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# Developing Instructors' Personal Server for Web Based Teaching

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## Abstract

*The article considers the issues of implementing web-based teaching. It discusses the low cost hardware, software and course materials necessary to turn an instructor's office computer into a web server. By using these tools, a special topic course, Corporate Intranet Development, is developed for information system majors.*

## Introduction

In the past, college faculty had to physically meet students in the classroom and lab. As computer technology becomes more and more available to students and instructors, some of the lectures and lab activities can be taught over Intranet/Internet. This is especially important for a campus with remote teaching sites. The campus where the author is teaching has several teaching sites about a hundred miles apart. It is difficult for both instructors and students to have the traditional classroom.

The lectures and homework for an information system major often require hands-on activities. This suggests that the web-based teaching must be interactive. The web-based teaching should allow students to:

- submit the homework in a predefined on-line form;
- create projects with Java scripts;
- conduct the design and analysis over Web database;
- register for team activities;
- log on to protected materials;
- make changes on submitted homework before the deadline;
- participate in class discussions;
- download lectures;
- work on the interactive material provided by the instructor;
- play games designed for the class.

and get access to many more other interactive activities. Though many colleges and universities provide web browsers for faculty members, the static HTML web page is not enough. Instructors will have greater flexibility for creating web-based teaching materials if they have a web server in their offices.

## Web Server Development

The easiest way to have a web server in an instructor's office is to convert the existing office computer into a web server with a minimum cost. To the author's knowledge, based on the education price, one can build a web server with Microsoft FrontPage which costs $34. Although the performance is very limited, the students can develop their own databases on the instructor's server. Over the Internet, students can practice certain operations on their databases such as viewing, searching , querying, adding and deleting items. For a more powerful web server, one can choose one of the following combinations:

- Microsoft InterDev with personal server.
- Microsoft NT server with Internet Information server.
- Microsoft NT server with Internet Information server and FrontPage.
- Microsoft NT server with Internet Information server and InterDev.

Usually, colleges and universities have the Microsoft Office licence available. If not, it costs less than a hundred dollars to purchase it. With one of the above servers and Microsoft Office, one can build a web server good enough for many classes. If an instructor's web site has more than several hundred visitors per day, he/she should consider using the Microsoft SQL server. As for hardware, a PC with 133 Mhz Pentium processor, 32 Mb RAM, 2 GB hard drive should be enough to run the Microsoft NT server.

One of the key software packages that can be used to publish course materials on the World Wide Web is the web server. A web server should have the following features:

- It provides the information requested by the client's web browser.
- It supports the standards (such as, CGI, ISAPI, Java Script, and VB script.)
- It has the ability to access the database information over the Internet through the ODBC gateway.
- It can be integrated with Web developing software such as Microsoft FrontPage.

There are several web servers available:

1. FrontPage personal web server, which is integrated with Microsoft FrontPage. When FrontPage is installed, the FrontPage personal web server is installed automatically. The FrontPage web server can only publish up to eighteen webs. The main drawback of the FrontPage web server is that it does not have the ability to run databases.
2. For a computer with Windows 95, one may choose to a install Microsoft personal web server. The Microsoft personal web server has all the features listed above, it can publish more webs, and it has a better security control. When installing FrontPage 98, the user will have an option to install the Microsoft personal web server.
3. When installing FrontPage to a computer with Window NT 4.0 workstation, the Peer Web Services on NT 4.0 workstation is used as a server.
4. When your office PC has a Microsoft NT 4.0 server installed, you have all the software needed for publishing course materials on the World Wide Web. The Internet Information Server integrated with NT server is the web server. The Internet Information Server has all features needed for web publishing. It also has a much better access control. If the security is a concern, one should use the Microsoft NT server. The Internet Information Server has the following components:
    ‣ Internet Service Manager: An administration program for managing the service.
    ‣ World Wide Web service: A World Wide Web publishing server.
    ‣ FTP service: A File Transfer Protocol publishing service.
    ‣ Gopher Service: A Gopher publishing service.
    ‣ Internet Service Manager: An HTML version of the service manager.
    ‣ ODBC drives and administration: ODBC provides a method of connecting an application to a data source. Many vendors have adapted their databases for ODBC regulations. This makes ODBC an important tool when developing web databases.
    ‣ WWW service samples: Samples of Internet Database Connector and ActiveX files used to assist of web pages.

Microsoft FrontPage is another useful software in web development. One can create and publish web pages completely within FrontPage. Microsoft FrontPage has the following components.

‣ Frontpage Explorer: The administration center of FrontPage. It can be used to create a web from wizard or template, import and export webs, view and transfer webs, and set up user name and password.
‣ FrontPage Editor: A word processor for web pages. In a FrontPage editor, one can enter and edit text, images, tables and forms. One can also create hyperlinks, bookmarks, image maps and frames within the Frontpage editor. The wizards and templates in the FrontPage editor are convenient tools for creating web pages.
‣ Personal Web Server: A web server that can be used to run a small web site. If the class size is small and the course material does not involve web databases, the FrontPage web server is a handy tool. It starts up automatically when one opens Frontpage Explorer of the FrontPage editor. If one is satisfied with the performance of the Frontpage personal web server, he/she does not have to install other web servers. The FrontPage itself is a standalone multipurpose authoring package for the webs.

There are many books available on developing NT server for Internet or Intranet applications. The book Build a Microsoft Intranet by Dennis Lone and Mark Riley gives clear, step by step instructions on building a Microsoft NT server and developing web pages by using Microsoft FrontPage. Though it was published less than two years ago, some of its materials are already obsolete. The Frontpage 97 and the dbWeb are no longer produced by Microsoft. For updated knowledge on setting up NT server on PCs for developing Internet and Intranet, one can also refer to the books such as NT and UNIX Intranet Secrets by Sharon Crawford and Charlie Russel (1997), Building Your Intranet with Windows NT 4.0 by Stephen Thomas and Sue Plumley (1997) and so on. There are many such kind of books available. However, very few of them are suitable for beginners. The complaint about these books is that, from time to time, the computer screen does not match the figures printed in the book. The beginners have to use a trial and error process to find the best match. With lack of experience on NT server and FrontPage, these trial and error processes often end up in a black hole. To develop web pages or Web databases, one may refer to the books: Mastering Microsoft FrontPage 98 by Daniel Tauber and Brenda Kienan or Official Microsoft FrontPage 98 Book by Kerry Lehto and Brett Polonsky. The book, SQL Database Programming with Java written by Bill McCarty, provides useful information on SQL programming and Web-ready database applications.

For the security concern, the Windows NT server has several features providing security measures. One can control the access by assigning user name and password. To prevent hackers from accessing sensitive or confidential information, the information systems manager should set the faculty's server to have no authority to access other servers' sensitive or confidential information. A firewall should also be established to protect the servers with sensitive or confidential information. Usually, servers with this kind of information are protected at colleges and universities.

As to the faculty's office server, normally there is not much sensitive material to protect. Course materials are often open to the public. Those who are not registered in the class will not receive credits. However, the web server will provide a convenient tool for those who would like to learn something from materials open to the public.

# Implementation of Web-based Course Materials

With a PC equipped with the above software and hardware, a web server has been built for a special topic class, Corporate Intranet Development, for information system majors. In the early stage of the development, the following items have been added to the web server:

- ‣ Course information
- ‣ Online forms
- ‣ Java script Demonstration
- ‣ Web database
- ‣ Discussion group

This web server gives students an opportunity to work interactively with course materials, develop projects for the course, correct their homework, participate in the discussions of the class. Students are curious and delighted with the web-based materials. This has motivated many students to develop a web server at home and become an intern web manager. Through the interactive activities over the web, students gain confidence in problem solving. They pointed out that "this stuff is the real thing."

There is much more to add to the web server. Our future projects will enable students to:

- ‣ Download course materials,
- ‣ Run multimedia lecture notes,
- ‣ Build dynamic stock tracking pages based on their web databases,
- ‣ Participate in interactive mathematics concept demonstrations, and other interactive course materials.

We have seen web-based course materials create enthusiasm and convenience among students. Meanwhile, this also brings a new challenge to instructors. Instructors need training on new technology, need time to develop teaching materials, and need support from students and administrators. It can be done, but how much and how soon is uncertain. More discussion is needed on these issues.

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