

Design and Realization of Teaching Demonstration System based on .Net

Ailian Wang^{*1}, Jinfei Ma², Yueming Qin³

¹Department of Computer Science and Technology, Taiyuan University of Technology Taiyuan, Shanxi, 030024, P.R.China

²Information Centre of Datong Tobacco Corporation Datong, Shanxi, 030024, P.R.China

³Technical Center, Taiyuan Heavy Machinery Group Co.Ltd Taiyuan, Shanxi, 030024, P.R.China

*Corresponding author, e-mail: ym4008cn@yahoo.com.cn

Abstract

In order to realize the systematic planning for teaching demonstration, this article proposed a teaching demonstration system based on .Net. The system adopted the techniques of Windows forms and serialization, Windows tree controls and the type and level of algorithm, component interface, advanced realization of windows graphics device interface, graphics drawing application programming interface, object link embedded, platform/assembly technology based on SOA, and was applied successfully in the development of the project, providing an effective method for informatization teaching.

Keywords: NET framework 2.0, tree controls, serialization, drawing API, COM, service-oriented architecture.

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1. Introduction

The combination of Information technology with education provided effective and convenient way for teaching system. To meet the requirements for modern teaching system, it is necessary to make teaching presentation by means of systematic planning. This teaching demonstration system was developed using Microsoft .NET Framework 2.0 and Microsoft Visual Studio 2005 developer kits. The adopted open architecture decreases the interdependence between system environment and the relevant operation platform to the lowest level and realized the information interflowability and interoperability. As a computer aided teaching tool, it solved the administration problem for electronic documentation such as electronic books, thesis, and exercises while providing index function according to date, type of document or abstract. This enriched the teaching methods and optimized the teaching resources [1-2].

2. Realization Analysis for System Function

The objective of teaching resources administration system is to collect, classify, organize and store the separate information resources relevant to teaching on network, and then distribute and share them via web technology. By this way can decrease the searching time, increase the efficiency of exit bandwidth of campus network and the level of utilization and sharing of the teaching resources in universities.

The system focused on organizing and handling media information such as scripts, pictures, audio and video used in teaching. Information can be grouped and edited according to the teaching program [3-4]. Interlinks have been created between the relevant contents so that it is easy to share the different types of features but related each other on the same topic.

The system also is a platform of education. Teachers can use it to prepare lessons and give instruction on line, thus increase the efficiency of campus network.

Microsoft visual studio 2005 has provided many methods used to develop application programs running on user local computer [5]. Under the environment of Visual studio 2005, program developers can create windows based applications and GUI by use of Form controls; develop windows service applications using SDK provided with Studio and .NET Framework 2.0. The latter has a rich group of class used to develop complicated program [6-7].

Common language run time library used GDI+ (advanced realization of windows Graphics Device Interface GDI), which can create graphics, drawn texts, and take graphics and pictures as objects to operate. GDI+ aims to provide performance and ease of use in the presence of graphics and pictures on windows forms and controls.

3. Key Technique Analysis

3.1. Windows Form and Serialization Object

The editing of catalog and demo content involves the organization of characters, graphics, videos and audios with different file format and uploading of these files to the system. Windows form is the smart client technique of .net framework.

.Net framework is a group of managed libraries of simplified common applications task. When using like Visual Studio development environment, smart client application can be created to display information, request user input and communicate with remote computers via networks. Windows forms can contain different controls to display textbox, button, combobox, radio button, and even webpage. And it has abundant UI controls to simulate the function used in advanced applications like Microsoft Office.

Serialization is the process to convert the object state to the retainable or transferable format. The opposition is deserialization to convert stream to object. The combination of the above two processes can be used to store and transfer data easily. Net framework provides both of the techniques.

Binary system serialization can keep the fidelity of reproduction, which is very useful to retain the state of object during call between applications. Via object serialization to clipboard can share objects among different applications. It can also serialize objects to stream, disk, memory and networks etc. Remote control system can use serialization to transfer objects between computers or appdomains in form of values.

XML serialization is only limited to common attributes and fields, it can't keep the fidelity of reproduction of the types, which is useful when just providing or using data and not limiting the application utilizing these data. It is a good choice for sharing data by web due to the openness of XML. SOAP is also a open type standard to make it an attractive choice.

3.2. Windows Tree Controls and the Type and Level of Algorithm

Windows TreeView control displays hierarchical structures of the nodes resembling windows explorer displaying files and file folders [8].The nodes in Treeview including other nodes called child node can be expanded or folded to display child nodes or father nodes. By setting CheckBoxes attribute to true, it can be also to display the treeview with check box beside the node. By setting the node attribute to true or false, the node can be selected or deleted by programming.

The type and level of algorithm realized setting type and level for demo contents, the key of which is to classify and store the contents according to user's requirement.

3.3. System IO Interface

System IO assembly Interface is used to realize access to disk system and the storage, extraction and transfer of demo contents by serialization object technique. It includes types of permitting reading and writing files and data stream and provides basic files and directories supported types.

3.4. GDI+ API Graphic drawing Interface

The interlink function can link the characters and graphics in one section of demo contents to the other section, which can be realized by GDI+ API graphic drawing interface and technique provided by .net Framework.

GDI+ is a kind of application programming interface (API) consisting of the subsystems of Microsoft Windows operating system. GDI+ is responsible for displaying information on the screen and printers. GDI+ API is opened by a group of classes deployed as managed code, which are called managed class interface of GDI+. They comprise the following interface assemblies:

```
System.Drawing  
System.Drawing.Drawing2D  
System.Drawing.Imaging
```

System.Drawing.Text
System.Drawing.Printing

It doesn't need to consider the detail of the specific display devices by using GDI+ when displaying information on screen or printers. Applications call the methods provided by GDP+, and then the methods call the specific device drivers. GDI+ separates applications and graphic hardware to create device independent applications.

System drawing assembly interface provides access to basic GDI+ graphic functions. Classes included in the assembly interface allow users to create and use various fonts.

Graphics classes provide the methods drawing to display devices, such as Rectangle and Point of packaged GDI+ elements. Pen classes are used to draw lines and curves, while classes derived from abstract Brush Class filling up interior of shapes [9].

System Drawing.Drawing 2D assembly interfaces provide advanced two dimension and vector graphic functions, which include shade brush, Matrix class (used as defining geometric transformation) and GraphicsPath Class.

System.Drawing.Imaging assembly interfaces provide advanced GDI+ image processing functions.

Metafile Classes provide the methods of recording and storing metafiles.

Encoder Classes allow users to expand GDI+ to support any image format.

PropertyItem Classes provide the methods of storing and retrieving metadata in image files.

System.Drawing.Text assembly interface provides advanced GDI+ type setting functions.

3.5. OLE, ActiveX COM Techniques

The system provides multi-user support function; different user can only see the demo contents or files within the authorization to the user itself.

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OLE ActiveX COM are core techniques of Microsoft. As the previous technique of COM, OLE refers to linking and embedding object data between applications. It provided the way of creating combined documents, solved the problem of communication and message transfer among applications. It supports not only simple linking and embedding, but also activating in position and drag and drop. OLE controls can be embedded to other applications providing its featured function, which makes the applications on the platform of windows work together coordinately and get higher efficiency, especially after the foundation of COM standard in OLE2.0 (Component Object Model).

The definition of COM standard doesn't depend on specific language. Program developers can select programming language familiar to him to develop assemblies. This permits the language used in assembly object can be different with used in client program only if that both can generate executive code in accordance with COM standard. COM assembly follow COM standard and publishes in form of win32 DLL (ActiveX DLL) or executive file (.EXE), which is a standard at the level of binary code. This can meet the requirement for assembly architecture, create flexible application system and realize effective code reusability via its multiple interfaces and independence features.

COM is a kind of method developing assembly software. Assembly reusability is founded on the basis of assembly object behavior, not on its realization. This can effectively improve developing speed and maintainability.

3.6. Service-Oriented Architecture

The system adopted 'platform/assembly' technology based on SOA (Service-Oriented Architecture). Under the control of platform architecture, the system can coordinate to work and this architecture is reconfigurable, expandable and dynamically finishes different business requirements. Architecture and assembly constitute a bus mode layer structure to solve data

integration of different functional modules and subsystem based on XML format, utilizing Web Service to remote call for system functions, so as to realize cross platform data share and integration.

4. System Design-system Architecture

The system adopts B/S architecture, relational database and Microsoft ASP.NET platform. Current three layer architecture mode is adopted as follows:

Diagram is explained in detail for three layer architecture [10]. Client is the first layer, which realizes mainly presentation logic. It faces operator directly. Main function is: provide user operation interface to realize man-machine interaction and image data scanning, transfer image data and submit requests to application server on second layer, feed processing results back to client. This layer generally does not do business logic verification, only do simple verification.

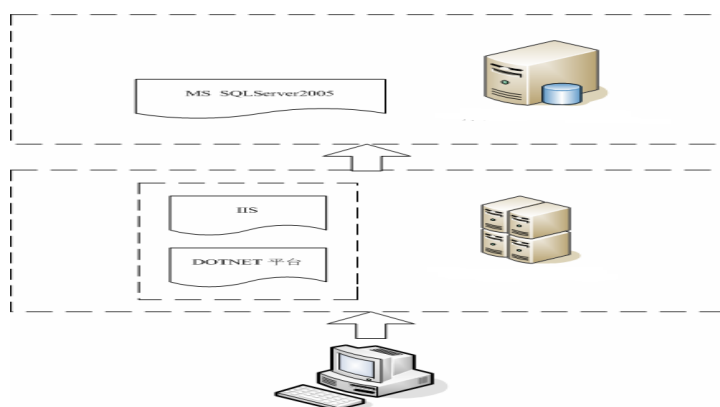


Figure 1. Three Layer Architecture Mode

Business procedure and logic are finished by application server according to business rules. When business logic realization changes, only business rules in database are modified via application server without modification on client.

Task scheduling is carried out by application server according to the priority set by system to send business data or process load balance and failure recovery to guarantee effective running of the system host. This layer includes some existing developing tools and software to provide a basic frame to help build up, operate and administrate application server. It can shorten development time and increase the success possibility without starting from scratch.

Database (explorer) constitutes the third layer of the model. Relational database is responsible for managing data resources and finishing data operation. Server assembly accesses administrated data by explorer during the serving process or requests data services from explorer [11].

Three-layer architecture has following advantages:

First, when clients number increases greatly, there is an interlayer to separate client with database. Clients only need to link at this layer, and business logic and client business interface are also separated. Software development and maintenance are independent each other to relieve the pressure for network. This interlayer also provides full process business protection, either all submit or all discard. Data has high level of integrity. Because of three-layer architecture the visit can be separated between different layers as that security maintenance and administration can be easy to realize. Furthermore, three-layer architecture is a developing mode based on assembly, interlayer is adopted some assemblies or objects. Every business logic corresponds to some assemblies just like car body and its constituting elements, so make development as a team work and easy to reassemble, and increase greatly the production efficiency.

ASP.NET builds up on the foundation of .NET Framework programmable class, and provides a set of simplified Web application creating controls and basic structure for Web application program model. It includes a set of controls which can be used in packaging general HTML user interface elements (textbox, button and list box). These controls run in Web servers and display user interface in explorer in the form of HTML. On server these controls publish object oriented programmable model. The model provides abundant object oriented functions for Web development personnel.

ASP.NET also provides basic structure service, such as status administration and process recycling. By doing so can decrease code amount development personnel has to write and increase dependability of application program. Moreover, ASP.NET applies same concept to make developers hand over software in form of service. ASP.NET developers can write their business logic via XML Web Service function and deliver service by SOAP using ASP.NET basic structure.

5. Conclusion

The first consideration in system design is practicability to meet the specific requirements of comprehensive business by adopting mature techniques [12-13]. The followings are preferred: design in accordance with existed management model, complete functions and good performance, friendly and localized interface, easy to operate and maintain, high efficiency and providing information accurately.

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