use of automation. As VB support ActiveX control-automation agreement, and Matlab support ActiveX automation server-side agreement, so if have established a VB application and Matlab link between the ActiveX automation, it can be a free call in the application of the Order of the Matlab.

### 2.3 Create ActiveX object

To create an ActiveX object, simply creat object assign function to return to the subject of an object variable, in a statement object variables can be used as object clause. For example:

```
Dim Matlab As Object
```

```
Set Matlab = CreateObject ("Matlab.Application")
```

Create a good ActiveX objects, will be conducted this operation, just as in VB to operate like other objects.

### 2.4 Operate the ActiveX object

Matlab.Application objects are three main methods,

namely Execute, GetFullMatrix, PutFullMatrix. Usage briefed as follows:

(1) BSTRExecute ([BSTRCommand])

Execute method of implementation will call Matlab implementation of a decision by the Command string of Matlab orders, all orders in Matlab window can be in the order of this type can be used, at the same time to return to the implementation of the order, drawing orders generated graphics window will be displayed on the screen .

(2) GetFullMatrix ([in] BSTRName, [in] BSTRWorkspace, [in, out] SAFEARRAY (double) \* pr, [in, out] SAFEARRAY (double) \* pi)

GetFullMatrix method specified Matlab work in a space of one-dimensional or two-dimensional array to the VB program, Name Matlab specified in the matrix of variables, Workspace specified in the matrix of the work space, pr respectively, and pi Is an array of real and imaginary parts.

(3) PutFullMatrix ([in] BSTRName, [in] BSTRWorkspace, [in, out] SAFEARRAY (double) \* pr, [in, out] SAFEARRAY (double) \* pi)

PutFullMatrix Methods VB program in a one-dimensional or two-dimensional array of Matlab sent to the designated work space.

### 3 Example

Red Tide Monitoring data visualization system for red tide monitoring data management, research and development of software for internal use. In order to manage the red tide monitoring data much more effective, the author used Microsoft SQL Server database data management. With this visual query system, users can limit access conditions on the database, searching to meet the

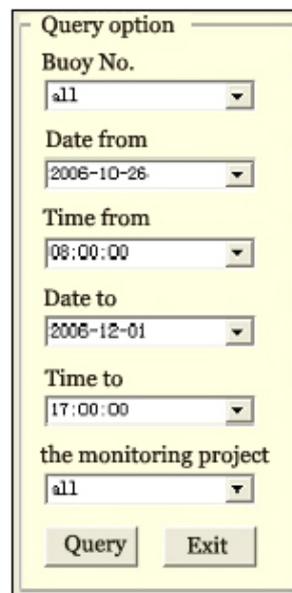


Figure 1.Users select query

requirements of the data sets will be stored in the array, as required by ActiveX automation technology Matlab sent to the designated work space, then can use Matlab for graphics.

### 3.1 Extract the red tide monitoring data

During this visit before the red tide monitoring database, first of all, with the following statements and the corresponding database establish a connection.

```
Public Cn As New ADODB.Connection
Cn.Open "Provider = SQLOLEDB;
Data Source = 'server name or IP address';
User ID =**; Password =**; Initial Catalog = ' database name '; Persist security Info = True"
```

Users can in VB Visual Interface conditions for the limited choice of district retrieval conditions, as shown in Figure 1. Furthermore, the process can use SQL statement to achieve the SQL Server database based on the red tide monitoring data retrieval, for example:

```
Dim strSQL as string; Set rs = New ADODB.Recordset
strSQL = "select 'database table field names' FROM ' database table ' where ' users query '
rs.Open strSQL, Cn, adOpenStatic, adLock-ReadOnly
```

### 3.2 Mapping by Calling Matlab

First of all, with the following statement to create an ActiveX automation object:

```
Dim Matlab As Object
Set Matlab = CreateObject ("Matlab.Application")
Then, ActiveX objects can be carried out this operation:
(1) call PutFullMatrix Methods VB program in a two-dimensional array sent to a designated work space base in Matlab.
Call MatLab.PutFullMatrix ("a", "base", MReal, MI-mag)
```

(2) the implementation of Execute method, called Matlab implementation of a series of Matlab command.

```
Result = MatLab.Execute ("set (gcf, 'visible', 'off');")
h = "plot (a (:, 1), a (:, 2:3 ), '*-'); grid on; axis tight"
Result = MatLab.Execute (h)
h = "h = legend ('PH value', 'temperature', 1); legend ('boxon')"
Result = MatLab.Execute (h)
Result = MatLab.Execute ("print (gcf, '-dmeta', path + \ filename.emf");")
Image1.Picture = LoadPicture (path & "\ filename.emf")
```

Procedures for the implementation of the results shown in Figure 2.

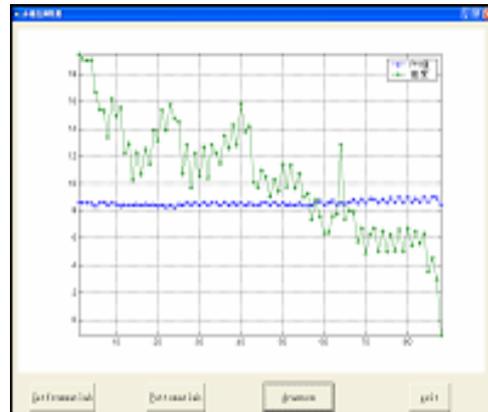


Fig.2 interface of Calling matlab graphics

## 4 Conclusions

In the rapid development of modern science and technology fields, the technical staff are all walks of life need to use a computer program to solve the daily life encountered in the wide variety of issues, division of labour among the various departments need to play to their respective strong points. In the field of software programming and improve the efficiency of programming, and sharing, cooperation, it is particularly important. The best use of the software platform, not only for the programming staff can save a lot of time, energy, and can also greatly enhance the efficiency of programming, programming save time, reduce programming errors and improve program results. In this paper, the integration of VB and MATLAB programming, and give full play to their strengths these two languages, and the VB Visual Interface and MATLAB powerful graphics rendering the effective integration of capacity and shorten the development cycle programming.

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