Microsoft® Internet Explorer 4.0 for Windows® 95 and Windows NT® 4.0

White Paper

The Best of the Web, the Best of the PC

March 1997

Internet Explorer 4.0 Vision

The Internet has become a vital part of almost everyone's lives. But even with the advances in browser technology, there are still a number of key consumer issues that need to be addressed:

- **There are different and inconsistent tools to browse the Web and use the PC.** Users tell us that finding and using data on the Internet requires a different set of tools and methods than finding and using information on their computer or on a server, making their learning curves longer, and training and support costs high.
- **Finding useful information on the Internet is too difficult.** Today, when users want to find information, they have to initiate a search with the hopes that the results will be easily manageable, useful and relevant. Invariably, the searches result in information overload. Overwhelmingly, users tell us that they would like to have only the information that is pertinent to them, delivered right to their computer.
- **Bandwidth issues limit productivity.** Users tell us that the way they use the Internet could be improved. For example, if a user has five favorite sites they want to check every day for new information, they have to visit each Web site to determine if anything has changed. This is magnified for users of dialup connections, who tie-up a phone line for an inordinate amount of time while reading and searching online.
- **Web content lacks compelling presentation.** Many users, after they visit a few Internet sites, complain that the Web is not exciting, the cool content is not there, it takes forever to download the Web pages, and so on. Users expect Web sites to offer the same experience and quality they experience with television and CD-ROM titles, when in fact they don't.
- **Rudimentary communication capabilities.** Users tell us that communication tools on the Internet today are limited, with most not venturing beyond basic e-mail. Even with the existing communication tools, finding friends, family, or co-workers on the Internet is difficult.

This document outlines Microsoft's plan for addressing these key issues that customers have told us about in focus groups, user groups, and newsgroups.

What is Internet Explorer 4.0?

Microsoft Internet Explorer 4.0 integrates the PC and the Internet into Microsoft's overall concept known as the Web PC. Web PC embraces the importance of integrating Web tasks into a proven and popular user interface that leverages current investments in training and solves key customer issues. Web PC is the next step in Microsoft's vision of Information at Your Fingertips− finding information should be easy and painless, regardless of where it is stored.

For corporations, Internet Explorer 4.0 is designed to make users more productive and to ease the migration to the intranet, while allowing administrators a fine degree of control. Integrating the browser into the operating system interface leverages the existing investment in training. For users, it provides a much richer Internet experience through Web site interaction, delivers full-featured communication capabilities, and makes finding information on the Web easier than ever. For developers, Internet Explorer 4.0 delivers on the promise of full interactive and compelling content.

Web PC delivers four key components:

- **Best Browser**
  Having a great Web experience starts with the browser. Internet Explorer 4.0 once again raises the bar for innovation by providing the easiest, fastest, and most fun way to browse the Web.
- **Complete Communication and Collaboration**
  Internet Explorer 4.0 offers integrated tools that appeal to every type of user: electronic mail, news, conferencing, authoring tools, publishing tools, and broadcasting.
- **Webcasting**

Internet Explorer 4.0 enables users to have information delivered to their desktop when they want it. Additionally, Internet Explorer 4.0 can automatically notify users of Web site changes and offers innovative offline capabilities so users can view Web contents while they're on the road.

- **True Web Integration**

  True Web integration has two parts. First, the Windows user interface has been updated to be Web savvy. Internet access becomes a seamless part of the desktop, with the browser and browser-like navigation available in every view. Second, the Internet Explorer 4.0 suite of products is tightly integrated to ensure consistency across all components in the suite and to provide an easy way to switch between them.

Best Browser

Having a great Web experience starts with a powerful browser. The innovative improvements described in this section both remove frustrations people have experienced in using the Web and enable users to make the most of Internet Explorer 4.0's integration with the operating system, Webcasting options, and communication and collaboration features.

Through performance improvements, drag-and-drop customization, easy navigation of URLs, and enhanced searching, Internet Explorer 4.0 provides an easy, fast, and fun way to use the Web. Making the Web more fun also involves leading the way in supporting Internet protocols and standards that result in exciting and rewarding content. Internet Explorer 4.0 supports more Internet standards than any other product including HTML, Java™, ActiveX™, JScript™, and Visual Basic Scripting Edition®.

The following sections explain these features of Internet Explorer 4.0 that make it the best browser available:

- Ease-of-use innovations and personalization improvements
- "Take the Web with You" offline capabilities
- Best implementation of Internet standards
- Performance enhancements
- Security features

Ease of Use Innovation and Personalization Enhancements

While many people are excited about the Internet's potential, they also find it frustrating to find what they want. Internet Explorer 4.0 introduces major improvements that make using the Web and managing its information much easier and rewarding.

Key Features of Making Browsing Easy and Personalized

- **Search Bar.** Users now have a Search bar, which lists search results in view while the user explores the sites listed. This answers one of the main difficulties Web users report: returning to their search results after visiting a site is cumbersome.
- **AutoComplete.** The Address bar in Internet Explorer 4.0 automatically completes addresses for users based on sites they've already visited and also corrects syntax errors. Users can easily override the suggestions by typing over them.
- **Improved Favorites.** Favorites are considerably improved in three areas:
  - *Drag-and-drop ordering*. Users can now drag and drop their favorite sites and links into the Favorite menu and order them however they want.
  - *Thumbnail view*. Users can preview multiple Web sites simultaneously without visiting the sites by selecting Thumbnail View. Thumbnail View is so extensible, it can be applied to any folder, so users can quickly see its contents.

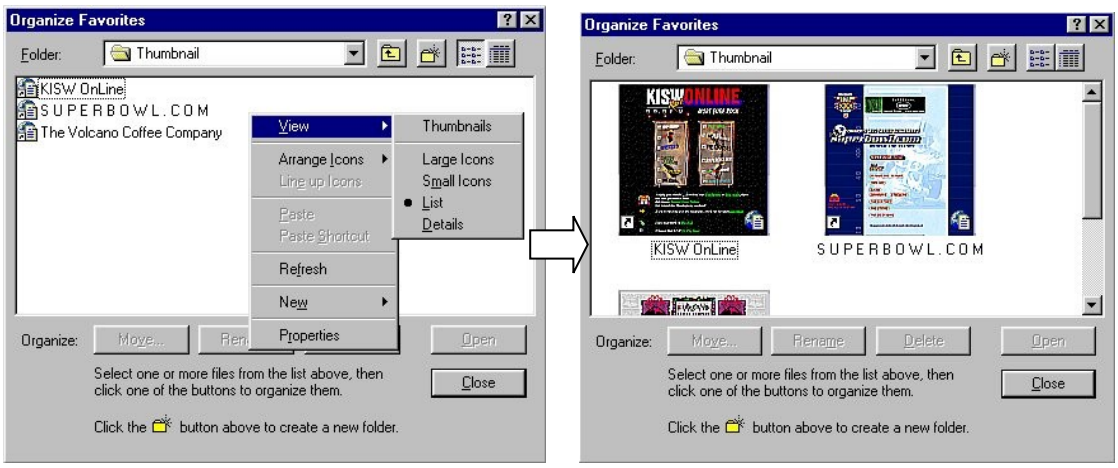


Figure 1: Thumbnail View of Favorites

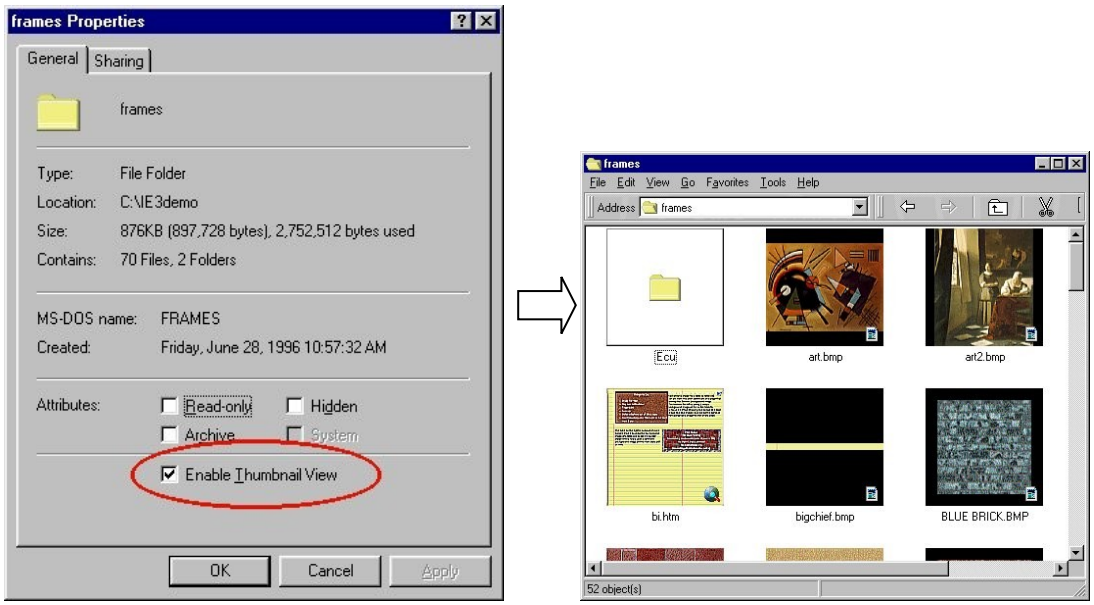


Figure 2: Thumbnail View of a Folder

- *Smart Favorites*. Smart Favorites automatically checks a user's favorite Web pages for updates since the last time the user visited. It notifies the user by adding a red "gleam" next to the site on the Favorites menu, as well as displaying a tooltip with the updated information.

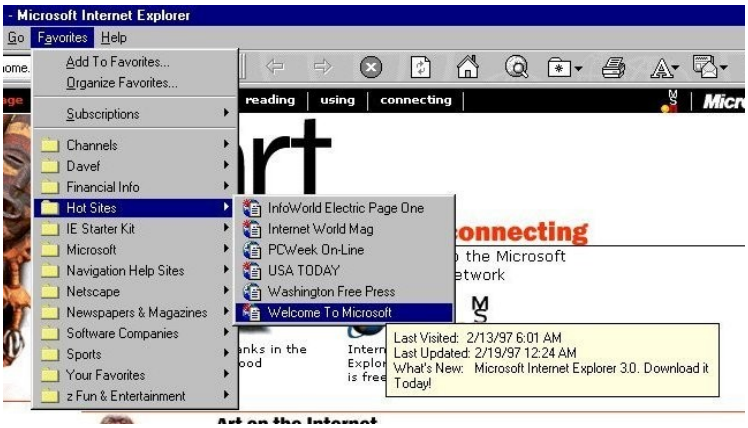


Figure 3: Smart Favorites with Tooltip

- **Navigation history on Back and Forward buttons.** Users do not need to repeatedly click the Back or Forward button to return to a page, they can view a list of the sites they've visited most recently by right-clicking the Back and Forward buttons.
- **Full Screen mode.** Users can select Full-screen mode (Beta 2), which removes all toolbars and scrollbars from the screen to make more room for Web pages, thereby reducing the need to scroll to view content.
- **Drag and drop anywhere.** From any Web site or folder, users can click the icon in the upper-left corner, and drag the shortcut anywhere. With local or LAN content, right-clicking and then dragging the icon enables the user to move, copy, or create a shortcut to that location.
- **Improved printing.** Internet Explorer 4.0 has substantially richer printing functionality including background printing of documents, recursive printing of all links on a document, and intelligent frame printing options, such as printing one frame only, or all the frames on a page.
- **User feedback (Beta 2).** With most Web browsers, users spend a long time waiting for pages to download, never knowing if the site is down or if it is just going slowly. Internet Explorer 4.0 has improved user feedback, so users always know what the browser is doing. Sound effects help cue the user to when the page has been requested, transmitted, and received. An improved status bar details how long the process will take.
- **History bar (Beta 2).** Navigating the Internet is enhanced with the Internet Explorer 4.0 history bar. The history bar lists the pages the user has visited, making it easy to jump back to a site that was visited days or even weeks ago. The pages are grouped by time, site, and individual page.

What are the Benefits of Making Browsing Easy and Personalized?

- **Increased Productivity**. Internet Explorer 4.0 makes it fast and easy to view commonly visited sites. By removing the frustration in exploring the Web, users spend less time remembering where something is located and more time working.
- **Personalized content.** Internet Explorer tracks changes in a user's favorite sites, and informs them of changes before the user even sees the site. This way, users decide whether it's worth their time to visit the site.

How does Making Browsing Easy and Personalized Work?

Search Bar

Internet Explorer displays a Search bar when users click the Search button on the toolbar. The Search bar displays search results independent of the main browser area. The Search bar slightly reduces available content area and remains visible until the user presses the Search button again. Each time the user opens the Search bar, it displays a list of search engines that the user can choose from. When the user starts a search, the results appear in the Search bar only. When a user rests the pointer over a result, Internet Explorer 4.0 also displays a summary of the site in a tooltip.

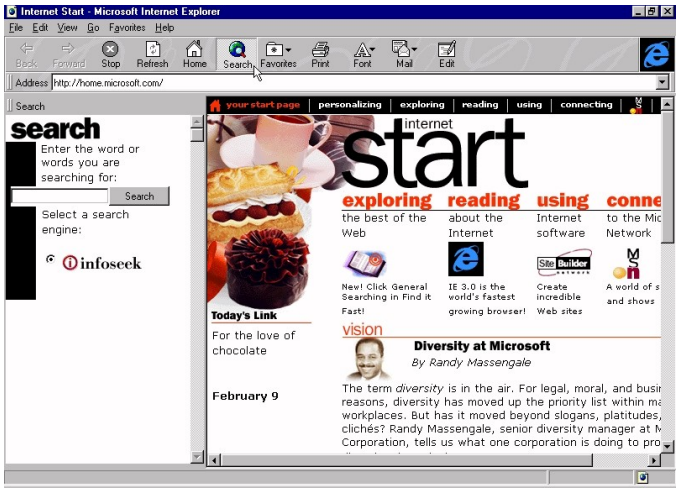


Figure 4: The Search Bar

When the user selects a site from the results list, the site appears in the main browser area, keeping the Search bar available for future searches. The results remain in the Search bar, so the user can easily move from result to result without repeatedly using the Back button to return to the search-results page. Internet Explorer 4.0 also preserves the state of the search, so if a user clicks the Search button again during the same session, the results of the previous search are displayed.

The Search bar takes advantage of the component architecture of Internet Explorer 4.0 and is *not* simply a frame, but a separate browser control.

AutoComplete

AutoComplete makes it easier for a user to type in an Internet address and reduces the opportunity for typographical mistakes. It does so by providing heuristics for completing URL addresses based on sites the user has visited previously. It also adds prefixes and suffixes to Internet addresses and corrects syntax errors. AutoComplete is similar to the AutoFill feature in Microsoft Excel.

AutoComplete uses the user's history to predict what will be entered in the Address bar. The predicted text is displayed as a selected region of characters that the user can delete instantly to override the AutoComplete.

AutoComplete includes the following features and shortcuts:

- Users can skip to break or separation characters in URLs (i.e., \\ \ . , ? +) by pressing and holding Ctrl and then clicking the left or right arrow keys.
- Users can search their history file by typing the beginning of an Internet address and then pressing the up or down arrow keys to complete it.
- Pressing Ctrl and Enter causes a quick complete to "http://www.<what you typed>.com". This can be customized through a registry key.
- Right clicking the Address bar displays a context menu, including available completions for the current text.
- The AutoComplete features in the Windows Run command (on the Start menu) are provided not only for Internet addresses but file path addresses also.

Figure 5: The AutoComplete Shortcut Menu

Smart Favorites

The Smart Favorites feature is a major time-saver for users because they never have to open a Web site to see if there's something new. When a favorite site has changed since the user last viewed it, a red gleam appears over the icon next to the site name in the Favorites menu. By moving the mouse over the listing, a tooltip appears listing both when the user last viewed the site and the last time it was updated.

With Smart Favorites, Internet Explorer 4.0 monitors the favorite sites in the background to see if anything has changed. Internet Explorer 4.0 displays two levels of information for the user:

- By grabbing the HTTP header in the page background, it can determine the date that the site was last updated, and present that to the user. Internet Explorer 4.0 also displays the date that the user last accessed the site.
- A Web site author can include their own text in meta tags, and their customized content will appear in a tooltip when the user rests the pointer over the site name in the Favorites menu.

If site authors include the following meta tags in their page headers, Internet Explorer will even display the header contents in a tooltip on the Favorites menu.

- <meta http-equiv="Bulletin-Text" content="Just Released: Microsoft Internet Explorer 4.0. Download it Today!">
- <meta http-equiv ="Content-Type" CONTENT="text/html; charset=iso-8859-1">
- <meta name="Author" content="Microsoft Corporation">
- <meta name="Description" content="Microsoft Corporate Information, Product Support, and More!">

Web site authors will want to include these tags in the headers of their Web pages for several reasons. When a company is releasing a new product, for example, users can get that information directly from their Favorites menu. If a site has new articles that will appeal to readers, authors can insert the information in the header tags, and Internet Explorer will display it prominently. Smart Favorites makes it easy for site authors to put information directly in front of people to motivate them to browse their site.

Users can also direct Internet Explorer 4.0 to download a site to their computer, automatically dialing the connection and downloading the content to view offline. Users can specify how often each site is checked and download only what has changed. Users can also specify how many levels are downloaded from a site,

and how they're notified when a favorite site has been updated; either by an icon on the Windows taskbar or by an e-mail message.

Users can also reorder their Favorites menu so the sites they visit most frequently appear at the top for quicker access. The default order for the menu is alphabetical. To change the order, the user clicks and holds the item to be moved and then drags it up or down the list.

Navigation History on Back/Forward Buttons
Repeatedly clicking the Back or Forward button to return to a page they recently viewed is a waste of time. Internet Explorer 4.0 lets users avoid repetitive clicks by introducing drop-down menus that contain all the recently viewed pages at a site.

Users access the drop-down menus by clicking the new arrow keys on the right-hand side of the Back and Forward buttons. Users can then click the listing they want, and return to that page immediately.

Full Screen Mode
Internet Explorer 4.0 provides Full Screen mode (Beta 2), which removes all toolbars, desk icons, and scrollbars. This view reduces the need to scroll down to see the full contents of a page. Content providers can also employ *Kiosk mode*, where the computer serves as a one-purpose tool such as a terminal emulator.

To clear the screen for Web content, users select Full Screen from the View menu. The only element remaining on the screen in addition to the Web page is a floating palette with which to turn off Full Screen mode at any time.

Improved Printing
Previous to Internet Explorer 4.0, it was frustrating to display every page you wanted to print. Also, the formatting of a Web page was very different than the formatting of a printed document. Internet Explorer 4.0 is the first browser to begin implementing the new cascading-stylesheet extensions for printing, which are currently in a W3C proposal. Internet Explorer uses the standard CSS specification to define numerous page-formatting features, including page breaks, to make printed content look as great as online content. Also, Internet Explorer caches the hyperlinks on a page for printing, making it easy to print an entire Web site with one visit.

"Take the Web with You" Offline Capabilities

One of the more frustrating problems with the Internet is that you always have to be connected to a network to take advantage of its vast resources. This limits when users can use Internet content. Browsing is also slow when connected, as the browser must traverse from the client to the Web server, and then back to the client to refresh the content on their screen. Users should be able to view Internet or intranet content even though they are not near a network connection.

Key Features of Take the Web with You Offline

- **Offline reading.** Each time a user subscribes to a site or page, Internet Explorer 4.0 downloads the page based on the user's scheduling preference and then notifies the user of changes to the page. Users can then disconnect from the Internet and still work with the cached information.
- **Maximizing Internet connect time.** By downloading the subscribed Web site in the background at the scheduled time, users can connect to the Internet, quickly download subscribed contents, and then disconnect from the Internet.

What are the Benefits of Offline Reading?

- **Taking the Web with you.** Offline reading lets users take portions of the Web wherever they go. They can view favorite Web sites while travelling, or whenever it is inconvenient to be connected to the Web.
- **Optimizing Internet connect time.** Today, users must be connected at all times to view a Web site and read its contents. By setting up the favorite Web sites to automatically download, users can get the

information they need without being connected to the Internet. Users can choose the depth of information they want to read offline and even specify when to download the information. Internet Explorer downloads the Web site at a convenient time and then automatically disconnects from the Internet when finished.

How does Offline Reading Work?

Offline reading works with the Internet Explorer's Subscription feature described previously. To set up Offline Reading:

1. Select a Web site and add it to the Favorites list. You can make an offline folder for easy storage and retrieval.
2. Check the Subscribe box, and then select the schedule, delivery, and notification options needed.

Offline reading uses a pull technology WebCheck;which, in conjunction with the Internet Explorer 4.0 scheduling agent, checks the date and time of the subscribed Web pages. If it detects a change, it pulls the updated information down to the local cache, and then uses the notification agent to tell a user that the site has changed.

When Internet Explorer 4.0 is installed, it configures a new scheduling agent called Scheduled Tasks which replaces the Microsoft Plus! System Agent for Windows 95 and is a new component for Windows NT 4.0. It has been greatly enhanced to accept not only Internet tasks, but also any other task (like scheduling a financial spreadsheet to be printed each day at a specified time) with drag-and-drop ease.

Best Implementation of Internet Standards

The key to advancing the Web experience is to provide the best implementation of standards. Now, people can view and listen to real-time netcasts, watch videos, run ActiveX controls and Java applets, and play interactive, multiplayer games while they are connected to the Web. All this content can be experienced in Internet Explorer 4.0 because of its extensive support for Internet standards, and because it includes innovative, underlying technologies, such as Dynamic HTML, ActiveX, and Java. Using this set of technologies, Web authors can produce more enticing content and develop consumer and business applications that deliver more value and create a unique, fun, and more rewarding Web experience.

Dynamic HTML

Limitations of current browser technology often require HTML authors to choose between interactivity and speed. Once a page is loaded, changing the display or content of the page typically requires the entire page to be reloaded; or, depending on how extensive the changes are, additional pages may have to be retrieved from the server. To address that limitation, Internet Explorer 4.0 includes several new features collectively called Dynamic HTML. These features provide the client-side intelligence and flexibility to enable HTML authors to create interactive pages that dynamically change the display and/or content of a page entirely on the client machine, without requiring additional server resources.

Dynamic HTML enables HTML authors to create innovative Web sites with interactive pages without having to pay a performance penalty. By reducing requests from the server, Dynamic HTML also reduces server load, thus improving performance.

Microsoft is committed to working with the W3C and other standards groups to make the Web an open environment for building efficient and interactive multimedia content. We are also committed to providing the best standards-based solutions. Dynamic HTML represents the next step in that commitment. Previously, Microsoft participated in the W3C's efforts to define and promote the use of the OBJECT tag as an extensible way for adding objects in an HTML page. That standard resulted in the use of ActiveX controls—objects that authors can insert into HTML pages and that users can view and run in a safe and seamless way. We are now working with the W3C to extend that paradigm to standard HTML. Dynamic HTML is simply a way to access and modify the elements in an HTML page.

Key Features of Dynamic HTML

Dynamic HTML is the umbrella term for several innovative improvements in Internet Explorer 4.0. These enhancements fall into the following categories:

- Dynamic styles
- Positioning
- Dynamic content
- Filter, transition, and animation controls
- Data awareness

These combined features enable page authors to dynamically change the style and attributes of elements, as well as insert, delete, or modify elements and their text even after a page has been loaded. Internet Explorer 4.0 automatically updates the page to reflect these changes, including reformatting it where necessary. Some of these features can be used without scripting, while others are exposed via an object model that can be accessed from scripts and other components within a page (for example., ActiveX controls, Java applets). The object model is a superset of, and is therefore backward compatible with, the JavaScript object model in Netscape Navigator 3.

Although the individual pieces of Dynamic HTML are compelling in themselves, they also work together seamlessly to provide solutions.

What are the Benefits of Dynamic HTML?

- **Create engaging, interactive Web sites.** Content providers walk a very tenuous line between creating a fast informative site with little aesthetic value, or creating a site with graphics, applets, and controls that may be visually pleasing but literally take minutes to download. Cascading stylesheets (CSS) were one of the first ways that authors could control fonts, sizes, two-dimensional overlapping, and exact positioning without having to embed it all into a JPG or GIF file. Dynamic HTML enables authors to create interactive Web pages, revealing HTML on the fly without taking up the bandwidth needed with other technologies.
- **Remove the burden from the Web server.** You can now deliver, sort, filter, modify, and update data on the client machine with just a single hit to the server. By reducing server processing time and decreasing the number of trips to the server, data binding increases performance on both the server and the client machine.

How Does Dynamic HTML Work?

Dynamic Styles

In Internet Explorer 4.0, HTML authors can dynamically change the style of every HTML element in a document. Styles are specified as element attributes or via cascading stylesheets. The Dynamic HTML object model exposes every HTML element in the document, including its attributes and CSS properties. Using simple scripts, HTML authors can dynamically read and change the values of these attributes and CSS properties. For example, dynamic styles can be used to:

- **Show or hide an element**. For example, the text of a bullet point could be hidden until the user moves the mouse over the bullet.
- **Change the size, color, or other font properties of elements.** For example, highlighting a title by enlarging the font and changing its color when the user moves the mouse over it.
- **Change the position of elements on a page.** (see Positioning below).

Unlike other browsers, Internet Explorer 4.0 can dynamically change the style and content of a page at any time, even after it has been loaded. Internet Explorer 4.0 supports intelligent recalculation to only re-render the sections of the page that changed, including re-flowing text paragraphs as needed. For example, if list items are shown or hidden, Internet Explorer 4.0 dynamically adjusts the other related items, including renumbering them where appropriate.

Positioning
Internet Explorer 4.0 supports the ability to position HTML elements in x- and y-coordinates, and z-plane, as specified in the W3C Working Draft on Positioning HTML with cascading stylesheets (see http://www.w3.org/pub/WWW/TR/WD-positioning-970131.html). This capability allows authors to place elements−images, controls or text−exactly where they want on the page. By placing objects in different z-planes, authors can also overlap objectis, and specify which element should be on top.

With Dynamic HTML, not only can you continue to have text wrapping around images as you do today, but now when elements on a page are repositioned, the text will dynamically flow around those images naturally. Also, to create the look and feel that you want for the graphics on your pages, it's easy to layer images on top of each other. Instead of creating one big image file, Dynamic HTML enables authors to place multiple images wherever they want, including on top of one another.

By manipulating these coordinates and other dynamic styles using scripts, authors can move these elements around a page, thus animating the page. The combination of dynamic styles, positioning, transparent ActiveX controls, and transparent images present authors with a rich set of animation options.

Two-dimensional style layout functionality was first available from Microsoft using the HTML layout control in Internet Explorer 3.0. The syntax used by the layout control was previously submitted to the W3C. Since then, we have been actively working with the W3C to turn the syntax into an open proposal. This positioning functionality represents the evolution of that 2D functionality, the key difference being that Internet Explorer 4.0 uses native HTML and W3C proposed syntax.

Dynamic Content
In addition to changing the styles on a page, authors can also dynamically change the content of an HTML page. This capability can be used to insert or hide elements in a page, as well as to modify the text of individual elements. In essence, scripts can construct and alter the contents of a document at run time. For example, a script can scan the elements of a page and, using dynamic content, insert a table of contents at the beginning of the page. Furthermore, the table of contents can be made live, using links to bookmarks.

Unlike other browsers that restrict content changes to download time only, these changes can be made at any time, even after the entire document has been downloaded.

Filter, Transition, and Animation Controls
Internet Explorer 4.0 includes animation and multimedia controls that can be used to apply visual effects to elements in a page or to the entire page without scripting. These controls support filters, animation, and transitions. Transitions can be used for elements in a page or for transitions between pages.

These controls leverage new Internet Explorer 4.0 multimedia and animation services. ActiveX control and Java developers can take advantage of these services to implement additional multimedia or animation effects.

Data Awareness
Many HTML pages are based on data, regardless of whether that data is stored in databases or files. Internet Explorer 4.0 incorporates several features to integrate data with native HTML elements. These features make HTML a better environment for displaying and collecting data. The data awareness features in Internet Explorer 4.0 include:

- **Automatic generation of table rows from data records.** By binding a table to a data source, Internet Explorer 4.0 can automatically create a table row for each record in the data source. This solution provides several benefits:

  The table expansion is dynamic. The user can view the page while the table is still being rendered. With server-generated tables, the server has to generate the entire table before sending the page to the client.

  The table can be regenerated (for example., sorted or filtered) on the client without requiring the server to send additional data.

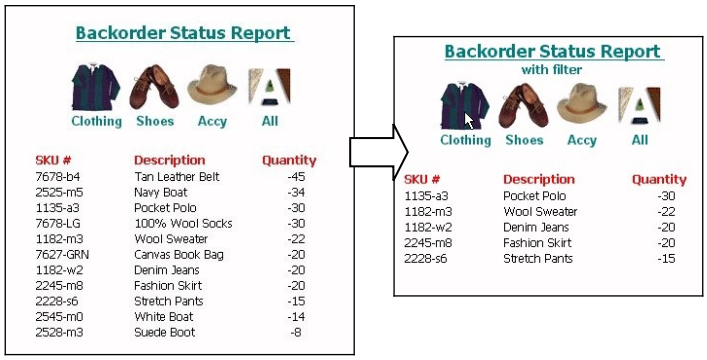


Figure 6: Data Aware Controls

- **Binding of HTML elements to a specific record.** By designating a record as the current record and binding fields from the record to elements on the page, data from the current record is displayed as part of the HTML in the document.
- **Data-bound form fields.** HTML forms can be created using intrinsic and ActiveX-compliant controls. These controls can be bound to fields in a record. Whatever the user enters in the control would then be pushed into the record in the data source control. Based on user command (for example, a button), the data source control would then upload the data to the HTTP or database.

Internet Explorer 4.0 data awareness is implemented using an open architecture; within each data aware page is a *data source object*. A data source object is an invisible ActiveX control that knows how to communicate with a data source (such as a database). Internet Explorer 4.0 understands how to bind HTML elements to fields in the data source control. It includes three data source controls to access:

- Comma-delimited data in files
- SQL data in SQL Server and other ODBC sources
- JDBC data sources.

ActiveX control and Java applet developers can implement additional data source controls to communicate with other data sources.

The Internet Explorer 4.0 data awareness functionality provides a rich set of options for authors to use native HTML to enable users to manipulate and input data efficiently with minimal load on the server. The result is faster, richer, and more interactive pages.

ActiveX

ActiveX enables software components to interact with each other in a networked environment, regardless of the language in which they were created. Embracing both Java and Microsoft's industry-standard COM technology, ActiveX makes writing Internet applications as easy as writing applications for the operating system. Plus, authors can reuse these components in current networking and standalone applications.

ActiveX Controls. ActiveX controls are software components that providing interactive and user-controllable functions. Small, slick, and versatile, they open limitless opportunities for creating cool Web content. ActiveX controls can be written in most programming languages, including Java and Microsoft Visual Basic®.

With Internet Explorer 4.0, ActiveX controls have full access to the HTML dynamic object model to access and modify the page around them.

Internet Explorer 4.0 presents a set of new opportunities for control and script engine developers. Most notably, Internet Explorer 4.0 is an OC96-compliant host. Controls can now be faster, smaller, and more integrated than ever before. Some of the highlights of OC96 include:

- **Windowless controls.** Allows creation of transparent and nonrectangular controls, which combined with 2D placement, enable authors to overlap controls on a page. The multimedia controls included with Internet Explorer 4.0 are all windowless and take advantage of this functionality.
- **Apartment model controls.** Internet Explorer is a threaded container. For better performance, controls used inside Internet Explorer 4.0 should be marked as Apartment or Free Threaded.
- **Quick activation.** The complex "QI Dance" that control writers needed to write is greatly simplified with Quick Activation. In most cases, a single call can initialize most controls.
- **SBindHost service.** Internet Explorer's support for SBindHost service allows controls to download additional data asynchronously. This results in better performance for controls that download images or other complex data.

How ActiveX Technology Works

The open, component architecture of ActiveX enables content developers to create dynamic Internet content and applications. Using proven COM technology, scripts, software components (including Java applets), and standalone applications can interact with each other. True component architecture enables you to run applications and software components in Internet Explorer, and run Internet Explorer as a software component in other applications and components. For example, a database access applet can interact with a script that displays a multimedia graphic of the data in Internet Explorer.

ActiveX controls, because they are based on the component object model (COM), are language-independent. Java is an excellent programming language for both implementing and using COM objects, and Java and COM integrate seamlessly. COM makes Java a distributed language. Every public Java class is a COM object and can be called remotely just like any other COM object. COM gives Java direct access to native code. Any COM object appears to the programmer as a Java object. There is no need for large class libraries that wrap existing objects; the existing objects can be called directly.

Java

Microsoft is committed to providing the fastest, most robust, best-of-the-breed Java development tools and Java run-time implementation. Java brought dynamic, interactive content to the Web. With Internet Explorer 4.0, Java applications become even more powerful. Internet Explorer 4.0 makes it easier for developers to create more full-featured Java applications for the Web. Performance has been improved too, making Java applications run even faster than in Internet Explorer 3.0. In addition, there are enhancements to security, ensuring that interacting with these powerful applications is safe.

Key Features of Java Support

- **Full ActiveX integration.** ActiveX controls can be accessed as Java Beans, and Java Beans accessed as ActiveX controls. In addition, there is seamless debugging between VBScript, JScript, and Java.
- **New object model.** The new Internet Explorer 4.0 object model is exposed through Java libraries. This allows Java developers to manipulate the page dynamically.
- **Improved abstract Windows toolkit (AWT).** The AWT has been improved to reduce overhead and improve performance.
- **New application foundation classes (AFC).** AFC provides Java developers with a rich set of user interface controls.
- **New multimedia class libraries.** All the functionality of DirectX media and DirectX foundation is provided as cross-platform Java class libraries, enabling developers to manipulate and animate a full set of media types.
- **Internationalization support.** Unicode support simplifies developing worldwide applications because it supports multilingual display and input, and its easy resource format facilitates localization.
- **Speed.** Internet Explorer 4.0 provides the fastest way to run Java applications, as shown in recent performance tests that Microsoft conducted against Netscape Navigator 3.0

ActiveX Scripting

With its support for ActiveX scripting, Internet Explorer 4.0 provides fast, comprehensive, language-independent script-handling capability. You can view Web pages that use any popular scripting language, including VB Script and JScript. Internet Explorer's scripting support lets you ask questions, respond to queries, check user data, calculate expressions, link to other programs, and connect to OLE controls, applets, and 3D animations.

Internet Explorer 4.0 Multimedia Controls

The following multimedia controls are included in Internet Explorer 4.0:

- **Sequencer.** Easily controls timing of events on pages.
- **Structured graphics.** Provides high-quality, lightweight, scalable, rotatable graphics.
- **Sprite.** Creates animated images.
- **Sprite buttons.** Creates animated multi-state buttons.
- **Path.** Easily moves objects across a two-dimensional path.
- **Mixer.** Mixes multiple WAV files together dynamically.
- **Effects.** Alters any item on a Web page by applying a graphic filter.
- **Transitions.** Alters any item on a page, or the page itself, over time.
- **Behaviors.** Applies high-level behaviors to controls and Dynamic HTML elements.
- **Hot spot.** Establishes regions of the screen that can process mouse clicks.

All of these controls are transparent, windowless, and can be seamlessly integrated within a Web page.

NetShow

Microsoft NetShow 1.0 is the easiest, safest way to deploy multicasting on your intranet. NetShow, a multimedia platform for Microsoft Internet Information Server (IIS) 3.0, is built into Internet Explorer 4.0. NetShow provides live multicasting of audio and on-demand streaming of stored audio, illustrated audio (audio synchronized with images), and video. A set of authoring tools for creating multimedia content is also included. Unlike other streaming products, NetShow lets content providers generate compelling productions in which audio, graphics, video, URLs and script commands are synchronized based on a timeline. See the NetShow section for more details on this component.

Interactive Music Control

The Microsoft Interactive Music control provides dynamic musical accompaniment and software wavetable synthesis.

Interactive Music combines the best of MIDI and WAV technologies to present a lightweight, consistent musical accompaniment solution. Interactive Music provides infinitely flexible musical output. It's more flexible than wave file output because a WAV file is an encapsulated recording that cannot change, whereas the Interactive Music Control creates music on the fly, according to whatever is happening at that moment.

The Interactive Music engine provides an ever-evolving, responsive musical soundtrack. It tracks the user's actions and creates a soundtrack accordingly. And unlike standard MIDI playback, the music can assume a nonlinear form and respond to user and programmatic input. Additionally, via Microsoft Synthesizer, Interactive Music supplies the user with software wavetable synthesis, which ensures consistent and configurable musical playback via any sound card.

Performance Enhancements

From a performance standpoint, the just-in-time Java compiler gave Internet Explorer 3.0 the fastest Java performance in any browser available. Internet Explorer 4.0 continues that tradition by not only continuing to have fantastic Java performance, but also by improving the browsing experience with Dynamic HTML. Dynamic HTML enables users to interact with the information on a Web page without taking the large amounts of time that it normally takes to browse a site.

Key Features of Performance

- **Dynamic HTML.** Dynamic HTML lets Web authors create even richer, interactive pages than was possible with HTML 3.2 while reducing bandwidth requirements. Dynamic HTML enables authors to create pages that don't need to talk to the Web server each time a user clicks a hyperlink. This saves the user from waiting for something to happen, and it reduces the load on the Web server.
- **Java just-in-time compiler.** Java applets run faster than ever. Plus, support for a new, open, backwards-compatible compression technology means that classes download faster, and you can even have class libraries installed, so you don't have to reload them every time.
- **Basic performance improvements.** Continuous performance improvements regarding how pages are downloaded and displayed increase the browsing speed of Internet Explorer 4.0.

How does Speed Work?

Dynamic HTML will greatly influence users' Web experience. When an author writes code with Dynamic HTML, not only will users get more interesting, engaging pages, but they will also receive a faster, more interactive experience. Users will be much more satisfied with Web sites that provide continuous action, as opposed to those that must search the Web on every mouse click. The following Dynamic HTML features enable a great deal of interaction to take place on the client, without talking to the Web server.

- **Dynamic HTML multimedia controls.** A set of multimedia controls is automatically installed with Internet Explorer 4.0. These controls provide special graphic effects, such as transitions and text art, without requiring high-bandwidth images. Instead of waiting for graphics and animations to be downloaded and displayed, users can instantly see graphics when they download a page. In addition, Dynamic HTML lets authors create structured graphics, a type of multimedia control that describes a meta file. These produce slick graphics that look better than traditional images while reducing the overall size of graphics.
- **Dynamic HTML data binding.** Today, users expect to interact with data in an application like Microsoft Excel or Microsoft Access. They can sort it, filter it, and make queries. On the Web, however, normal HTML pages must contact the originating Web server and/or database server to allow the user to rearrange the data on their page. Data binding lets authors embed a data source on a page, which users can sort and filter like a database, without contacting the original database server.
- **Dynamic HTML outlining.** Outlining lets authors show or hide text based on user events such as pointing or clicking the mouse. For example, a table of contents can be created on the fly, or hidden text can pop out from a heading when a user selects it. New HTML is created on a Web page dynamically, without talking to the original server, so users open and display fewer pages to find the information they need. Keeping the intelligence on the client side significantly improves performance.

Security on the Internet

The Internet provides a convenient and effective way to communicate and share information with others worldwide. However, many people are increasingly relying on the Web to use new applications such as online banking and shopping. Along with this increased reliance comes a greater need for security on the Internet. With its strong support of standard Internet security protocols, Internet Explorer lets users communicate privately, protect their identity, shield themselves and others from inappropriate content, prevent others from tracking their activities, and have greater control over what software to download. It even enables users to verify the identity of Web servers, and positively identify themselves to those servers when desired. This means conducting transactions and participating in consumer services on the Internet with the same privacy and security as in the real world.

Microsoft actively participates in the Internet Engineering Task Force (IETF), the World Wide Web Consortium (W3C), and other groups to develop Internet security standards. Recent Microsoft security initiatives include the code-signing proposal submitted to the W3C and the Transport Layer Security (TLS) efforts through the IETF, aimed at creating a single, secure, channel standard.

Microsoft Authenticode Technology
Software on the Internet is not labeled or shrink-wrapped like software in retail stores. As a result, users may not know who published a piece of software, what the software will do on their computers, or if the software code has been tampered with.

Microsoft developed Authenticode™ technology to help address these concerns. When users download signed code to their computers, Authenticode verifies both the publisher and the integrity of the code (that it has not been tampered with). No software can be guaranteed to be 100% safe under all circumstances, but Authenticode gives the user the opportunity to make an informed decision as to whom they trust and to selectively block execution of certain code. Authenticode technology works with all common types of downloadable code including Java applets, ActiveX controls, and plug-ins.

Microsoft is working with VeriSign, a leading certificate authority, who is issuing digital IDs to be used by software publishers to sign their code. Tools for code-signing are available through the ActiveX SDK.

Secure Channel Services
Support for Secure Sockets Layer 2.0/3.0 (SSL), Private Communication Technology 1.0 (PCT) ensures that personal or business communications using the Internet or intranet are private. The SSL and PCT protocols create a secure channel, so that no one can eavesdrop on communications. With secure communications guaranteed, users can buy consumer goods, reserve airplane tickets, or conduct personal banking on the Internet.

Transport Layer Security (TLS)
In the near future, Microsoft will add support for TLS, a new secure channel protocol under development by the Internet Engineering Task Force (IETF), which builds upon existing protocols to create an improved Internet secure channel protocol.

Personal Information Exchange (PFX)
This set of public key-based security technologies, which is part of the Microsoft Internet security framework, supports Internet standards such as X.509 and PKCS#7 certificate formats. Microsoft has submitted PFX for consideration as a new PKCS standard.

Cookie Privacy
Some Web sites use cookie technology to store information on a client computer. These cookies are usually used to provide Web site personalization features. With Internet Explorer 4.0, users can choose whether or not to store a cookie.

SOCKS Firewall Support
Many corporations provide their employees with access to the Internet through firewalls that protect the corporation from unwanted access. SOCKS is a standard protocol for traversing firewalls in a secure and controlled manner. Internet Explorer 4.0 is compatible with firewalls that use the SOCKS protocol. This support was provided by Hummingbird Communications Ltd., a leading provider of firewalls.

NTLM Challenge/Response
Corporations can take advantage of the Windows NT Server challenge/response authentication that may already be in use on their Windows NT Server network. This enables users to have increased password protection and security while remaining interoperable with their existing Internet information servers.

CryptoAPI 2.0
CryptoAPI provides the underlying security services for secure channels and code signing. Through CryptoAPI, developers can easily integrate strong cryptography into their applications. Cryptographic

Service Provider (CSP) modules interface with CryptoAPI and perform functions including key generation and exchange, data encryption and decryption, hashing, digital signatures, and signature verification. CryptoAPI also provides developers with high-level APIs for authentication, signing, and encryption and decryption services as well as certificate management functionality. CryptoAPI is included as a core component of the latest versions of Windows operating systems. Internet Explorer 4.0 will automatically provide this support for earlier versions of Windows.

Microsoft Protected Store

Microsoft Protected Store supports securely storing important, private information, such as credit cards, electronic drivers license, ATM cards, and electronic cash. No application or person can view this information without a user's permission. In addition, a user decides where to store the information (on a computer, smart card, or floppy disk). Users only have to enter password or account information once and don't have to remember many different passwords. It also gives users complete control over who can see or use this information. The Protected Store allows information to be securely transferred to any computer and used with any application through the use of PFX technology. Designed for the future, the Protected Store supports additional payment methods (such as Internet cash) as well as other credentials and confidential information.

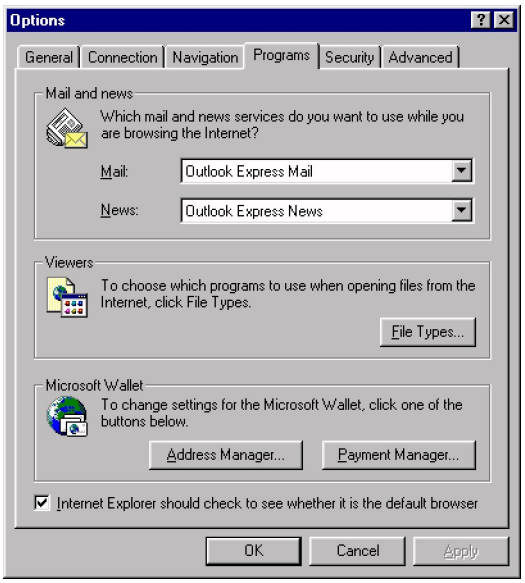


Figure 7: Setting for the Protected Store

The Protected Store exposes a set of open APIs that are integrated into the operating system. Microsoft will evangelize these APIs to all third parties as the common, open way of storing personal information. The Protected Store will exist first on 32-bit Windows platforms in a future version of Windows (and downloadable from the Web) and later on Macintosh and Windows 3.1.

PICS Standards for Internet Content

Parents want assurances that children cannot visit sites that display inappropriate information. Corporations have similar concerns, wanting to block the use of sites that offer no business value to their employees. Microsoft has been working closely with the Platform for Internet Content Selection (PICS) committee to help define standards for rating Internet content.

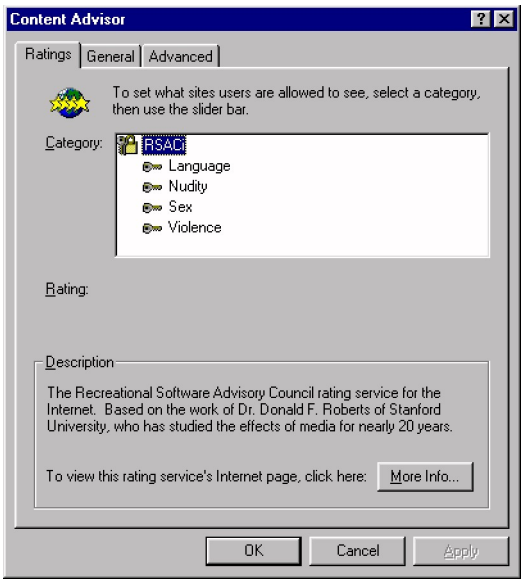


Figure 8: PICS Rating Options

Internet Explorer 4.0 supports the PICS standard, which enables users to control access to rated Web sites or use third-party rating bureaus to control the content to see. (For more information about third-party rating bureaus, see the PICS specification at http://www.w3.org/pub/www/pics.) By choosing different levels of allowable language, nudity, sex, and violence, users can filter out unwanted sites, effectively blocking access to objectionable material. Parents or supervisors can set passwords to allow access to any Web site, and block users from accessing Web sites that aren't rated. Since the system is open and extensible, users can set up their own ratings system to further refine limitations on site access.

Sandbox Security
Support for sandboxing, the Java security model, was built into Internet Explorer 3.0 and will be enriched in Internet Explorer 4.0. Running a Java applet in a sandbox prevents it from accessing a computer or network resources, but also greatly restricts what it can do. Authenticode provides additional protection for the user, in that they can verify the publisher and integrity of software components, such as Java applets or ActiveX controls. Internet Explorer users can review this information and make an informed decision as to whether running such applets is in their best interest.

Internet Explorer 4.0 provides an enhanced capabilities-based sandbox security model, which allows a finer degree of control over access of applets to users' computer resources, such as their hard disk, network connections, and so on. It presents users with a range of security options, such as allowing a Java applet to access a specific amount of hard disk space on a client computer.

What are the Benefits of Internet Security?

- **Communicate privately.** Internet Explorer 4.0 ensures that what users send over the Internet, whether it's a password or a credit-card number, cannot be read if intercepted.
- **Protect your identity on the Internet.** Users who subscribe to a service or have personal information stored on a Web server can get a unique personal certificate that makes it virtually impossible for others to impersonate them when accessing a Web site.
- **Know who you're talking to.** Internet Explorer can make sure users don't pass private information to the wrong people by enabling them to find out who the server truly belongs to.
- **Protect yourself and others from inappropriate content.** By setting ratings using the content advisor, you can control what sites can be viewed on your computer. These ratings are based on PICS industry standards.

- **Prevent others from tracking your activities.** Internet Explorer 4.0 lets users prevent Web sites from storing personal information on their computer.
- **Provide information on the source and reliability of online software.** Using Microsoft Authenticode technology, Internet Explorer 4.0 tells users who published signed software and whether it has been tampered with. This information helps users decide whether to download software to their computer.
- **Securely store and control private information on the Internet.** With Microsoft Protected Store, users can store credit card numbers and electronic cash securely, eliminating the need to memorize passwords and re-enter numbers. For webmasters, it provides a ready-made solution for end-user payment, reducing the cost of developing a Web site.
- **Provides an interface to third-party cryptographic service provider (CSP),** eliminating the need for software developers to create their own cryptography. The modular design of the CryptoAPI allows developers to work with a full range of CSPs that provide either software- or hardware-based cryptography, such as software algorithms or smart cards. Plus, replaceable cryptographic modules let developers create applications for worldwide use without worrying about encryption export issues. CryptoAPI frees developers from the financial obligation of licensing cryptographic technologies directly from other vendors.

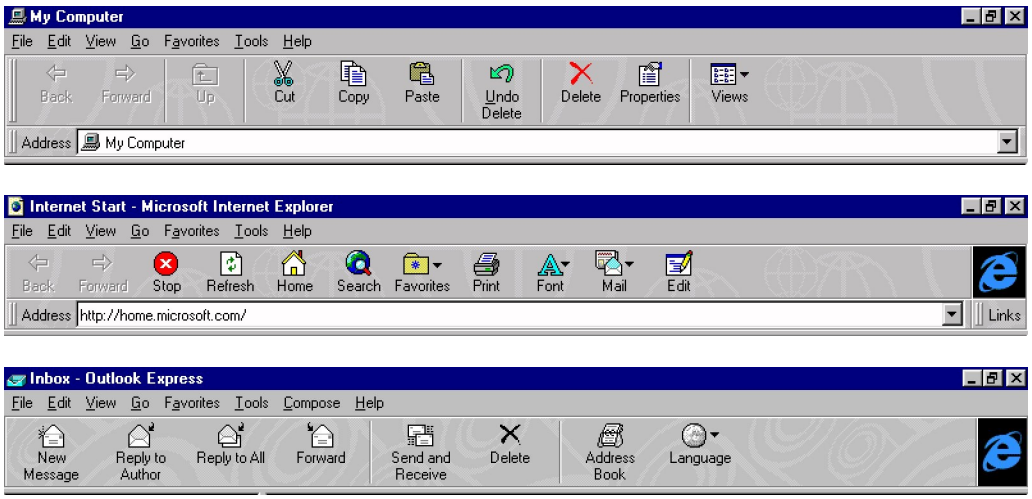
Complete Communication and Collaboration

Collaboration across the Internet is one of the most exciting, avidly discussed topics today. Microsoft is committed to a complete communication and collaboration suite of tools, and the Internet Explorer 4.0 Suite provides a solution for whatever Internet-based communication needs users have. Using its modular installation program, users can set up only the pieces they need, or take advantage of the extensibility and openness of the Internet Explorer Suite and integrate it with their existing solutions.

The new Internet Explorer Suite contains these components for communication and collaboration:

- **Outlook Express** for messaging
- **NetMeeting™** for conferencing and application sharing
- **NetShow** for broadcasting
- **FrontPad** for Web authoring
- **Personal Web Server and Web Publishing wizard** for Web publishing

The Internet Explorer 4.0 suite allows seamless integration from one application to the next, as they are all tightly integrated and developed with a common menu and toolbar user interface. This simplifies training, as a user who learns one application in the suite already has a head start in learning the next one.



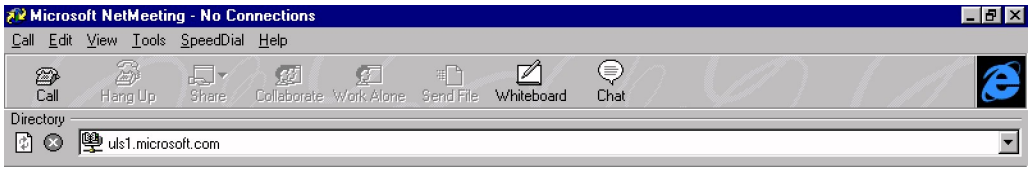


Figure 9: The Internet Explorer Suite Toolbars

The Internet Explorer suite is built for extensibility; an organization that uses it does not need to discard their existing tools. For example, a corporation can use an existing messaging solution and still enjoy many integration features with the Internet Explorer Suite.

Figure 10: Mail and News Options

In addition, Internet Explorer 4.0 offers a scalable solution for users who need high-end applications. Microsoft Outlook can replace Outlook Express for those who need a richer mail client. While FrontPad is terrific for making Web pages, Microsoft FrontPage is the full Web site development platform. Finally, for a true enterprise Web server, users should move from the Personal Web Server to Microsoft Internet Information Server, which has all of the security, scalability, and robustness that a Web site truly needs with the scale of the Internet today.

Messaging—Outlook Express

E-mail has become the most popular Internet application in the world. Unfortunately, most e-mail is limited to text-only messages, perhaps with attachments. Internet Explorer 4.0 allows an entirely new type of standards-based messaging, opening the door to a level of richness and detail. Outlook Express provides a host of new features that make it easy to communicate around the world, while being tightly integrated with the browser.

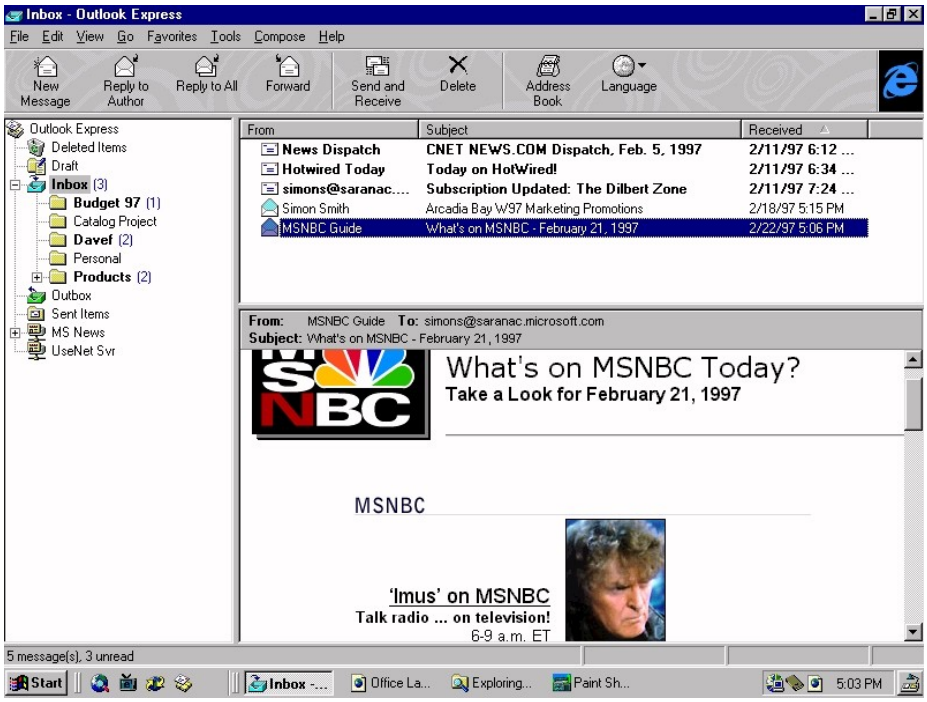


Figure 11: Outlook Express

Key Messaging Features

- **LDAP Support.** Internet Explorer 4.0 has full support for lightweight directory access protocol (LDAP) directory services, which provide access to virtual Internet white pages. This makes it easy to find anyone on corporate LDAP servers, or use the built-in support for Four11, InfoSpace, Bigfoot, or WhoWhere to locate anyone on the Internet. Due to strong customer requests, Internet Explorer also includes support for vCard, for exchanging business card information.
- **IMAP4 Compliant.** With support for IMAP4, Internet Explorer 4.0 enables users to get e-mail from any computer connected to the network that is running Outlook Express. With support for IMAP, users have the following added capabilities:
  - Ability to access e-mail from multiple locations and computers. For example, users can access their e-mail from work and from home.
  - Improved bandwidth utilization. Users can choose to download headers only.
  - Central mail store administration, such as mail store back up.
- **HTML View and Edit.** Outlook Express now supports full HTML, so you can send e-mail messages with the richness of Web pages. In fact, with support for MIME HTML, users can send full Web pages from the Internet or intranet to each other, even when they are offline. The Insert HTML command lets users insert content from existing Web pages into messages quickly and easily.
- **S/MIME Support.** Support for Secure MIME enables users to encrypt their messages, digitally sign messages, as well as certify senders with digital certificates.
- **Integration**. Outlook Express is tightly integrated with the rest of the Internet Explorer suite, making it easy to use together and switch between applications seamlessly. For example:
  - E-mail folders and newsgroup servers are located in the same namespace, so it's seamless to move from e-mail to news.
  - POP, IMAP, and NNTP server information is kept in the same hierarchy.
  - It shares common menus and toolbars with other components.
  - You can send a whole Web page to someone with one click from the browser; the message embeds the entire page, not just a link to a Web site.

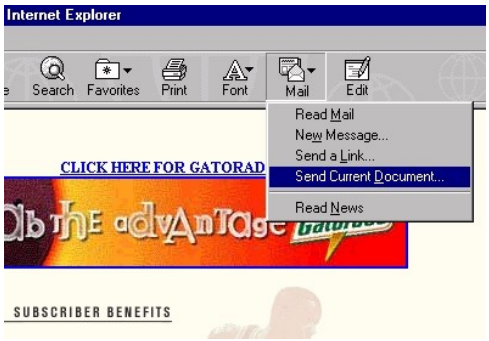


Figure 12: Sending a Web Page from Internet Explorer

- Drag and drop an entire Web page or an Internet shortcut into the Inbox, and Outlook Express will send it out.

  Beta 2 Integration Features

  - Quick access to Outlook Express from the other applications' toolbars, as well as the new Internet Explorer taskbar.

- **Productivity Features.** Numerous features have been added to make Outlook Express easier to use.
  - Users can create multiple, hierarchical folders, and drag and drop them and their associated messages as needed.
  - Important e-mail addresses are saved easily by using Auto-add to build an address book.
  - The Draft folder stores saved e-mail messages before they are sent, making it easy to keep track of messages in progress.
  - Support for multiple mailboxes makes it one simple step to get e-mail from several servers. It can even dial multiple ISPs separately without user prompting.
  - The Send and Receive commands can be executed separately, so users can spend their time online efficiently. For example, a user on a slow link can choose to only send messages and not download large messages with attachments.
  - Inbox rules have been enhanced so that users can forward, move, or copy messages automatically. Inbox rules make it easy to filter mail among family members who have separate accounts. Users with slow connections can download small messages locally and keep everything else on their server. With the Delete Off Server feature, messages can be removed even before they're downloaded.

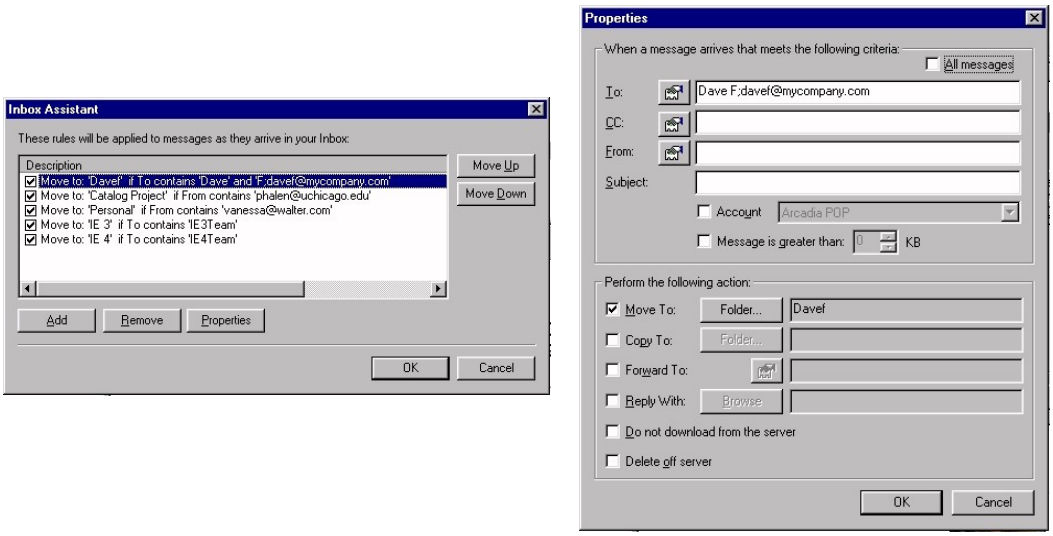


Figure 13: Inbox Assistant Routing Options

What are the Benefits of Outlook Express?

- **Improved communication and productivity.** Internet Explorer 4.0 takes messaging to a new level. With the ability to integrate full HTML into a message, users can send information with a fidelity never before available. The integration with the browser, as well as integration with directory services and security features, makes it easy to find anyone in the world and communicate with them richly and safely.
- **Be efficient online.** With support for LDAP and IMAP4, users can be productive online by avoiding endless searches for addresses and e-mail messages. A combination of the search engine for LDAP directories, IMAP4's ability to download only what users need, and the Inbox Assistant for messaging rules all make sure that users find what they need quickly and easily.
- **Ensure your safety.** S/MIME enables message recipients to verify who sent a message and enables users to send encrypted messages. For example, if you want to send an e-mail message to your broker telling him to sell 100 shares of stock, you want to make sure that he knows it came directly from you. Digital signatures ensure user identity. Also, if you send a credit card number in an e-mail message, you only want the intended owner to read it. With Outlook Express, you can take the recipient's public key and encode your message so that only that person can read it.
- **Built for future extensibility.** The MIME engine inside Outlook Express is freely available to developers who want to create either client or server-based solutions using MIME technology. In fact, all of the engines and protocols—S/MIME, NNTP, IMAP, and SMTP—are available for third-party development and will be used in future Microsoft products.

How does Messaging Work?

LDAP Support

By using open, standards-based protocols, Microsoft is helping to make searches on any LDAP directory service provider easy and accessible. Using the new LDAP-enabled address book, users can search popular Internet white pages directory services using first name, last name, or e-mail name. Once the information is found, Outlook Express can store the address for later use.

Sending mail has never been easier. Users simply type the person's name on the TO: line in any message, and Outlook Express automatically searches the selected white pages directories to fill in the e-mail name. Internet Explorer supports partial name checking against various LDAP servers. Outlook Express searches for a partial name against whatever hierarchy you create. For example, by typing in a partial name, you can tell Internet Explorer to search your local address book first, then your corporate LDAP servers, and finally, the Internet.

The LDAP lookup engine implements a form of fuzzy logic to help users find others on the Internet. For example, if the name John Doe is entered, Outlook Express looks for successful matches on:

- Exactly John Doe
- First name exactly John, last name beginning with Doe
- First name beginning with John, last name exactly Doe
- First name beginning with John, last name beginning with Doe
- The whole e-mail address beginning with John Doe

Messaging Independence

Outlook Express ensures that users can not only read messages regardless of source, but it also allows the interaction between protocols. Outlook Express supports all the different message protocols (POP3, IMAP, NNTP, SMTP, etc.), and then lets users mix and match them to suit their needs. So, someone could take a news message that they've received and place it into their mail folders. They can even leave it on an IMAP server, ignoring the fact that it came from an NNTP source. In Beta 2, users will be able to create e-mail messages where the recipients are both users and newsgroups, both internal and external.

HTML Mail

With support for MIME HTML, Internet Explorer 4.0 ushers in a new way to share Web content through e-mail. However, because not everyone with an e-mail address will have a MIME HTML messaging client,

Outlook Express makes sure that the appropriate message comes across regardless of the technology on the recipient's side.

- If the recipient doesn't support MIME, the message will contain the text-based information first, and then after a separator, the raw HTML will follow, which can be easily ignored.
- If the recipient supports MIME, the message will display the text-based information first, and include the HTML as an attachment, which the user can view in their default browser.
- If the recipient supports MIME HTML, the full Web page will be displayed inside the mail message natively.

S/MIME Support

Outlook Express enables users to feel secure about both sending information across the Internet and being assured that the information they receive is from a valid source. This level of security is dependent upon *public key encryption and certificates*, which means that if you encrypt a message with one key, only an accompanying key can decode the message. Users who want this extra level of security can make their public key available to the people they communicate with, but keep their private key to themselves.

Certificates are a way of wrapping up public keys, and they are how public keys are shared. All of the security in Internet Explorer and Outlook Express is based on standards-based public key algorithms. Users can obtain certificates from certifying authorities such as Verisign. This is necessary because you need a certifying authority to trust in telling you that the public key really belongs to the person it says it belongs to. This way, a user can sign a message with their private key, and anyone with their public key will be able to read it, but the recipient will be assured of who the message came from and that it has not been changed since it was sent.

Conversely, a user can use someone else's public key to encrypt a message, and only that person is able to read it, since the only key that will decrypt it is that person's private key, which they have not shared.

Conferencing—Microsoft NetMeeting

Microsoft NetMeeting delivers a complete Internet conferencing solution. NetMeeting users can experience the benefits of a real-time, multipoint communication and collaboration client, and third-party vendors can take advantage of the NetMeeting platform to integrate conferencing features into their products and services. NetMeeting provides the following powerful conferencing functions in a complete, integrated package for the Internet or corporate intranet:

- **Multipoint Data Conferencing.** With a comprehensive set of data conferencing tools, NetMeeting lets users collaborate and share information with two or more conference participants in real-time. Users can share information from one or more applications on their computer, exchange graphics or draw diagrams with the electronic whiteboard, send messages or take meeting notes and action items with the text-based chat program, and send files to other conference participants using NetMeeting's binary file transfer capability.

- **Internet Telephony/Audio Conferencing.** NetMeeting lets users talk to friends, family, and business associates over the Internet or corporate intranet in real-time. During a conversation, you can utilize NetMeeting's data or video conferencing capabilities to enhance your communication.

- **Video Conferencing.** With a video capture card and camera, users can send and receive video images over the Internet or corporate intranet for face-to-face communication during a conference. Recipients can receive video even without a camera connected to their computer. Users can also utilize video conferencing to take a snapshot with a video camera and place the image on the whiteboard for discussion or markup.

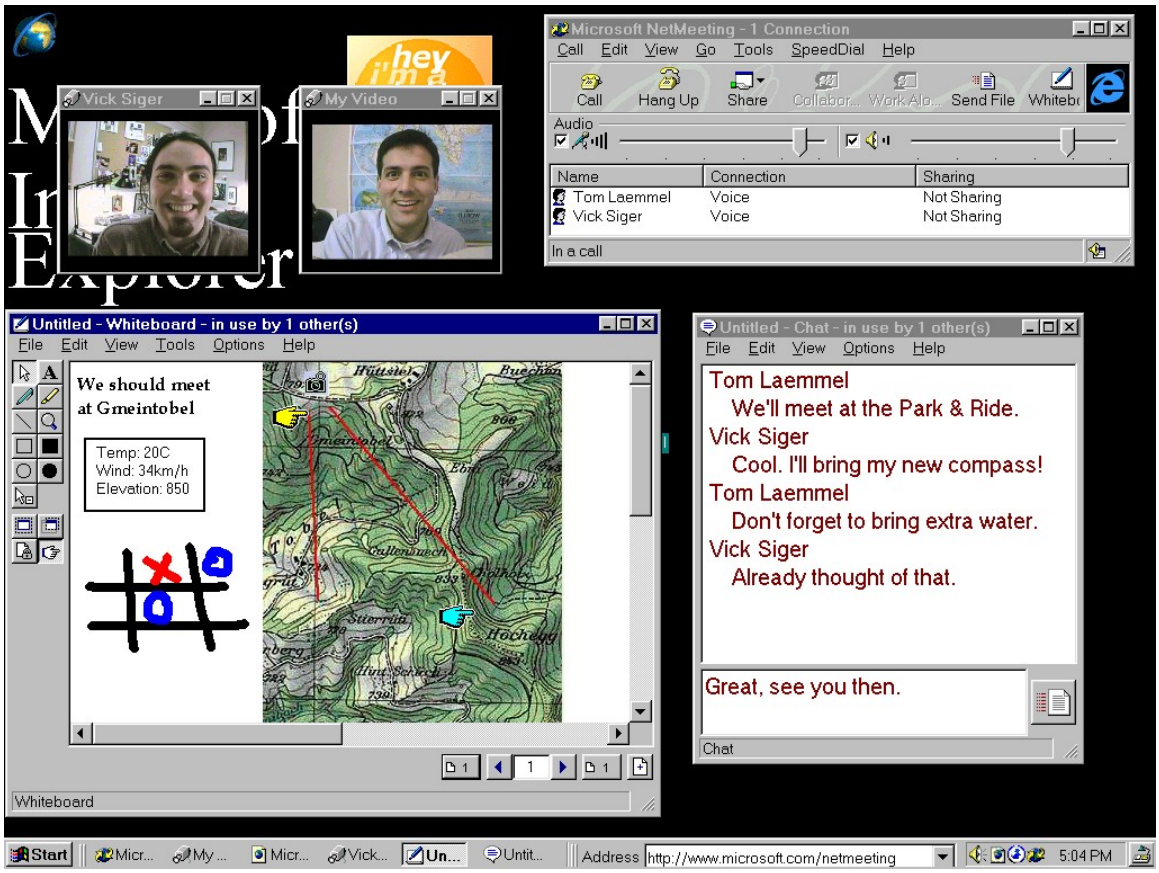


Figure 14: NetMeeting Conference with Audio, Video, and Data Conferencing

NetMeeting will help many types of users take full advantage of the global reach of the Internet and corporate intranet to communicate and collaborate more effectively in real-time. NetMeeting conferencing functionality is based on international communication and conferencing standards, including the International Telecommunications Union (ITU) T.120 standard for multipoint data conferencing, and the ITU H.323 standard for audio and video conferencing. The H.323 standard specifies the use of T.120 for data conferencing functionality, enabling audio, data, and video to be used together as part of a conference.

Support for these standards ensures that users can call, connect, and communicate with people using compatible conferencing products from other companies and can take advantage of conferencing services that also support these standards. Both the ITU T.120 and H.323 standards have broad industry support, with more than 120 leading industry vendors announcing their intent to build compatible products and services. For more information about NetMeeting, see the NetMeeting Web site at http://www.microsoft.com/netmeeting/.

Sample Scenarios for NetMeeting

Some typical scenarios for using NetMeeting on the Internet and corporate intranet include the following:

- **Virtual meetings.** Users from different locations can conduct meetings and share information as if everyone were in the same room. With true application sharing, you can share MS-DOS text and Windows-based applications to enhance the meeting presentation.
- **Document collaboration.** During a conference, users can share an application running on one computer with others in the conference. Everyone can view the information shared by the application, and a participant can take control of the shared application and edit or paste information in real time.

- **Customer service.** From a Web site, users can connect through a single phone call to a customer service representative and use audio and data conferencing features (or even video) to communicate about a product or service.
- **Telecommuting** Users can stay in touch with co-workers much more effectively by collaborating in real time or participating in a presentation while at a remote location.
- **Distance learning.** Organizations can quickly disseminate educational material to many people in different locations at the same time over the Internet or corporate intranets.
- **Technical support.** With the application-sharing feature in NetMeeting, users can share an application window with a Help desk technician, or even remotely share their Control Panel so the Help desk technician can verify the computer configuration.

How Does NetMeeting Work?

Feature Differentiation

As a complete Internet conferencing solution, Microsoft NetMeeting is unrivaled in ease, power, and functionality. Some of the factors that establish NetMeeting as the leading and most complete Internet conferencing solution include:

- **Support for standards.** NetMeeting delivers a standards-based Internet conferencing solution. With built-in support for the ITU T.120 standard for multipoint data conferencing, the ITU H.323 standard for audio and video conferencing, and LDAP for directory services, NetMeeting delivers the most complete conferencing product available for the Internet or corporate intranet. Support for international communication and conferencing standards enables NetMeeting to communicate with other standards-based products and services, and ensures cross-product, cross-platform, and cross-vendor interoperability.

- **Multipoint communication.** Rather than simply being point-to-point, NetMeeting provides built-in multipoint communication services so that many users can communicate and collaborate together during a conference. Users can connect and communicate in real-time over a corporate intranet to share applications, draw on a common, object-based whiteboard, use text-based chat, and transfer binary files—all extending the way that users communicate and interact. For audio and video conferencing, users can connect and communicate through an H.323-based conferencing server.

- **True application sharing.** Application sharing enables users to share a program running on one computer with other people in a conference. Instead of using a whiteboard to share pictures of application content, NetMeeting lets users share any Windows-based program with other participants in a conference without requiring that the applications have conferencing capabilities. When an application is shared, everyone in the conference sees what the person sharing the application is doing on the program (for example, editing content or scrolling through information.) In addition, the person sharing the application can allow other conference participants to edit or control the application. And only the person sharing the application needs to have the application on their system.

  Examples of how application-sharing can improve the way people communicate include sharing a word processing program to collaborate on a document, sharing a programming language to work on creating a program, or sharing a spreadsheet program to work together on verifying information. In addition, the protocol used by NetMeeting for application sharing is operating system and platform independent, enabling interoperability with other Macintosh and Unix workstations. Microsoft has submitted the application-sharing protocol (T.Share) to the ITU as a T.120 standard enhancement.

The following figure shows an active NetMeeting conference in which Microsoft Word is shared.

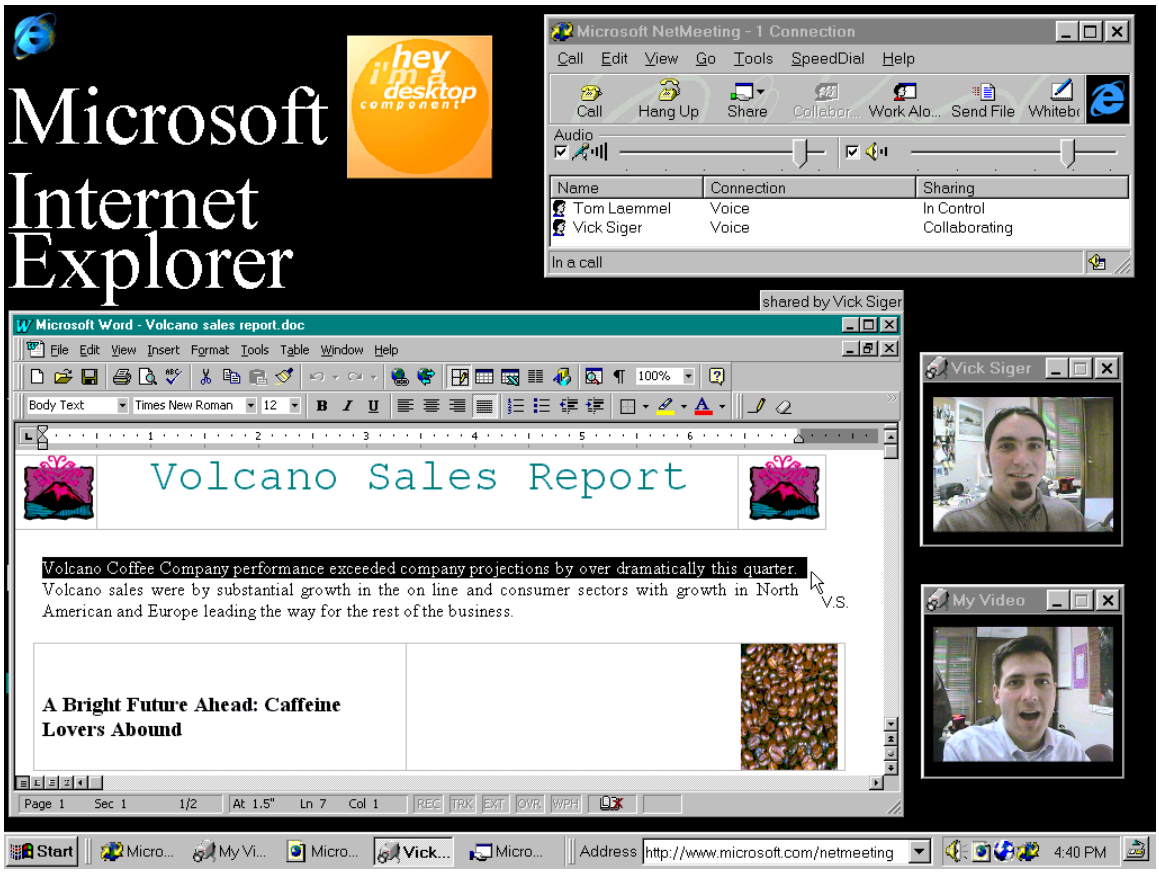


Figure 15: NetMeeting Application Sharing with Microsoft Word

- **Manageability**. NetMeeting supports the system policy features of Windows 95 and Windows NT, enabling an IS organization to preconfigure and manage the functionality available to their users. For example, system administrators can set up a system policy to disable audio or video conferencing capabilities, or specify the default directory server to connect with when NetMeeting starts. System policies deliver more control over what users can and can't do, and help system administrators better manage their environment. For more information about system policies, see the *Microsoft NetMeeting Resource Kit* on the NetMeeting Web site at http://www.microsoft.com/netmeeting/.

  The following figure shows the Windows 95 System Policy Editor, enabling the video and/or audio capabilities of NetMeeting to be centrally managed by the network system administrator.

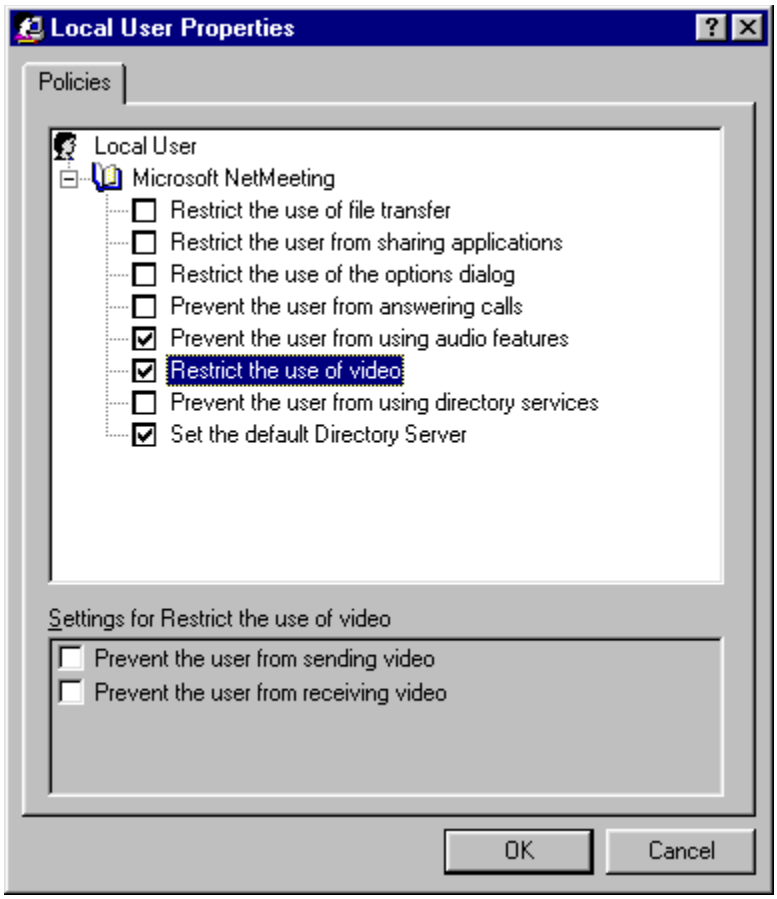
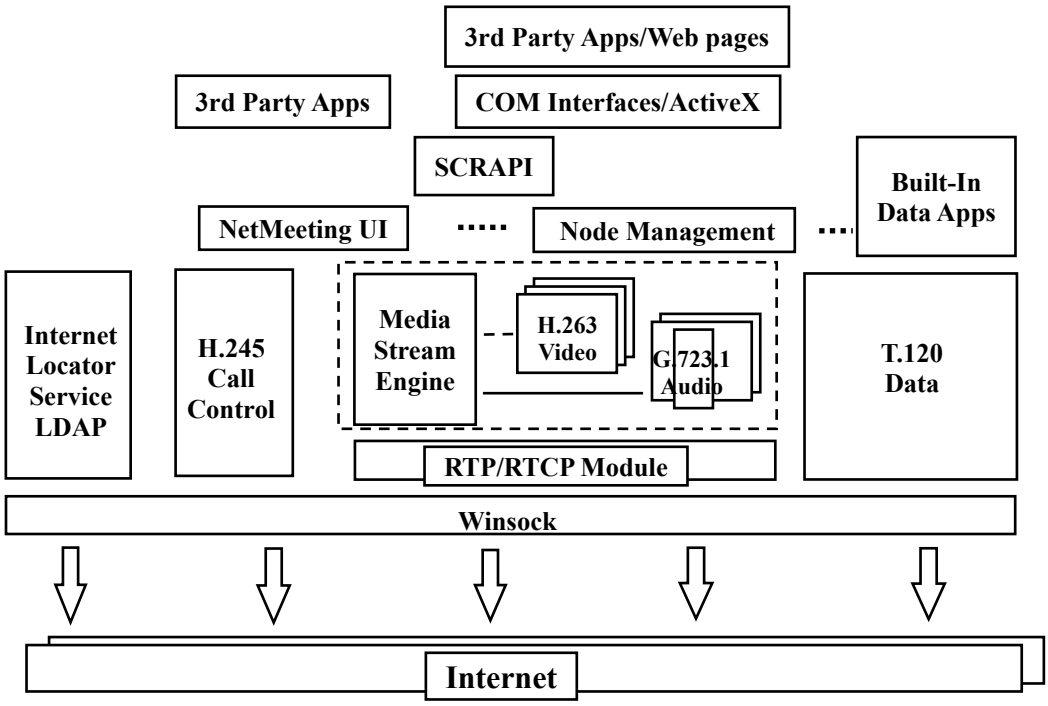


Figure 16: NetMeeting System Policy Editor

- **Open, extensible platform.** NetMeeting exposes the full communications infrastructure of protocols, codecs, and interoperability services through a set of APIs available with the *Microsoft NetMeeting Software Development Kit* (SDK). The NetMeeting SDK enables authors and developers to build value-added products on top of the NetMeeting platform or to add functionality to their own products. Also, system integrators or corporate development organizations can easily integrate audio, video, and data conferencing with their custom in-house solutions. Third parties can extend NetMeeting compression algorithms and install additional special-purpose audio or video codecs.



- **Broad industry support.** With support from more than 120 leading industry vendors for the H.323 and T.120 standards, NetMeeting has the broadest support for an Internet conferencing client and platform. Conferencing servers, gateways, multipoint control units (MCUs), audio and video devices, and conferencing services are some of the many products and services that enhance the communication and conferencing capabilities built into NetMeeting. For more information about products and services that are compatible with NetMeeting, see the *Microsoft NetMeeting Compatible Products and Services Directory* on the NetMeeting site at http://www.microsoft.com/netmeeting/.

International Communications and Conferencing Standards
Standards are critical to achieving the vision of the NetMeeting 2.0 product−to create and popularize the use of interoperable real-time communications and conferencing on the Internet. To achieve this vision, a real-time communications and conferencing product requires standards so that users can connect with each other as easily and reliably as with using a telephone. Consumers expect and demand that all products will operate error-free—that every connection will succeed and that they can communicate independent of the operating system or the product. Standards ensure this experience.

With standards, a product from one vendor can provide a guaranteed level of compatibility with products from other vendors. Vendors can continue to build compatible, add-on products that will successfully interoperate with different multimedia telephony products. Depending on the standards they support, users can potentially share applications and information, see each other with video, talk to one another, or perform all of these functions simultaneously.

T.120
The ITU T.120 protocols enable developers to create compatible products and services for real-time, multipoint data connections and conferencing. T.120-based applications enable many users to participate in conferencing sessions over different types of networks and connections. Depending on the type of T.120 product, they can make connections, transmit and receive data, and collaborate using compatible data conferencing features, such as sharing applications, using a conferencing whiteboard, and transferring files. Microsoft and more than 100 other major companies support the T.120 standard.

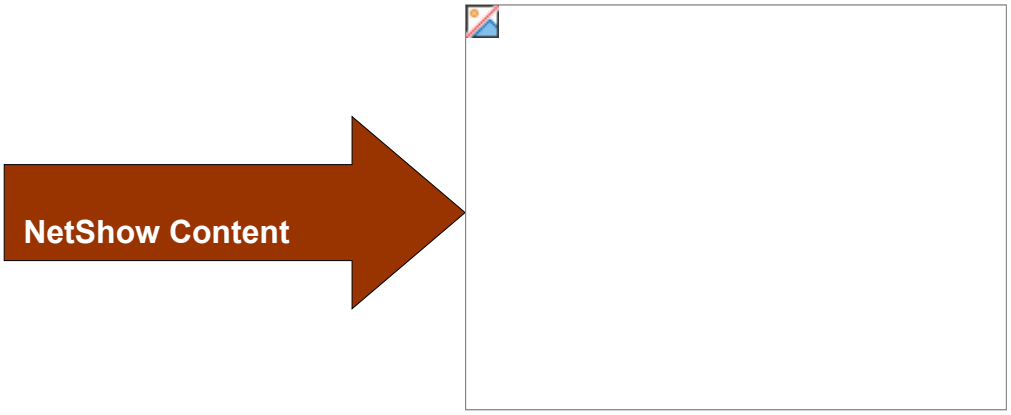
H.323
H.323 is an ITU standard for terminals (PCs), equipment, and services for multimedia communication over local area networks (LANs), such as the Internet, which do not provide a guaranteed quality of service. H.323 terminals and equipment can carry real-time video, audio, and data, or any combination of these elements. This standard is based on the IETF real-time protocol (RTP) and real-time control protocol (RTCP), with additional protocols for call signaling, data sharing, and audiovisual communications.

Products that use H.323 for audio and video enable users to interconnect and communicate with other people over the Internet, just as people using different makes and models of telephones can communicate over PSTN lines. H.323 defines how audio and video information is formatted and packaged for transmission over the network. Standard audio and video codecs encode and decode input/output from audio and video sources for communicating between nodes.

Also, the H.323 specification identifies the use of T.120 services for data communications and conferencing within an H.323 session. This T.120 support means that data handling occurs in conjunction with H.323 audio and video, rather than separately.

Broadcasting – NetShow

NetShow brings the power of broadcasting to the desktop. The Web comes alive with interactive content including audio, illustrated audio (images and sound) and video. It includes both client and server components to add the power of traditional broadcasting systems (audio and video) to HTTP. NetShow harnesses Internet technologies and the power of Windows NT Server to transform Web communications into a richer and more effective medium: the network show.



Key Features of NetShow

- **Client component designed for Internet Explorer 4.0.** The NetShow client is an ActiveX control that receives multimedia content and allows the user to play it without a long download time.
- **Streamed, synchronized illustrated audio.** NetShow streams content to users on-demand without a long download time. Unlike most audio or video streaming products, NetShow also enables content providers to generate sophisticated productions, in which graphics, slides, photographs and URLs can be synchronized with the audio stream.
- **Live multicast audio.** By allowing many users to 'tune into' a single multicast transmission, network managers can dramatically reduce the load that would otherwise be placed on their networks when large numbers of users listen to live events.
- **Live multicast files.** Multicast file transfer provides another way for network managers to save bandwidth when large quantities of data have to be simultaneously distributed to many users. Multicast file transfer can be used to dynamically change files on Web sites to broadcast a variety of Web content.
- **Integrated tools.** NetShow comes with simple, starter tools to enable content developers to prepare many popular content formats for streaming as "illustrated audio" (images synchronized with an audio

track). Files in WAV, AVI, QuickTime, PowerPoint, JPEG, GIF, PNG and URL formats can all be used to generate illustrated audio.

- **Standards-based.** NetShow is based on Internet standards including IP multicast and RTP. As a result, NetShow users can distribute multicast audio to MBONE-compatible applications and can listen to MBONE multicasts (VAT compatible on client and server).

What are the Benefits of Broadcasting?

Microsoft NetShow uses key technologies to enhance users' multimedia browsing experience, while reducing traffic on the network:

- **Reduced network traffic.** NetShow uses IP multicast, an open, standards-based way to distribute identical information to many users simultaneously. This contrasts with regular TCP/IP (IP unicast) where the same information can be sent to many clients, but the sender must transmit an individual copy to each user. To take full advantage of multicasting, the routers and other infrastructure components that make up intranets and the Internet must be multicast enabled. Microsoft, along with its NetShow partners, make it possible to deploy this technology in a safe and controlled manner.
- **Receive multimedia content faster.** Normally when accessing networked multimedia content, a user has to wait for the entire file to be transferred before they can use the information. Streaming allows a user to see or hear the information as it arrives. NetShow is an open platform capable of high performance streaming under demanding network conditions.
- **Integration with Internet Explorer.** NetShow will change the way people share multimedia information through its ability to efficiently broadcast multimedia presentations. Typical scenarios include:
  - *Entertainment and information.* NetShow makes Web sites come alive with interactive, multimedia content. Musical events and Web broadcasting are examples of how NetShow can be used.
  - *Training.* Many organizations devote considerable resources to this critical area. By using NetShow to leverage the intranet and extend the reach of professional instructors, a business can maximize its investment in training. NetShow makes it easy for trainers to generate content and for users to receive the training whenever and wherever they need it.
  - *Advertising and retailing*. Advertisers can use NetShow to present information in a much more compelling way such as attaching audio commentary to a Web site and guiding users through a demonstration of a product, process, or site.
  - *Corporate communications* Everyone in an organization can listen in live to important organizational briefings. Everyone on the network can follow the presentations as they are made regardless of their geographic location. If they miss the meeting, they can see and hear a stored version later, on-demand.

How does NetShow Work?

Streaming lets users see or hear the information as it arrives, without having to wait. Unlike other streaming products, NetShow lets content providers generate compelling productions in which audio, graphics, video, Internet addresses, and script commands can be synchronized based on a timeline.

Additional NetShow innovations include:

- **IIS 3.0 integration**. NetShow is administered through standard Windows NT Server and IIS administration utilities. IIS 3.0 makes it easier to build server-based Web applications and to create rich and dynamic content
- **Internet Explorer 4.0 integration**. On the client side, Microsoft NetShow is integrated with Microsoft Internet Explorer 4.0. Applications can be easily enhanced with audio and video content with the same development tools used to create HTML applications. A familiar HTML-based client allows users to learn operations quickly. Easily add multicast audio to any Web page using any Web-authoring tool.
- **Codec and network independency**. Content providers can choose the best compression scheme (codec) for a particular type of application and content. NetShow includes a variety of Windows ACM and VCM codecs. Users have their choice of compression schemes. In addition, NetShow runs on a variety of networks.

- **Ease of use.** Simple server installation from the Internet and easy-to-use administration ensures fast, easy operation. The services are easy to configure, monitor, and manage using standard Windows NT server facilities. The NetShow server is tightly integrated with Microsoft's HTTP server technology included with Windows NT IIS 3.0.
- **Easy to get started.** Client software automatically downloads from the Web page without user interaction for a seamless installation. Sample Web pages that make it easy to get started are included with the client. Audio only multicast server enables multicast evaluation without network management risks. In addition, live audio is delivered to all clients using the same bandwidth normally used to send to one client.
- **Standards-based.** Open client/server architecture includes RTP, HTML, ActiveX controls, IP multicast, ACM/VCM compatible codecs, and UDP.
- **Industry support.** NetShow includes server components for Windows NT Server, client software for Windows 95 and Windows NT, and simple authoring tools and administration utilities. Its programming interfaces and ActiveX controls provide a platform for third-party development of applications, tools, and content. Leading network hardware and software companies now offer system components, tools, and services building on the NetShow platform. More information on these companies and their press contacts can be found at http://www.microsoft.com/netshow/.
- **Free for unlimited users.** NetShow does not limit the number of users on the server at any given time through licensing.
- **Media support variety.** NetShow makes it easy to leverage files in popular formats such as JPEG, GIF, AVI, QuickTime, and WAV. In addition, it includes tools to create *illustrated audio* (audio and images synchronized to a common timeline).
- **Scalability.** NetShow is able to efficiently respond to stream requests and maintain high performance even in heavy load scenarios. IP multicast allows data transmission to very large numbers of users, scaling as transmission needs grow.
- **Multiple bit rate support.** Content can be authored for any targeted bit rate such as 14.4, 28.8 and above.
- **Error mitigation and correction.** NetShow uses error mitigation and correction to ensure high-quality audio, illustrated audio, and video delivery.

Authoring—FrontPad

While HTML has made it easier for many people to become Web publishers, it still is not a particularly intuitive tool. Inside the Internet Explorer Suite, Microsoft included FrontPad, an HTML editor with a graphical user interface that is based on the full-featured FrontPage 97.

FrontPad includes all of the features of the FrontPage 97 editor except for some premium features such as the editing of frames, image maps, proofing tools, active server pages, preview in browser, and all WebBot components except for Include, Search, and Time-Stamp. In Beta 1, tables, forms, plug-ins, Java Applets, JScript and VBScript are disabled temporarily. Although the user interface for inserting and editing these features has been disabled, FrontPad can render and refresh this HTML as well as allow users to edit it through the View HTML command.

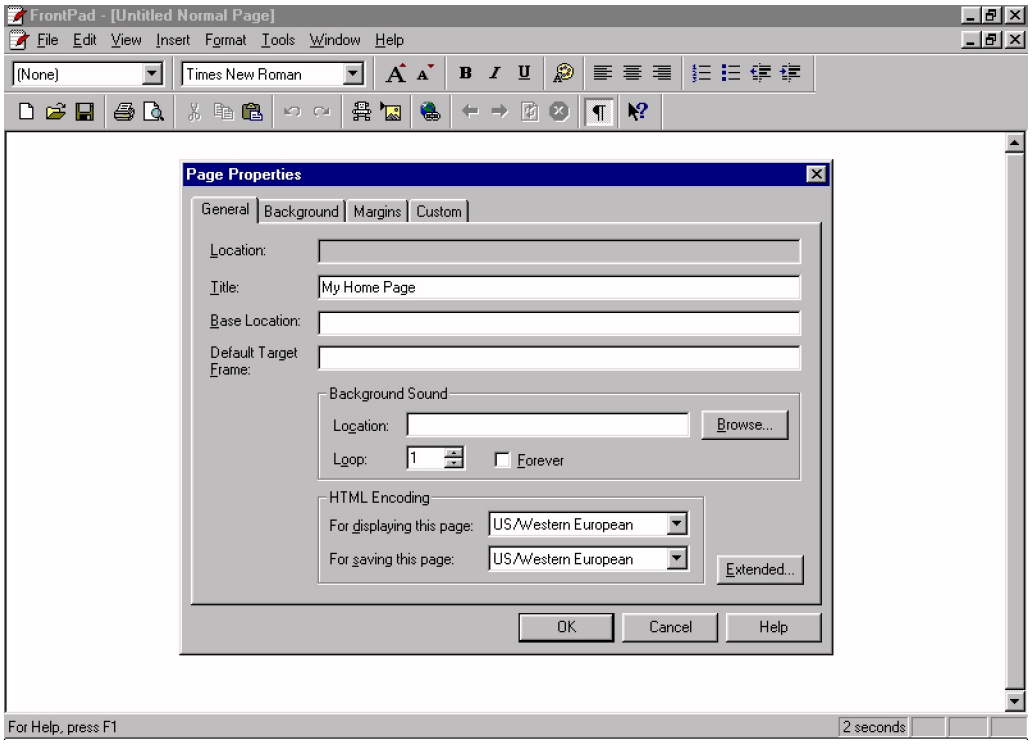


Figure 17: FrontPad Properties of a Web Page

Key Features of FrontPad

- **Personal Home Page wizard (Beta 2).** This wizard takes you step-by-step through the process of creating a personal home page.
- **Table creation and editing (Beta 2).** Insert a table into a Web page, and then edit either the entire table or individual cells.
- **Forms.** Add forms to your Web page that people can fill out and return. Your forms can include text boxes, checkboxes, drop-down menus, images, and more. (You must be connected to a server running FrontPage server extensions to use these forms-related features.)
- **Page templates and wizards (Beta 2).** If you're connected to a server running FrontPage server extensions, you can also use forms-related wizards and templates that let you create:
  - A form by selecting the types of information you need to collect
  - A page to acknowledge that you've received a user's input
  - A survey to collect information from readers and store it on your Web server
- **Java, JScript, plug-in, and ActiveX support.** FrontPad supports top Internet technologies to make your pages more engaging. Only ActiveX control support is enabled in this preview release; the others are available in Beta 2.

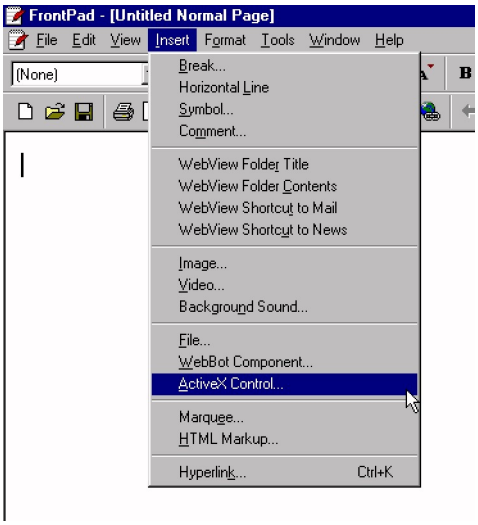


Figure 18: Inserting an ActiveX Control with FrontPad

What are the Benefits of Authoring?

- **Fast Web page development.** With FrontPad, there's no need to learn HTML; the application has a graphical user interface. FrontPad even lets novices insert Java applets, ActiveX controls, or scripts, without knowing any programming. However, for people who still like to edit HTML directly, there is the new color-coded HTML editing mode.
- **Tight suite integration.** With FrontPad installed, the Edit button on the Internet Explorer toolbar allows the currently viewed page to be easily edited. FrontPad has also been integrated into the Internet Explorer Web View wizard and includes specific commands supporting the customization of Web View folders.

How does Authoring Work?

On any Web page, a user can click the Edit button on the Internet Explorer toolbar to start FrontPad with all of the tables, controls, and pictures displayed inside the editor. FrontPad makes it easy to download pages from the Web locally by enabling users to save an entire Web page (pictures included) in a single step.

FrontPad also helps users customize their environment using the Web View feature discussed later in this document. When users or administrators customize a folder with HTML, the Customize This Folder wizard uses FrontPad. If they want that new Web page to include folder attributes, such as the actual folder contents, the folder's name, or even links to other parts of the Internet Explorer suite such as Outlook Express, FrontPad makes it easy. See the True Web Integration section of this document for more details.

Most WebBot components are added to a page using the Insert/Bot menu item in the FrontPage editor. When a WebBot component is inserted, dialog boxes help the author configure it, and then a graphical representation of the WebBot component is visible in the editor at that position in the page. A few WebBot components are specifically associated with forms and are accessed via the Form Properties dialog box rather than the Insert/Bot menu item. When the user views a page that includes a WebBot component, its interactive or programming properties are available. The WebBot components are stored using a specially formatted HTML comment, although this representation is not normally seen by the FrontPage author.

Publishing—Personal Web Server

As millions of users flock to the Internet for information and entertainment, many decide that they want to share information with the world also. The Microsoft Personal Web Server offers a way for users and corporations to publish Web pages on their own server, while the Web Publishing wizard offers the opportunity to publish Web pages on their own or on a third-party server. Their simplicity makes them perfectly designed for home users, schools, and corporate workgroups.

Key Features of Publishing

As your Web server needs grow, Microsoft offers a full range of Internet/intranet Web server products that run on Windows NT Workstation as well as the powerful enterprise-based solution, Windows NT Server.

Personal Web Server

Microsoft Personal Web Server for Windows 95 and Windows NT 4.0 turns any Windows 95 or Windows NT 4.0 computer into a Web server, enabling easy publication of personal Web pages. Easy to install and administer, Personal Web Server simplifies sharing information on corporate intranets or the Internet. It is designed for small-scale, peer-to-peer or small Web server usage.

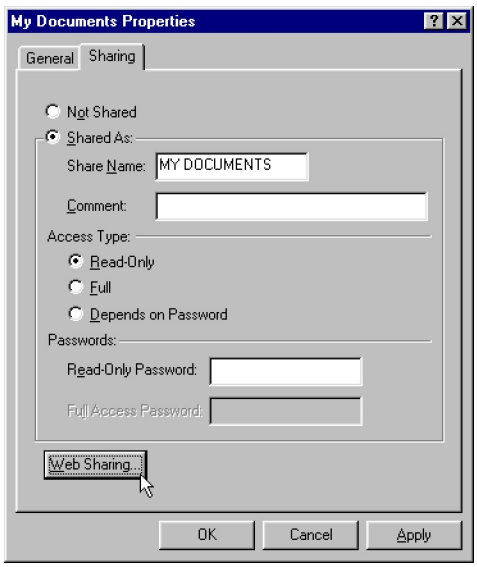


Figure 19: PWS Enables Folder Sharing Through HTTP or FTP

The Personal Web Server, available free from the Web, is the latest member of the Microsoft scalable family of Web server software, supporting Web use from the desktop to the enterprise and beyond. The Personal Web Server offers the following benefits:

- **Integration.** The Personal Web Server turns a Windows 95-based personal computer into a low-volume Web server, making it as easy to share HTML and FTP files over intranets and the Internet as it is to share and print document files over a network. The software is fully integrated into the Windows 95 taskbar and Control Panel, allowing users to start and stop HTTP and FTP services whenever needed, administer the server, or change general options. Microsoft also designed the Personal Web Server to complement its larger and fully compatible Web server products, such as Windows NT IIS. The Personal Web Server is also fully complementary to Peer Web Services included with the Windows NT Workstation version 4.0.
- **Easy to install, use, and manage.** The Personal Web Server installs easily in minutes and includes an intuitive HTML-based administration utility that also supports full remote administration. It supports both user-level and local security, ensuring flexible and effective protection of sensitive corporate information. Users can set up the Personal Web Server to support Windows NT Challenge/Response encrypted-password transmission.
- **Standards-based technology.** Personal Web Server fully supports existing standards such as CGI and includes the open Internet Server API (ISAPI) extension to the Win32® API that is up to five times faster than CGI-based applications. This enables any user to take advantage of ISAPI and CGI scripts.

Web Publishing Wizard
Web Publishing wizard makes it easy to post Web pages on the Internet or an intranet by automating the process of copying files from your computer to a Web server. The Web Publishing wizard can automatically post to a variety of Web servers and offers support for:

- Standard protocols: FTP, UNC, HTTP Post
- Third- party services: AOL, GNN, Spryet Primehost
- System-independent protocols: CRS, FrontPage, Extended Web

The Web Publishing wizard also supports these Internet service providers (ISPs):

- CompuServe
- America Online (AOL)
- Sprynet
- GNN
- America Online Primehost
- Microsoft FrontPage

And it supports these languages:

- French
- German
- Italian
- Japanese
- Spanish
- English

ISPs who have their own protocol scheme for uploading files to their Web servers can write a custom WebPost Provider DLL and distribute it from the Microsoft Web site at http://www.microsoft.com/windows/software/webpost/. For details on this procedure, send e-mail to WebPost@lists.msn.com expressing your interest in writing a provider DLL. Code for a sample WebPost provider is included in the ActiveX SDK.

What are the Benefits of Publishing?

- **Increased communication.** The ability to turn a Windows 95 or Windows NT computer into a full-blown Web server has intriguing possibilities. Workgroups can share information either with each other, or expose their projects to a wider audience, making sure that others are aware of their progress.
- **Faster development.** Personal Web Server supports many backend programming APIs such as CGI and ISAPI. This enables Web site developers to host their test pages with complicated engines such as forms or applications on their own PC locally, and then upload them to the Web server when they've debugged their code sufficiently.

How does Publishing Work?

Personal Web Server is ideal for developing, testing, and staging Web applications as well as peer-to-peer publishing with its support for file sharing over HTTP and FTP protocols. Personal Web Server supports all ISAPI extensions and CGI scripts and is optimized for interactive workstation use. It does not have the system requirements of a full Web server such as IIS.

Personal Web Server supports multiple WebPost service providers such as CompuServe, Sprynet, AOL and GNN. The default WebPost Service Provider DLL can post to the most popular Internet servers, including the NCSA HTTPD, APACHE Web server and Microsoft Windows NT IIS. The Web Publishing wizard connects to the Internet Service Provider (ISP), determines the protocol needed to copy the files, and then uploads the files to the appropriate directory on the ISP computer.

To begin publishing on the Internet with the Web Publishing wizard, users do the following:

- Create a Web page using their favorite authoring tool.
- Sign up for an account with an ISP.

- Use the Web Publishing wizard to copy the Web pages to the Internet.

Scalability Notes

Finally, it should be noted that several of our components have associated applications for users who need high-end applications. Microsoft Outlook can replace Outlook Express for those who need a richer mail client. While FrontPad is terrific for making Web pages, Microsoft FrontPage is the full Web site development platform. Finally, for a true enterprise Web server, users should move from the Personal Web Server, to Windows NT IIS, which has all of the security, scalability, and robustness that a Web site truly needs with the scale of the Internet today.

Webcasting

When users are asked the biggest problem they have with the World Wide Web, the number one response is getting the information they need. The wealth of information on the Web has raised the desire for tools to push and pull selected information to the desktop. Internet Explorer 4.0 improves upon the work in this area with Webcasting, which consists of two parts:

- Premium channels
- Subscriptions

Premium Channels

A formidable challenge for the Web today is providing a forum to deliver appealing content that takes advantage of the latest Web technology. Internet Explorer 4.0 gives content providers an opportunity to truly innovate, turning a portion of their Web site into a *channel* that resides directly on users' desktops. Microsoft is working very closely with leading content providers to advance the viewer experience via premium channels for Beta 2.

Key Features of Premium Channels

- **Premium content.** Users will be a click away from the top content providers in the world.
- **Active platform support.** Inside the channels, you'll see the most interesting, interactive content available, as these premium channels are specifically designed for Internet Explorer 4.0 with support for Dynamic HTML, ActiveX, and Java.
- **Customization.** Users can choose the content they're most interested in, and it's delivered directly to the desktop. Use the channel bar to select your favorite topics, and Internet Explorer will get the information for you, so you can read it whenever you want—even offline.

What are the Benefits of Premium Channels?

- **Exciting viewing experience.** Before Internet Explorer 4.0, there was no reason for developers to spend time enabling their Web pages to take advantage of the newer, advanced technologies of the Internet. It was typical to develop for the lowest common denominator. However, with the Internet Explorer channel selector directly on the desktop, providers have a vested interest in making sure that their content is both informative and engaging.
- **Personalized content.** In the sea of today's information, premium channels provide users with the best content available anywhere, yet users have the flexibility to customize their view. This way, they only get the content they need, like a customized multimedia newspaper. Users spend less time surfing the Web aimlessly, and more time getting the information they need.
- **Efficiency.** With the current limitations of HTML, it was difficult and time consuming to create truly engaging content that users could download and view quickly. With Dynamic HTML opening the door to more interactive Web sites and multimedia extensions, content providers can create fantastic sites that don't require users to make time-consuming trips to the Web server.

How do Premium Channels Work?

On the desktop, an Internet Explorer 4.0 user has a channel bar that contains a set of buttons. Each button is stored as an Internet shortcut) on the user's hard disk, in the Channels folder. When the user clicks a button, Internet Explorer 4.0 opens (if it isn't already open) to the Channel page specified by the shortcut. The channel page can support anything an Internet Explorer 4.0 HTML page can support, such as Java, ActiveX, or Dynamic HTML.

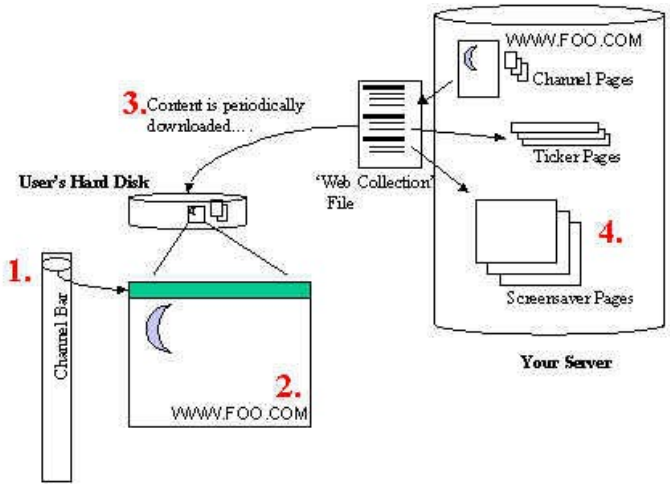


Figure 20: Channel Delivery Architecture

Every channel is a subscribed site, so the pages displayed are the ones most recently cached on the user's hard disk. Performance is fast, because the page is displayed from the hard disk. The creator of a channel provides a list of URLs—a Web collection file—that describes what content (HTML, images, class, and so on) is to be downloaded to the user's hard disk, as well as the schedule for downloading it, if they want to control the download schedule. If they don't include those parameters, users can control when Internet Explorer downloads the content.

In the Web collection, the content provider can specify pages that are to be displayed in the default screensaver or perhaps a desktop ticker. Again, these are ordinary HTML pages displayed in a window more specialized than an ordinary browser.

An important note about both channels and the Active Desktop is that the desktop components must still provide information when a user is on the road, or at home, and they don't have a permanent connection to the Internet. Therefore, the Active Desktop is enabled to work offline. Since most dial-up users do not have a constant connection to the Internet, a desktop component should display some reasonable content in the absence of a connection. This is of key importance, since the desktop is visible as soon as the user starts the operating system, even before they initiate a dial-up.

For this reason, any data files that the component requires should be cached on the local machine. Fortunately, the Internet Explorer 4.0 subscription feature, described below, can be easily configured to cache any object referenced by a desktop component. In the typical case where a component is built from an HTML document inside a floating frame, Internet Explorer 4.0 subscriptions can be set to automatically download any in-line images, objects, or applets, and download any number of HTML links *N* levels deep. The component can also specify individual subscriptions for any data files or objects it may reference.

Subscriptions

An important part of efficient information delivery is providing a mechanism to automatically select and schedule downloads of information. Users who frequently visit the same Web sites can subscribe to the site, which enables the user's computer to periodically download Web pages that have changed. This

allows users to see what has changed on the Web site without actually visiting the site. Once subscribed, users are notified on a periodic basis through a number of user-selected methods ranging from e-mail notification to a new taskbar icon notification.

Key Features of Subscriptions

- **Receiving new content.** Each time a user adds a favorite, they can subscribe to the site or page, and Internet Explorer will download the page to the cache based on scheduling preference and then notify the user of the changes. Once the subscribed site or page is received, users can disconnect from the Internet and still view and work with the data.
- **Scheduling site downloads**. Users can choose when they want the computer to retrieve the information that they have subscribed to. Users have numerous options for scheduling downloads, such as daily, weekly, or custom and manual options.
- **Notification of new content.** Users have a number of options concerning how they would like to be notified of the content changes on the site.

What are the Benefits of Subscriptions?

Subscriptions improve a user's ability to stay in touch with current Web site information and be able to take the information on the road with them. The following examples demonstrate these key benefits.

- **Improving a user's ability to stay current with Web site changes.** A user who regularly views ten key Web sites every day must open the browser, visit the sites, and then scan numerous pages on each site to see what has been updated. With Smart Favorites, Internet Explorer 4.0 polls the sites in the background (by using WebCheck technology), looks at the tags, and then notifies the user of changes.

- **Take the Web on the road (mobile Web computing).** Lets say that every day you ride the train to work and you enjoy reading a newspaper (*USA Today or Wall Street Journal* as an example). With Subscriptions, you can simply subscribe to the *Wall Street Journal* or *USA Today* online, schedule it to update while you are getting ready for work, and then read the news on the train. This is also extremely beneficial to people who fly; they can subscribe numerous Web sites and, then completely browse the subscribed Web sites in the air!

- **Optimizing connect time.** Today, most people have something specific to do when they connect to the Internet,. It is very easy to get sidetracked, however, with the ever-present links to multiple sites. Using subscriptions in conjunction with the scheduling capabilities in Internet Explorer 4.0, a user can select the sites they are interested in, connect to the Web, download the sites, and then disconnect from the Internet, and read all the information they are interested in later. This saves valuable connect time.

How do Subscriptions Work?

Receive

First, any site that is in the Favorites list is grouped into the Smart Favorites category. Internet Explorer will automatically look at those sites and alert you when they have been updated. Subscriptions go further in that they download a custom amount of information into the user's cache. In the Add to Favorites dialog box, there is a new checkbox enabling users to subscribe to their favorite sites.

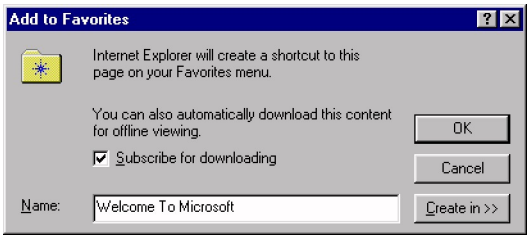


Figure 21: Add a Favorite and Subscription

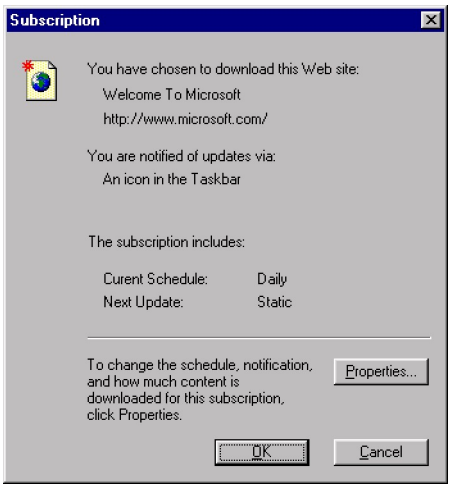


Figure 22: Subscription Overview

After subscribing to a site, users have different delivery options for downloading varying levels of Web pages from the site. Users can also control the amount of download time and disk space used by each subscription. All subscription information is kept in a new Subscriptions folder created by Internet Explorer 4.0, which makes it easy to find out when sites have been last checked or downloaded.

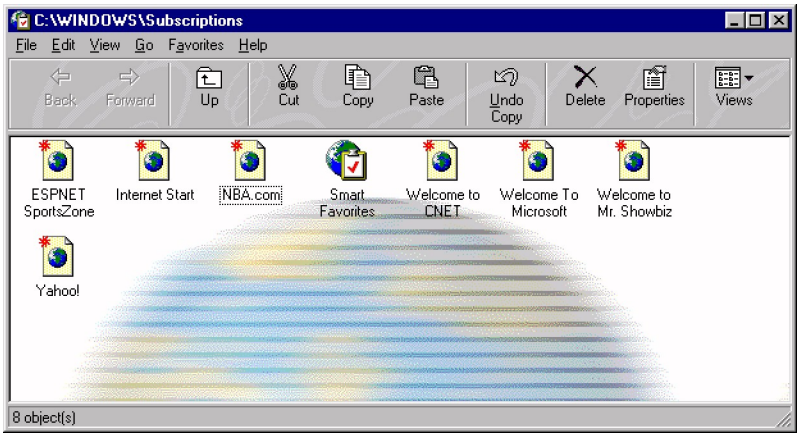


Figure 23: A Red Gleam Marks Subscriptions with New Content

Schedule

Users can schedule when to have information downloaded to their computer, such as daily, weekly or a custom time. Users can also manually request a download.

Figure 24: Scheduling a Subscription Update

Notification

Users have the following choices on how they are notified of changes on the site they subscribe to:

- **Show notification icon on the taskbar.** This will enable a subscription task icon on the taskbar and when the site is updated, a red gleam appears over the icon as shown in Figure 24. Sites that have been updated appear on the menu when the user clicks the subscription task on the taskbar. Users have the option to update their subscriptions and set global subscription properties from this menu.

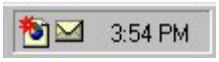


Figure 25: Taskbar Icon Notification with Red Gleam

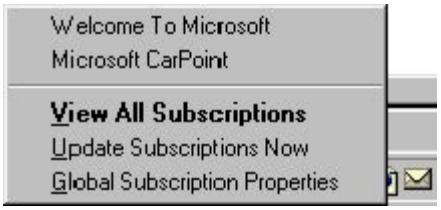


Figure 26: Options on Taskbar Icon Menu

- **Send notification via Outlook Express**. This option results in an e-mail message notifying the user when a subscribed site is updated. The message also includes a link to that site. In Beta 2, with enhanced e-mail clients that support rich MIME HTML, Internet Explorer sends the entire updated Web page as an e-mail message. The link takes you to the Internet, and you can receive this information directly inside your e-mail client. With Internet Explorer, you can subscribe to any site in the world and receive these rich e-mail messages; you're not limited to any specific set of vendors.
- **Favorites notification:** On the Favorites menu, there is a red gleam next to each subscribed site that has been updated. As shown in the following figure, a user can point to the site to see a brief description of the site changes.

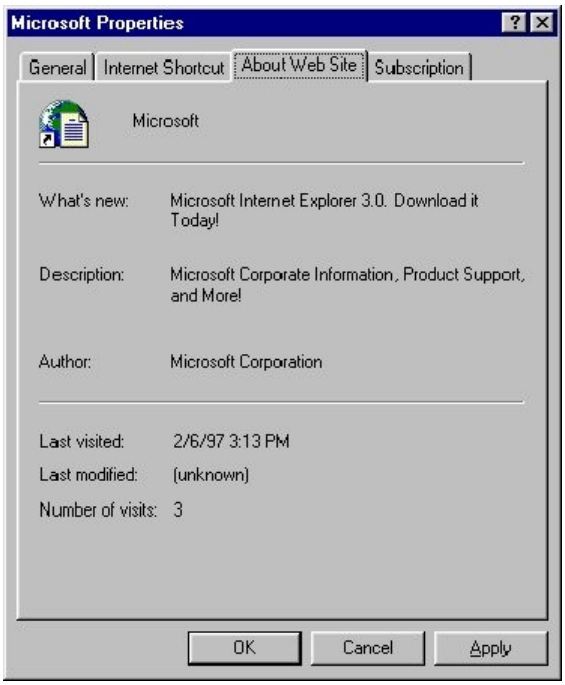


Figure 27: Properties Reveal New Content

Figure 28: View of Favorites—Tooltips Show Update Properties

Channel Definition Format

To give Web authors a means for optimizing the delivery of content to millions of Internet users, Microsoft has developed and submitted the industry's first Channel Definition Format (CDF) for push technology to the World Wide Web Consortium (W3C). CDF is an open and easily authored format for the publishing of Web-standard channels that will allow Web publishers to optimize the broadcast of their content, streamlining the delivery of information from Web servers to users.

Internet Explorer 4.0--which will automatically enable any Web site to be a Web broadcaster--will implement CDF, optimizing the delivery of push content to the millions of users of Microsoft Internet Explorer. The CDF specification is now available at http://www.microsoft.com/standards/cdf.htm.

Microsoft's CDF submission has garnered broad support from more than 30 content providers, ISVs and Internet solution providers. The benefits that CDF offers developers include the following:

- **Open format.** Any company can author content to take advantage of CDF, any server can run Web sites that are enhanced by CDF, and any broadcast-enabled client software can access channels available on Web sites using CDF.
- **Proven technology.** Microsoft's leadership in Internet client/server solutions and extensive work with leading Web content and technology developers will ensure that CDF will meet demanding market requirements.
- **Low cost.** The CDF specification will save content development costs by allowing Web content developers easy access to a market of millions of compatible clients, using readily available software.
- **Use of compelling Internet technologies.** CDF is extensible, enabling sites to publish channels utilizing any or all of simple HTML, Dynamic HTML, ActiveX™ technologies and other specialized broadcast technologies.

For Internet users, the above benefits of CDF mean rich content broadcast seamlessly to their desktops. For Web publishers, the open and easily implemented content specification dramatically reduces costs and makes entry-level channel publishing possible with a standard Web server such as Microsoft Internet Information Server (IIS).

True Web Integration

For many people the Internet has become the fastest way to get the information needed to perform daily tasks successfully. However, with current technology, there is a distinct division between two different worlds: one containing local and network information and the other containing intranet and Internet data. Internet Explorer 4.0 eliminates that division, as it integrates the Internet into every aspect of the PC—the desktop, file folders, the network, even the Start menu. Through rich integration with the operating system, Internet Explorer delivers true Web integration.

True Web Integration consists of several components, which are described in the following sections:

- Single Explorer
- Start menu and taskbar get Web savvy
- Active Desktop

Single Explorer

Today, users are faced with more information than ever before. Not only do they contend with the thousands of documents that may already exist in various formats on their hard drive or their company network, but also the Internet has opened the door to a world of Web sites and applications containing the information they need. To access this information, however, they have to learn multiple applications: one to look at their local information, another to look at their network, and unquestionably another to use the Internet or intranet. With a single Explorer, Internet Explorer unifies this process into one utility to universally view local, network, intranet, and Internet data, so users can get to the information they need faster and easier.

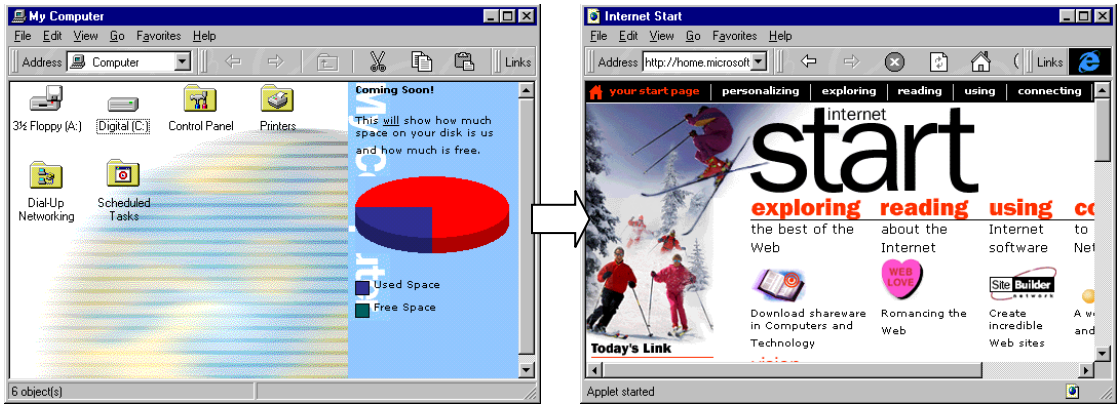


Figure 29: Web View Displays HTML in any Folder

Key Features of the Single Explorer

- **Simple, consistent navigation.** Users can browse their local hard drive or the network the same way they browse the Web. Simple, ease-of-use navigation functions used in Web browsers such as Back, Forward, and single-click navigation appear throughout the entire user interface, so users can now find information regardless of their location or format. In fact, users can right-click on the Back and Forward buttons just as they can in the browser, since the browser and Windows Explorer have become the same application.
- **Browser enabled everywhere.** The single Explorer provides the ability to view multiple types of content in any folder, whether it is files and folders or HTML. This makes it easy to access any data whether it's local, on the network LAN, or on the Internet or intranet. While you're looking at the contents of your hard drive, a single click can bring you to a Web page without starting a new application. Because all content can be viewed in the same window, another click can bring you back

to your local contents seamlessly. This enables integration between local storage and your intranet, all without the overhead of running a second Web browser application.

- **Context-sensitive menus and toolbars.** The user interface detects the type of information presented, whether it is HTML or local files and folders, and it automatically adjusts the toolbar accordingly. For example, Edit, Search, and Print replace features such as Delete and Properties. The Address bar also supports both URLs and paths such as c:\windows.

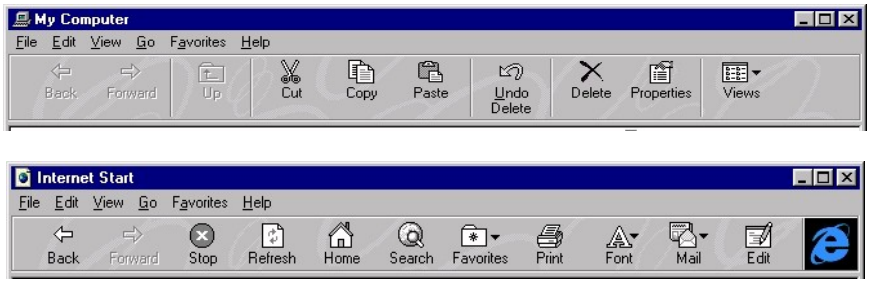


Figure 30: Toolbars and Menus Switch Automatically

- **Global Favorites.** Keeping track of the places you go most often shouldn't be limited to just Web pages. With new Global Favorites, you can keep track of any folders, files, or servers along with your favorite Web sites, so you can seamlessly navigate from local content to Web content. You can even get a birds-eye view of your favorite sites by opening up the Favorites folder, and then clicking Thumbnails from the View menu..

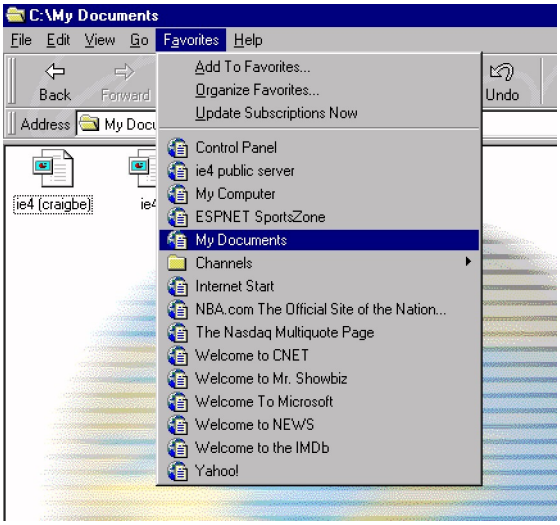


Figure 31: Global Favorites

- **Web View of folders.** Internet Explorer 4.0 opens up the user interface so that you can customize any folder (local or on a server) with HTML. Web View extends the original views in Windows 95 (large icons, small icons, list, details) with a fifth view that can represent any folder as a Web page. For example, when viewing a public folder on a network, users can see a Web page with Java or ActiveX controls, richly describing the folder contents.

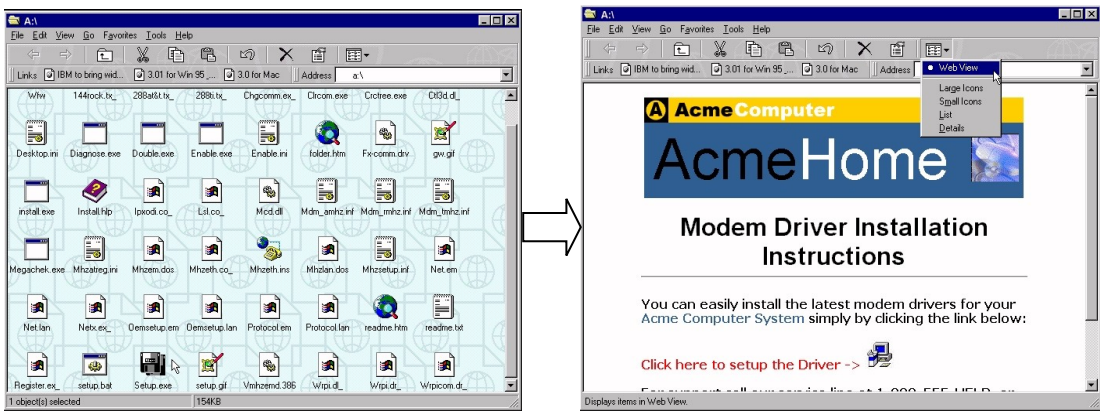


Figure 33: Use WebView to Richly Describe a Folder

- **Customize-This-Folder wizard.** The Customize-This-Folder wizard makes it easy to create a custom Web View (based on HTML) for any folder, whether it is local or on a network share without requiring an HTTP server. Any Internet Explorer 4.0 user who views the folder will see the customized Web View.

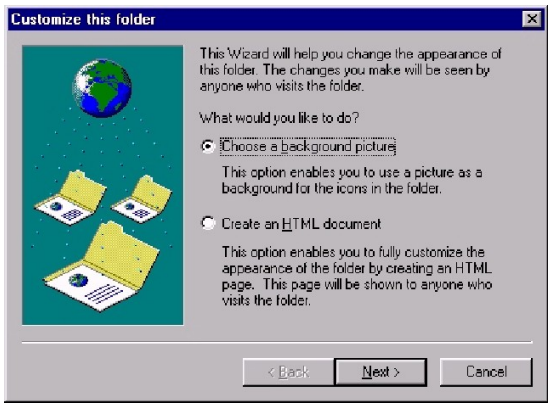


Figure 34: Customize-This-Folder Wizard

What are the Benefits of the Single Explorer?

Integrating the best of the browser with the operating system's user interface produces several benefits:

- **Reduced training and support costs.** Users only need to learn one application or one navigation method for accessing information anywhere, regardless of location or format. Also, by adding simple Web page navigation buttons (Back, Forward) with intelligent toolbars and favorites that go beyond Web pages, Internet Explorer makes the operating system as easy to use as a Web browser.
- **Increased efficiency.** A single Explorer makes Internet/intranet use more efficient for end-users and makes the PC more efficient for all applications. Because the Internet is always accessible from any window, there is no need for users to start another application just to look at a Web site. This makes users more efficient, as it's easier to get to any type of content from each window. Furthermore, the PC becomes more efficient as well—the total memory overhead of running the single Explorer is less than the overhead of running a separate Web browser application along with the operating system. With the single Explorer, more memory is available for other applications and overall system performance is enhanced.
- **Unifies an intranet and file-sharing network.** Today, user access to shared files is entirely different from access to intranet pages. Shared files don't allow hypertext views and cannot be linked to related content. With Internet Explorer 4.0 and customizable WebView of folders, you can add HTML pages to your shared files, and unify your file service with your intranet. Adding HTTP servers may be

unnecessary; any Internet Explorer 4.0 user who visits a shared file the way they did before now sees an HTML view, complete with links to the intranet or Internet if appropriate.

In today's migration to the intranet, many organizations are spending a large amount of time and money trying to move all of their existing files from their file servers to new HTTP Web servers. Web View enables companies to migrate their existing directories to Web pages instantly, with no Web server required. By using WebView, organizations can leave files on their existing file servers, yet take advantage of all the functionality the intranet offers.

- **Easy, fast customization.** Today, a well-written front-end application requires knowledge of high-level programming languages like C or C++. With Internet Explorer 4.0, it is easy to generate front-ends for anything from file server folders to floppy disks or CD-ROM titles, as developers can simply create a Web page using any technology − HTML, ActiveX, scripting, or Java. These pages can provide much richer information to users than current readme text files.

How Does the Single Explorer Work?

Browser Enabled Everywhere

Internet Explorer 3.0 was developed with a component-based architecture. It included a browser OLE control, which developers could use to create their own Internet-enabled applications. This control was extremely powerful, as it exposed all of the functionality of Internet Explorer to the developer. It had the ability to display any HTML content, Java, Active Documents, or any other ActiveX control.

With the Internet Explorer 4.0 single Explorer, two key tasks were done. First, we inserted the browser object into the operating system interface, extending it to enable any folder to display any of the content mentioned above. Next, we created an ActiveX control that displayed the contents of a folder with the same look and feel as Windows Explorer but enhanced to behave like a Web page, with features such as single-click navigation and Back and Forward commands. Now, just like browsing the Web, a single click will take you to the "next page" whether it is opening a folder or starting a document or application.

By inserting that control into the operating system interface, any window on a PC can display all types of information. It can feature any view from the normal look of Windows, to Web pages, to Excel spreadsheets. Anything you can do on the Web, you can implement inside the interface, while at the same time, it preserves the Windows 95 functionality.

Web View

Another strength of the single Explorer, however, comes from its customization capabilities. WebView associates folders with an accompanying Web page that can be customized with anything you can create on a Web page, including HTML and associated software components like ActiveX or Java. Users see that Web page automatically, filled with rich descriptions generated in HTML, instead of the typical list of files and folders. This means that developers can create custom Web pages on existing file servers without implementing a Web server on each of them. That makes the operating system interface fully customizable with all of the HTML, Java, ActiveX, and scripting technologies available today. Third-party software developers have wanted an easy way to customize the Windows user interface for years; Internet Explorer 4.0 delivers that today with the simplicity of HTML.

The system knows that a Web View is available by a desktop.ini file that is created by the wizard and placed into the root of that directory. The .ini file points to the HTML page that should be displayed and adds a new menu item to the View menu. An .ini file is used so that you can point to any Active document, not just a Web page. This includes everything from Microsoft Word documents to Microsoft PowerPoint presentations, to custom applications built in VB Script. Select Web from the View menu to see the Web page in place of the normal icon view. Remember, anything you can do with HTML, scripting, Java, or ActiveX is possible on this page.

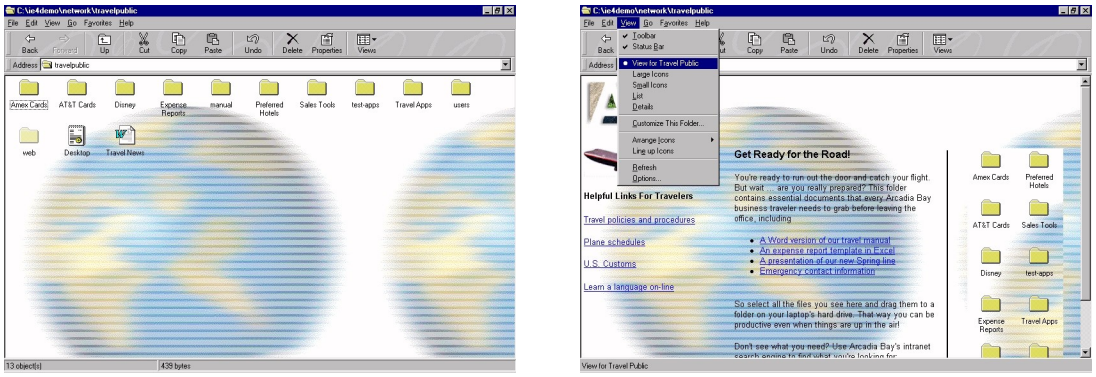


Figure 35: Before and After Web View

Start Menu and Taskbar Get Web Savvy

In developing the Windows 95 user interface, we learned from customers that a single, always-visible anchor for the environment makes the system easier to learn and use. The Start menu and taskbar provide that anchor in Windows 95, giving users one center for starting and switching tasks. In Internet Explorer 4.0, we extend those elements to integrate Web tasks and Web paradigms into a user interface that today's users have already mastered.

Together, the Start menu and taskbar make Web tasks easier and include specific enhancements that Windows 95 users have asked for, while leveraging investments in Windows 95 training.

- **Start menu for the Web.** Windows 95 users know that there is one place that they can always go to accomplish the tasks that they need: the Start menu. With Internet Explorer 4.0, the Start menu is now ready for the Web. There are new commands for Favorites and History (Beta 2) directly on the Start menu, making it easy to get to Web sites and documents. Also, the Find command now includes Find/On the Internet and Find/People, making searching for Web content and e-mail aliases one simple step
- **Easy customization of the Start menu.** Internet Explorer 4.0 makes the Start button customizable, as users can customize their Favorites menu, the entire Programs menu, and even the top of the Start menu simply by using drag and drop.
- **Taskbar for the Web.** The Internet Explorer 4.0 taskbar makes starting and switching easier through a number of enhancements:
  - *Task-launching buttons* − Quick access to your most common Web tasks such as browsing, sending and receiving mail, and so on.
  - *Address bar* − Users can add a type-in address bar to the taskbar for launching Web sites, applications, folders, or documents.
  - *Links bar* − The QuickLinks bar is now available on the taskbar.
  - *Desktop button* − Provides one-click access to your Active Desktop.

Figure 36: The New Internet Explorer 4.0 Taskbar

- **Easy customization of the taskbar**. As requested by many customers, we've made the taskbar highly customizable and very extensible.
  - *Adjustable "bands"* − All of the enhancements above are available in their own band, so users can adjust the contents of the taskbar in the same way they adjusted the Internet Explorer 3.0 toolbar. Furthermore, bands can be removed and docked on any edge of the screen.
  - *Create your own bands* − Users can add bands to the taskbar by right-clicking it and choosing the "New band" command from the menu, or by dragging and dropping any folder or URL to the blank space next to the Start menu or the notification area.
  - *Extensible for ICPs, ISVs, and Corporate MIS* − Organizations can add bands to the taskbar, implemented in any language. For example:
    - A Web site can offer a Java applet that displays real-time information in the taskbar.
    - A corporate MIS department can provide an HTML-based, intranet search form for the taskbar.
    - An ISV authoring a CPU-meter or other utility in C can add it to the taskbar.

What are the Benefits?

- **Increased productivity.** By integrating Internet technologies into the Start menu and taskbar, it's faster and easier to access Internet or intranet pages. It's easier to find information on the Web, get to the Web sites and applications you use most often using taskbars and favorites, and with the Address bar for your desktop, it's fast to get to any Web site you need.
- **Leverage Windows 95 training.** Internet Explorer 4.0 is simply an extension of the Windows 95 and Windows NT 4.0 user interface, so users will be able to learn it quickly.
- **Personalized user interface.** With Internet Explorer 4.0, users can customize the desktop with the Internet technologies they use most often. By providing custom Start menus and taskbars, each user sets up the user interface so that it's most useful to them.

How Does It Work?

Start Menu

By adding the Favorites menu to the Start menu, users can get to Web sites directly from their desktop. The new Find command on the Start menu opens the browser automatically, optimized for searching. This way, users get the most complete search results with the fewest steps. Find/People integrates with Outlook Express LDAP support, enabling users to find anyone on the Internet. Finally, users can click any object in the Start menu or in the Programs or Favorites menus, and rearrange its contents by dragging and dropping the shortcuts wherever they want them.

Taskbar Extensibility

The Internet Explorer 4.0 taskbar is able to host bands exactly as the Internet Explorer 3.0 toolbar does. Users can adjust these bands however they would like, varying the size of the taskbar and the amount of space used by each band. Furthermore, any band can be moved off the taskbar and onto an edge of the screen, where it can be set to Always On Top or AutoHide, just like the taskbar in Windows 95.

Users can create three types of bands on the taskbar:

- **Folder band**. This band references a file system folder and works just like a toolbar with buttons for each item in the folder. The user can choose Large Icon or Small Icon view, and adding and removing items works via drag and drop. The right-click context menu is also available for individual files.
- **HTML band.** This band references any URL. MIS departments or ICPs can create rich HTML experiences that are always available to users on the taskbar or on edges of their screen by using the HTML band. Furthermore, the HTML content in these bands is cached locally, so bands work even

when the computer is offline. (And, of course, any HTML band can include Java applets, ActiveX, and so on.)

- **Custom-coded band.** ISVs can write code in any language and have their functionality hosted in a band.

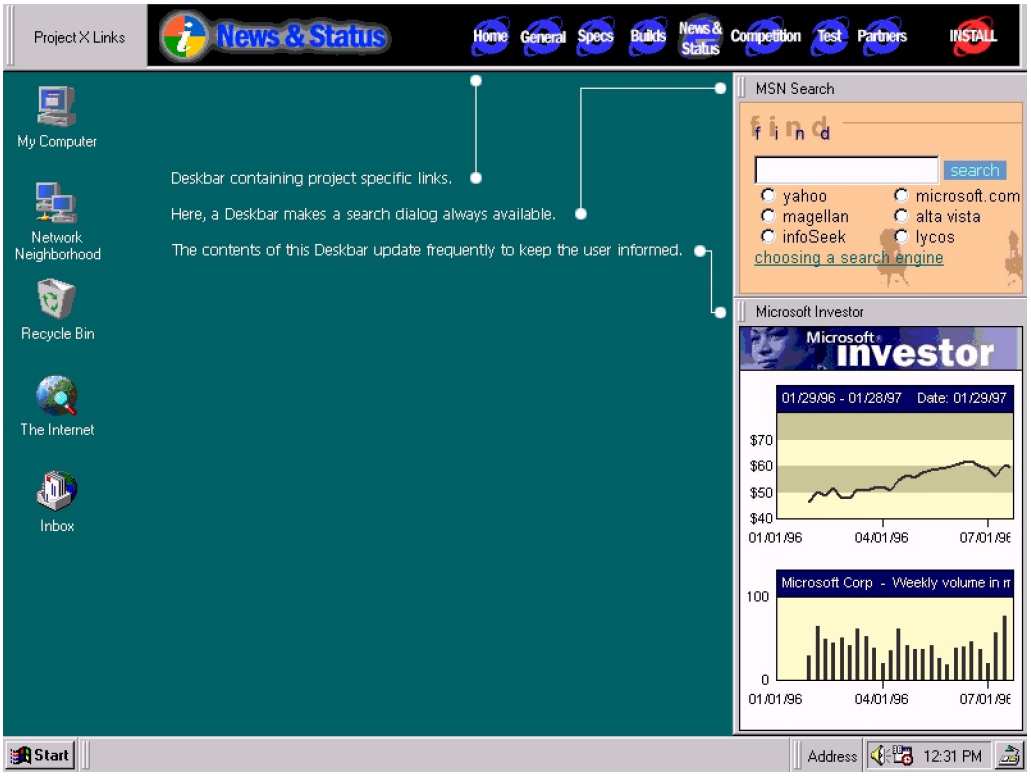


Figure 37: HTML Taskbars on the Desktop

Active Desktop

With the importance of information on the Internet and on intranets growing every day, users need fast, simple ways to get to data. Before Internet Explorer 4.0, users had to start a separate application to interact with Web content, and all Web content was displayed in a different, highly constrained application window.

The desktop has traditionally been a primary home base for users—a place to store documents and applications for easy and fast access. At the same time, users have enjoyed only limited customization of their desktops. With Internet Explorer 4.0, Microsoft has greatly enhanced users' ability to store any information on the desktop and keep it updated automatically. The result is the Active Desktop.

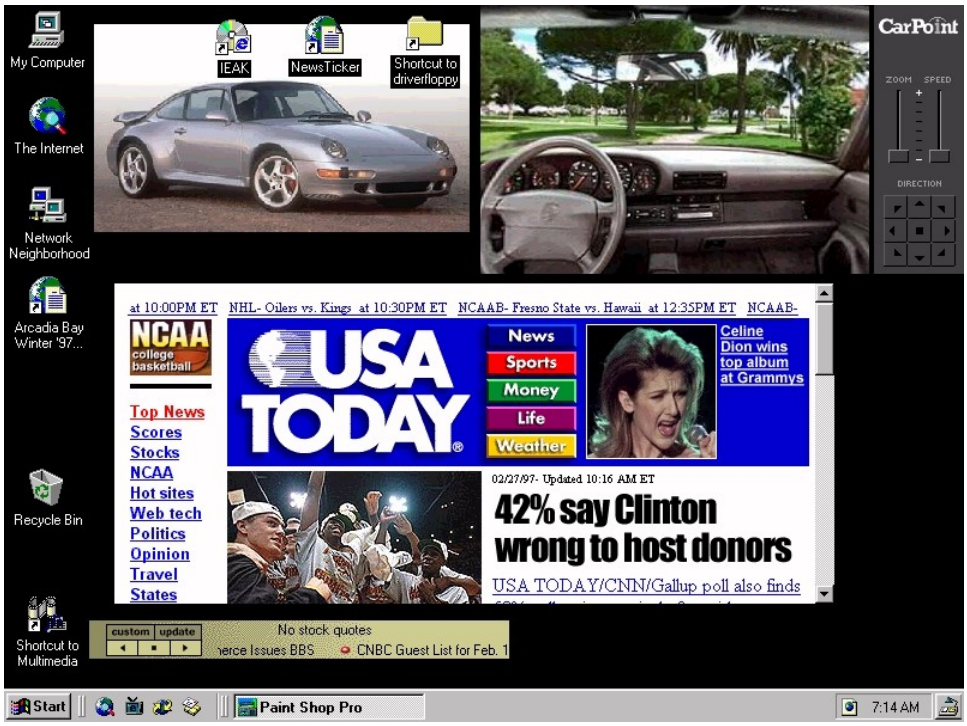


Figure 38: Desktop Components in the Active Desktop

Key Features of the Active Desktop

- **Fully customizable desktop.** The Active Desktop extends the existing user interface by enabling users to view and host Web components directly in the desktop. Desktop Web components are small floating frames that can be moved and resized by the user. They sit alongside existing desktop icons, giving users a 100% customizable space for favorite Web content. Since each one points to an URL, it can contain anything you'd put on a Web page today from Java Applets to ActiveX controls. Some examples of great desktop components include:
    - Pictures of sports highlights or breaking news stories, automatically updated from the Web every day
    - Web site displayed on the desktop as a moveable, resizable floating frame
    - Tickers for sports scores, stock quotes, or weather reports
    - Headline lists for news stories or announcements
    - Popup messages for internal corporate announcements
    - Notifications for new mail, chat, or public discussion forums
- **Built-in components.** Internet Explorer 4.0 provides a predefined set of desktop components designed to make the Active Desktop immediately useful. This set includes a Channel bar for fast access to your favorite Web channels and a notification component to inform you of what's new on subscribed content.
- **Supports roaming use and lockdown (Beta 2).** Network administrators can create custom HTML-based desktops for their users so that a customized work environment can be created for people with different job functions.

What are the Benefits of the Active Desktop?

- **Easy access to latest information.** With the Active Desktop, users have access to tools such as corporate directories and search engines right at their fingertips. From a content provider perspective, both ISVs and corporations can add customized HTML components that appear directly in front of their intended audience. Users don't even need to load a page to see the content.

- **Personalized user interface.** It's fast and easy to add components to the Active Desktop. All you have to do is point it towards the objects you're interested in, and then you've got a desktop built specifically for you, providing you with the information you need.
- **Reduced support costs.** Corporate IT departments can create standard HTML-based desktops for their end users, with links to important Web pages, e-mail aliases, documents, or applications, and then lock it down. By simplifying the user interface to a standard set of Web pages, the Help desk support burden can be reduced. Internet Explorer 4.0 even enables administrators to turn off the default set of icons on the desktop, providing even more control of the desktop for IT managers.

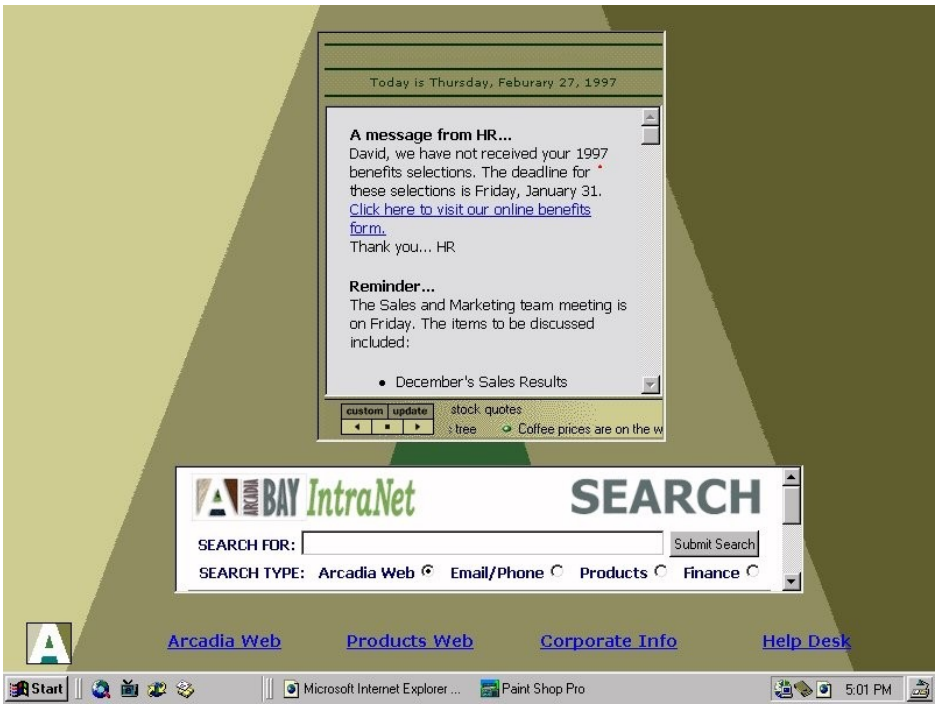


Figure 39: A Sample Corporate Active Desktop

How does the Active Desktop work?

The Active Desktop is made up of two layers: an HTML background and an icon layer that sits atop the HTML background. The icon layer supports all of the features of the single Explorer, such as single click navigation and the other features discussed earlier. Integrating an HTML background layer onto the desktop means that the desktop understands HTML and all of the associated software components such as ActiveX, Java, and ActiveX Scripting. In fact, there is an ActiveX control that manages all of the positioning of the desktop components, allowing users to move and resize them simply by using drag and drop, as well as layering components on top of each other.

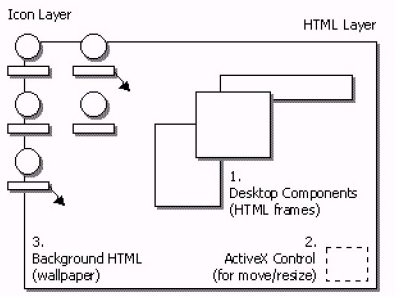


Figure 40: Active Desktop Architecture

Desktop components are typically designed to provide short capsule or summary information in a small amount of screen space. It makes sense for desktop components to offer hyperlinks or hotspots so the user can click a designated area, and then quickly open a new browser to get the details they need.

The desktop HTML layer is described by a single, local HTML file that is created and edited automatically by Internet Explorer 4.0. This HTML file contains the following:

- HTML tags that represent each desktop component. Each desktop component consists of a single HTML tag with an arbitrary x and y position (see Dynamic HTML earlier in this document for a description of 2D positioning and layering). The HTML tag for a desktop component can either be an image (<IMG> tag) or a floating frame (<IFRAME> tag), and is generated automatically by Internet Explorer 4.0. The floating frame is the most commonly used approach, since it neatly encapsulates an entire arbitrary HTML document that can contain anything the publisher desires. In either case, there is a single URL that points to the actual content.
- An ActiveX control that enables moving and resizing and helps manage the list of desktop components.
- Any other static HTML that the user wants to have in the background. By default, this is just a reference to the user's chosen wallpaper, which is exposed as the background watermark for the HTML page.

Adding and Updating Components:
Internet Explorer 4.0 allows users to add desktop components in two ways:

- **"Designed for Internet Explorer 4.0" desktop components**. If a publisher has created a desktop component following the instructions on http://www.microsoft.com, they can publish their component on their Web site. Microsoft has authored an ActiveX control to assist in setting the default configuration and scheduling options; the user simply clicks the control to install the component.

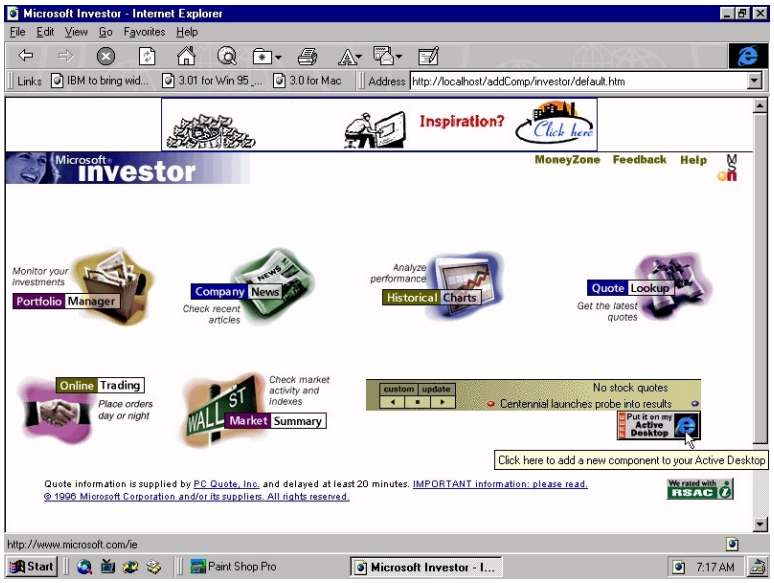


Figure 41: A Sample Page with the Desktop Channel Button

- **Other desktop components**. Users can choose *any* picture or Web site to be a component on their desktop. The Display Control Panel contains a new option tab labeled Desktop that allows a user to enter an Internet address and create an image or floating frame directly on their desktop.

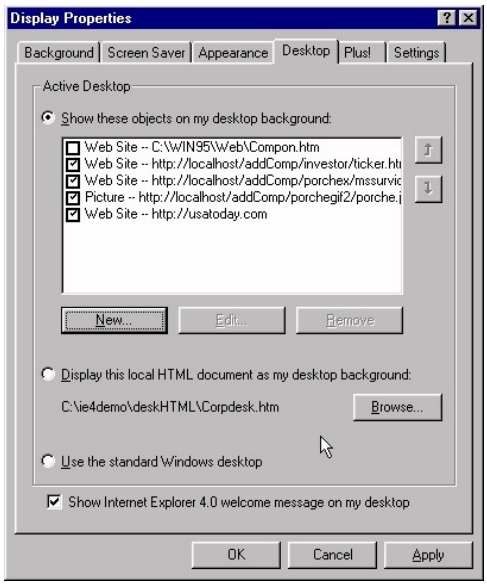


Figure 42: Desktop Display Properties

Works Offline

To keep all information up-to-date, all desktop components are added automatically to the user's Internet Explorer 4.0 Subscriptions folder. This has three effects:

- All content is automatically cached offline and marked as “sticky” in the cache, so its content is available even if no Internet connection is available.
- Users will be automatically notified whenever the component is changed on the server. Internet Explorer 4.0 provides this service automatically for all subscriptions.
- Each desktop component can be scheduled individually for updates on the client. For example, a user could have a sports ticker that gets updated once an hour, a news headline service that gets updated once a day, and a comic strip that gets updated once a week, all sharing space on the same desktop. Internet Explorer 4.0 automatically refreshes the associated HTML content on the desktop whenever the update occurs.

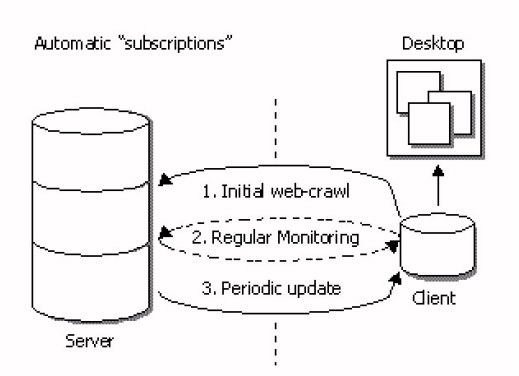


Figure 43: Subscription Architecture

Since each desktop component is simply defined by an Internet address, any content that the component references can synchronize with its corresponding content on its original server. For more details, see the Subscriptions section of this document.

Drag and Drop Customization

Any desktop component can be moved or resized by the user. To make these features intuitive, the move and resize features become available as soon as the user moves the mouse over a component.

To move a component, the user positions the cursor anywhere over it. The ActiveX control mentioned earlier is automatically added to the desktop HTML document .When it detects the mouse motion it creates a small move handle in the upper-left hand corner of the component. The user can then drag this handle around the screen to reposition the component.

Resizing works similarly. To resize a component, the user positions the pointer over any edge of the rectangular 2D HTML layer that contains the component. The cursor will then change to a standard directional resize cursor, and the user can drag and drop to change the size.

Complete Administration

As companies today are focusing more on reducing the total cost of owning and managing their distributed PC environments, it is critical for any software package to provide ways to automate common management tasks. Internet Explorer 4.0 includes several features to assist companies in software deployment, configuration, and desktop management.

The Internet Explorer 4.0 complete set of administration tools includes:

- Active Setup
- Internet Explorer Administration Kit
- ActiveX Control Viewer
- Automatic Proxy Configuration

Active Setup

The Active Setup engine is a way for administrators to both ease the burden of installation and also assist in the management of software once it is installed on their users' computers.

Key Features of Active Setup

- **Efficient, modular setup engine.** Active Setup optimizes network connection time by downloading only the initial install engine and identifying any potential problems (such as insufficient disk space) before downloading any application components. Administrators can create a single Internet Explorer 4.0 installation disk that contains only the install engine, which will then download application components from a network server.
- **Hands-free setup.** Administrators can deliver scripted installations that do not require user input, automatically installing preselected application components and configuration settings.
- **Automatic migration of existing configurations.** During setup, Internet Explorer 4.0 will import proxy settings, favorites/bookmarks, and cookies from a previous Internet Explorer or Netscape Navigator installation.
- **Enhanced logging features.** Active Setup records a transaction log during the installation process, allowing users and administrators to troubleshoot any installation problems that may occur.
- **Multiple download site switching.** During installation, if there is a problem on the server side of the process, Active Setup enables the client to switch to a new server automatically, continuing the installation seamlessly.

How does Active Setup Work?

Efficient, modular setup engine

Internet Explorer 4.0 installation occurs as follows:

First, the user chooses between minimal, typical, or full installations. At that point, the base Active Setup engine (approximately 200K) is downloaded. Active Setup then checks the available disk space for the appropriate installation option, and then downloads and installs Internet Explorer 4.0 *only* from the download site. Finally, Active Setup downloads and installs additional components from the download site.

Enhanced Logging Features
During the setup process, Active Setup creates a number of log files that can pinpoint any issues that may occur. The following log files are created in the Windows folder:

- **Active Setup Log.txt** – Logs all actions during the Active Setup wizard or component install phases of setup. Use this log if selected Internet Explorer 4.0 components do not get installed properly.
- **Soft Boot Log.txt** – Logs all processes running at the time installation finishes and prepares to restart the system. Use this log if a problem occurs when setup attempts to try to restart the system.
- **RunOnceEx Log.txt** – Logs all actions during the Dynamic Link Library registration phase. Use this log if you receive a message stating that a specific DLL did not register properly, or if any unexpected dialog box appears during the final setup phase.

Automatic Multiple Download Site Switching
Most Web sites force users to select the site from which they download products or components. In this model, the user runs a risk of download failure if their connection to that specific server fails. Active Setup automatically selects the download server and manages which components come from which sites. This architecture allows installations to be split into multiple packages for easier download and smart recovery if setup fails.

Internet Explorer Administration Kit

The Microsoft Internet Explorer Administration Kit (IEAK) enables organizations to create and distribute a Web browser that reflects the specific needs of their organizations and end users. With the IEAK, corporate administrators can create a hands-free customized installation of Internet Explorer 4.0.

Key Features of the IEAK

- **Customize the look and feel of the browser.** Administrators can create custom, branded versions of Internet Explorer 4.0, with a custom logo, title bar, preloaded Channels and Favorites, and Start and Search pages.
- **Bundle Internet Explorer and add-in programs together into a single download package**. Administrators can deliver in-house applications along with Internet Explorer 4.0 or run specific commands after the Internet Explorer installation process is complete.
- **Preconfigure and remotely manage all options for end users**. An administrator can preset all user settings in Internet Explorer 4.0 to ensure consistent deployment and use throughout the enterprise. After the user options are set and the browser is distributed, administrators can still manage all Internet Explorer options.

What are the Benefits of the IEAK?

- **Easy deployment.** The IEAK automates the time-consuming process of deploying and configuring browsers on users' desktops, enabling them to create a hands-free installation solution for their users.
- **Simple remote management.** The IEAK also gives administrators the control to manage all browser settings on the desktop. Once configured, browser settings can be managed and automatically updated from a central server, providing a self-maintaining browser. This way, when a news server or a proxy server changes, it is unnecessary to visit every computer in the enterprise to update the software.

How does the IEAK Work?

To create a customized version of Internet Explorer, an administrator runs the IEAK wizard. The wizard creates a hands-free Internet Explorer installation program that users can run to install Internet Explorer with the specified options. The IEAK also creates a master settings file (Install.ins) that contains company-wide browser customization settings. Administrators can also provide user-specific options that are updated when an individual user installs the customized package. Configuration options can be set at an individual, group, or company-wide level.

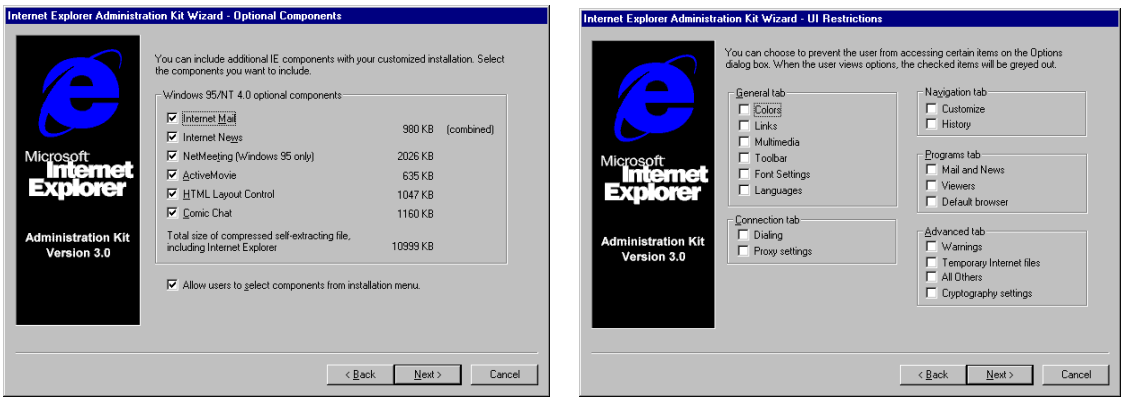


Figure 44: IEAK Wizard

Using the IEAK wizard, administrators can customize the following options for their users:

- **Internet Explorer Start and Search pages.** Specify Start and Search pages to internal Web sites. For example, the Start page could point to a departmental page, and the Search page could point to an internal search tool.
- **Subscribed channels.** Restrict which channels users can subscribe to, and provide custom internal channel options right on the desktop.
- **Preloaded Favorites list.** Preload links and folders according to project, department, division, job category, and so on.
- **Internet Explorer title bar.** Specify the text that you want to appear in the title bar of Internet Explorer. For example, this could be a company name or a division or department name.
- **Custom logo.** Replace the static Internet Explorer logo with the company or product logo.
- **Custom command folder.** Roll out any internal programs or custom command scripts at the same time that you install Internet Explorer. If you add other self-extracting programs to the package, you can specify the command line to extract them. Or, you can run simple maintenance commands, such as setting the user's clock or running virus-checking programs.
- **Internet Explorer add-ons.** Specify which Internet Explorer add-ons you want, including Outlook Express, NetMeeting, and NetShow. For Outlook Express, you can specify user or group settings for POP3 and SMTP protocols and server domain, specify the Internet news server and whether the server requires the user to log on. Plus, you can include a newsreader signature file to attach to all messages that users post to Internet newsgroups. For example, you could create a standard disclaimer that the opinions expressed are the user's own and not representative of a corporate position.
- **Other installation programs.** You can include up to two other self-extracting utilities or programs in the Internet Explorer installation package, and give users the option to install them at the same time as Internet Explorer.
- **Target language.** Specify the language version of Internet Explorer. You must run the IEAK wizard once for each language you want to create. (Each language ships on a separate CD-ROM.)
- **CD AutoRun application customization.** Create a CD-ROM/Network AutoRun program that could be used in the deployment of your product.
- **Option settings.** Preset all of the option settings for the end user.
  - General settings. Preset multimedia, color, and toolbar settings.
  - Connection. Specify proxy settings for addresses, ports, and exceptions that will enable your customers to connect to the Internet via a proxy server, or set dial-in phone number settings.
  - Security. Preconfigure users' permissions for downloading code such as Java applets, ActiveX controls, and scripts, and the preferred level of security for the different types of code. Also, you can preset users' PICS ratings configurations to meet your corporation's policies.
  - Advanced Options. Set which warning messages to show, cache settings, and enable or disable additional settings, such as the JIT compiler or stylesheets usage.
- **Restrictions for Options dialog box.** After you've configured the options, you can control which options a user can adjust and which are locked.

- **Installation directory settings for hands-free installation.** Select the folder in which you want the Internet Explorer installation program to save the files. For example, you can specify your own folder, or you can install into the Program Files folder.

ActiveX Control Viewer

Introduced in Internet Explorer 3.0, ActiveX controls enabled developers to use tools such as Visual Basic, Visual C++, or Borland Delphi could create small, fast software components that could be displayed inside Web pages. This made it much faster to develop Web-based applications; developers could simply leverage the code that they were already writing, perhaps for internal custom applications, and insert them onto a Web page. It did, however, make it difficult to manage these controls once they were installed on a client's PC. The ActiveX Control Viewer enables you to see all of the controls installed and clean them up when necessary.

Key Features

- **Integration with Windows user interface**. The ActiveX Control Viewer exists as a simple directory inside the Windows folder, displaying all of the installed ActiveX controls.
- **Delete controls**. Until now, there was no easy way to find all of the installed ActiveX controls, much less delete them. The ActiveX Control Viewer makes it easy.

How does the ActiveX Control Viewer Work?

In Internet Explorer 3.0, all of the ActiveX controls are installed into a folder called Occache, but there was no functionality in that folder. In Internet Explorer 4.0, they are installed into a folder called Downloaded ActiveX Controls, which, like the History, Subscriptions, and Tasks folders, has special functionality in the Windows 95 user interface.

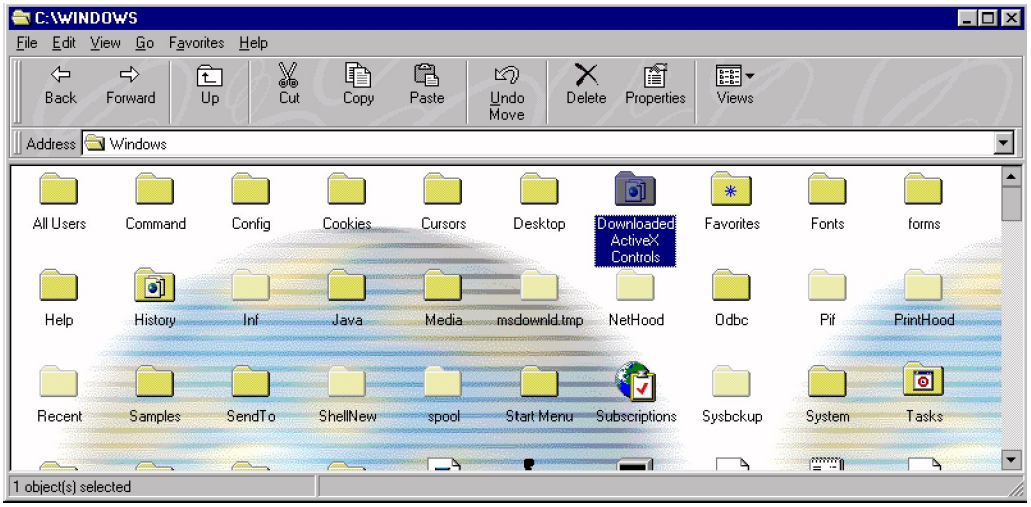


Figure 45: Downloaded ActiveX Control Folder

All of the installed controls appear inside the ActiveX Control folder and can be uninstalled by right-clicking any icon.

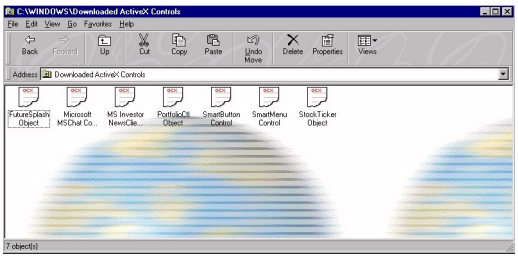


Figure 46: Listing of ActiveX Controls

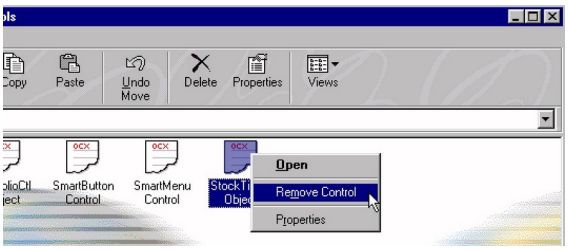


Figure 47: Uninstalling a Control

While the Authenticode security software will tell you where a control came from during installation, it was never easy to know where a control came from once it was installed. By choosing Properties on any ActiveX control, you can reveal information such as the last time the control was accessed and the source of the control.

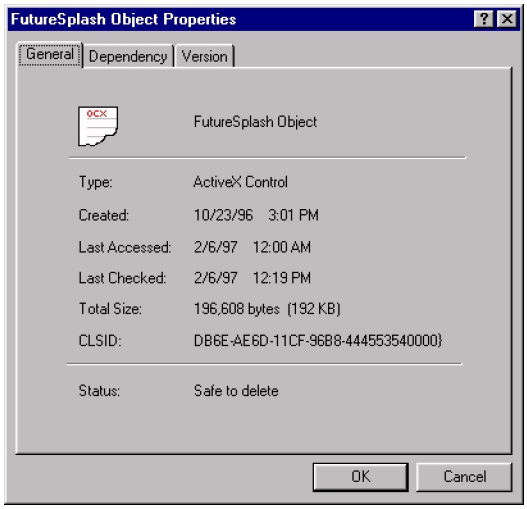


Figure 48: General Properties of a Control

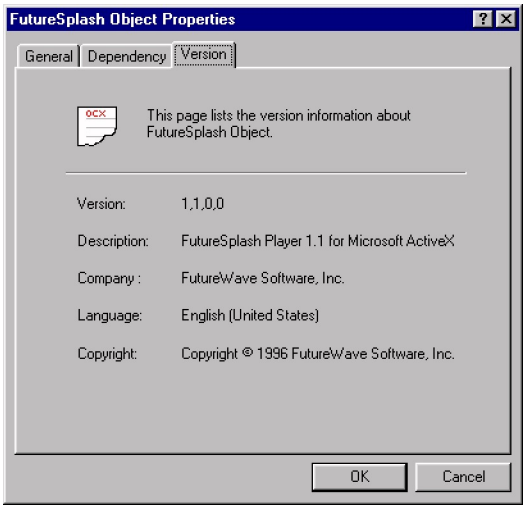


Figure 49: Version Properties of a Control

What are the Benefits of the ActiveX Control Viewer?

- **Easy user control.** With the ActiveX Control Viewer, it's much easier for users to see the controls installed on their PC and delete those they haven't used in a long time, maximizing their available disk space.
- **Find files faster.** For a stricter corporate environment, it makes it much easier to locate unnecessary software, which may not adhere to company standards.

Automatic Proxy Configuration

Internet Explorer 4.0 eases the administrative burden by allowing administrators to automatically configure proxy settings such as server addresses and bypass lists. Administrators can use the Internet Explorer Administration Kit to configure proxy settings or create a settings file using JScript.
Internet Explorer 4.0 can be configured to automatically retrieve proxy settings for each Internet protocol (HTTP, FTP, Secure, Gopher, SOCKS) from an .ins file created via the Internet Explorer Administration Kit, or from an HTML file that contains JScript that executes whenever a network request is made.
Multiple proxies can be configured for each protocol type, and Internet Explorer can automatically cycle through the different proxy servers to avoid overloading any particular server.

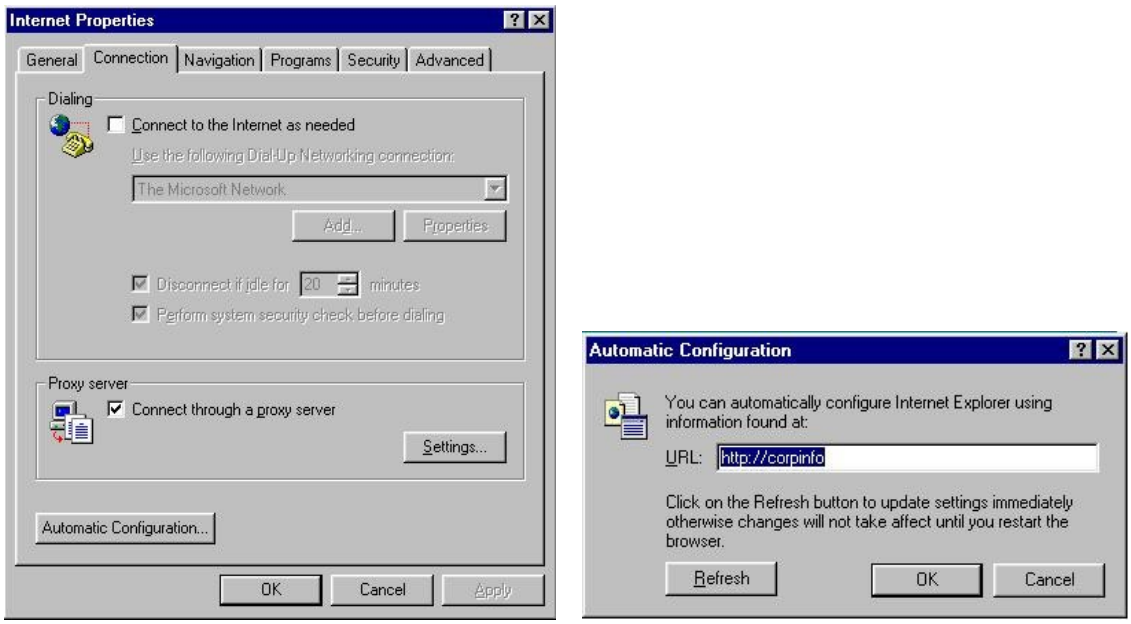


Figure 50: Automatic Proxy Configuration

What are the Benefits of Automatic Proxy?

- **Centralized management and compatibility**. Automatic Proxy Configuration makes it easy to administer a distributed network of PCs running Internet Explorer by allowing administrators to set proxy configurations in a central location for all users. Any changes are propagated to all users as they run their browser, without disrupting the work process.
- **Most compatible management solution**. With Internet Explorer 4.0, support for both IEAK settings and JScript configurations ensure maximum compatibility with existing installations. Therefore, if you would like to migrate your management solution from JScript to IEAK.ins files (or vice-versa), you can do so gradually, as both solutions work seamlessly.