WebObjects Tools and Techniques

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This manual describes WebObjects 4.0.

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Introduction

To develop server-based WebObjects applications, you use two primary tools: Project Builder and WebObjects Builder. These tools help you perform the major tasks required to develop your application

Project Builder is an integrated software-development application. It contains a project browser, a code editor, build and debugging support, and many other features needed to develop an application. It helps you to:

- Create and manage your project.
- Write code to provide behavior in your application.
- Build and launch your application.

This chapter discusses the main features of Project Builder that you use when developing WebObjects applications. For more information on Project Builder's other features, refer to its on-line help.

WebObjects Builder is described in the chapters "Editing With WebObjects Builder" and "Working With Dynamic Elements".

This document refers to example projects located in the **/Apple/Developer/Examples/WebObjects** directory.

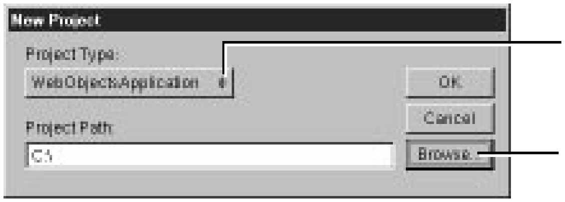
Creating WebObjects Application Projects

A WebObjects application project contains all the files needed to build and maintain your application. You use Project Builder to create a new project.

1. Launch Project Builder.

   On Mac OS X Server, choose Project Builder from the Apple menu under Developer Applications. On Windows NT, you can launch Project Builder from the WebObjects program group in the Start menu.

2. Choose Project ▸ New.



Project Type: WebObjectsApplication

Project Path: C:\

Set the project type here.

Click to choose the directory in which to create your project.

The New Project panel has a Project Type pop-up list that lets you choose the type of project you want to create.

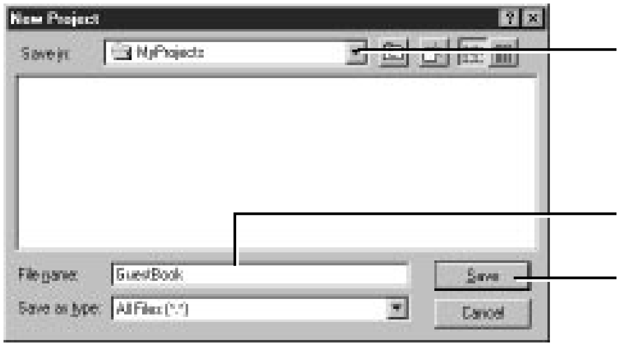
3. In the Project Type pop-up list, make sure WebObjectsApplication is selected.

   Another type of project you may want to create is WebObjectsFramework. See “Frameworks” for more information.

4. Click Browse to specify your project’s location.

   Type your project’s location and name directly in the Project Path text field.

5. Navigate to the directory in which to create your project.



Save in: MyProjects

File name: GuestBook

Save as type: All Files (*.*)

Choose a directory here.

Type the project name here.

Click when finished.

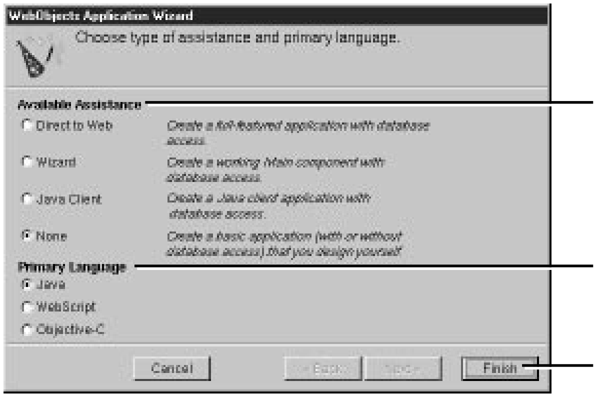
6. Type the name of the project you want to create in the File name field.

7. Click Save.

   The New Project panel now shows the path you specified.

8. Click OK.

   The WebObjects Application Wizard launches.


WebObjects Application Wizard

Choose type of assistance and primary language.

Available Assistance

○ Direct to Web — *Create a full-featured application with database access.*

○ Wizard — *Create a working Main component with database access.*

○ Java Client — *Create a Java client application with database access.*

● None — *Create a basic application (with or without database access) that you design yourself*

Primary Language

● Java

○ WebScript

○ Objective-C

Choose level of assistance.

Choose programming language.

Click to proceed.

Choosing Assistance

If your application doesn't access a database, choose None for Available Assistance.

If your application accesses a database, you also choose None if you want to develop the entire application yourself. However, you may wish to use one of the levels of assistance that WebObjects provides. Information about Direct to Web option can be found in the "Direct To Web" chapter. Information about the Database Wizard can be found in "Creating a WebObjects Database Application" in *Getting Started With WebObjects*.

Choosing the Programming Language

WebObjects supports three languages:

- Java
- Objective-C
- WebScript

Java and Objective-C are *compiled* languages. WebScript, which is based on Objective-C, is a *scripted* language. A scripted language allows you to make changes to your application withoutcompiling. When you use compiled code, your application runs faster, but you must continually build your application before running it.

Java files have the extension **.java**, Objective-C files have the extension **.m**, and WebScript files have the extension **.wos**.

The language you choose in the Wizard applies to the following files:

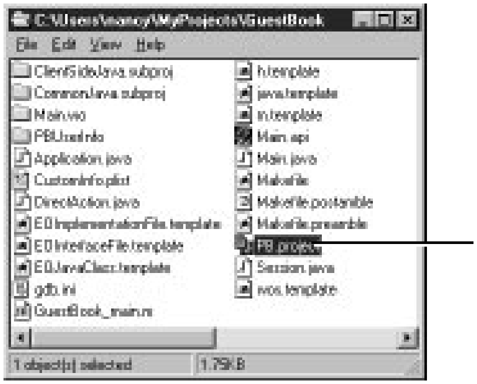
- The Main *component*. A component in WebObjects represents a page in your application (or possibly part of a page). When you create your project, Project Builder provides you with an initial component called Main. The component's code file implements the behavior of the component.

- The *application* and *session* code files. Application code contains variables and methods that affect the entire application. Session code contains variables and methods that affect a single user's session.

If, for example, you specify Java as your primary language, the Wizard will create the files **Application.java**, **Session.java**, and **Main.java** for you. You can mix languages in a project by choosing a different language when you create individual components.

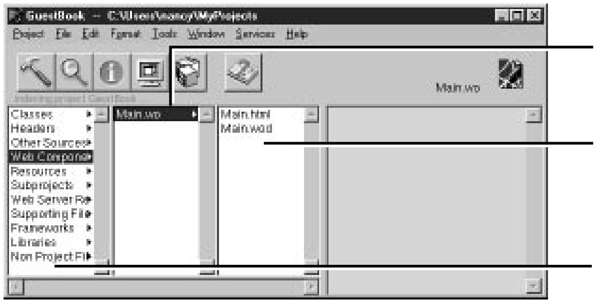
The Structure of a WebObjects Application Project

On disk, your project is a folder whose name is the project name. The project folder contains all the files in your project. The file **PB.project** is the *project file*. You can open a project by double-clicking this file.



Double-click here to open your project.

Project Builder displays a browser showing the contents of your project. The first column lists several categories of files that your project may contain. The following sections describe these categories.



Your project's components. Double-click to edit in WebObjects Builder.

Files in the selected component. Click to display their contents in Project Builder.

Categories ("suitcases") of project resources.

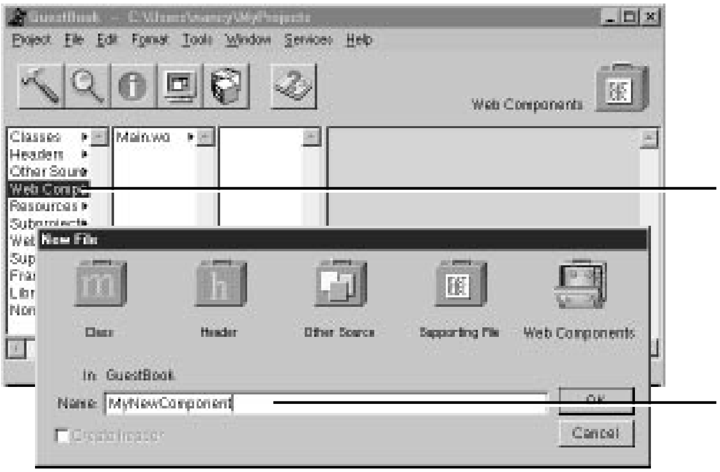
Adding or Deleting Items From a Project

As you work with your project, you'll use Project Builder to create new items (such as components or classes) or to add files (such as images) that you created with other programs to the project. For items in certain suitcases (such as subprojects and frameworks), there's a specific command to add them, discussed in the section about the suitcase. For other suitcases, you use the following procedures.

To create a new item of a particular kind:

1. Select the appropriate suitcase in first column of the browser.

2. Choose File ▸ New in Project.



Click here, then choose File->New in Project.

Enter new file name here.

The New File panel comes up with the suitcase you selected open by default.

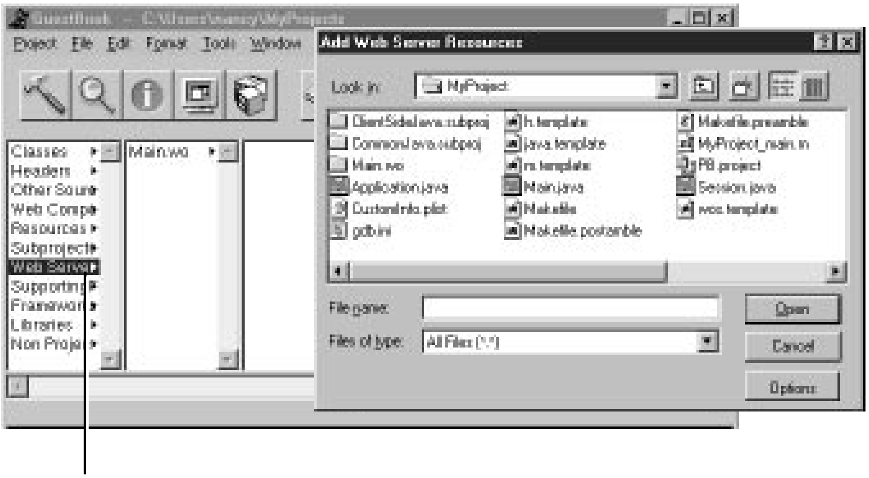
3. Type the name of the item and click OK.

   The new item is added to your project.

To add an existing item (for example, a component, a framework, or a source file) to a suitcase, first select the suitcase in the first column of the browser. Then either:

- Double-click the suitcase.
- Double-click the suitcase icon at the top right of the browser window.
- Choose Project ▸ Add Files.

A panel called Add *SuitcaseName* appears, allowing you to find an item to be added to the suitcase.



Look in: MyProject

File name:

Files of type: All Files (*.*)

Double-click to add existing files to this suitcase.

In addition, you can drag a file directly onto the suitcase icon in the browser, and the file is copied into the project and added to the suitcase.

To delete items from a project:

1. Select one or more items in the browser.

2. Choose Project ▸ Remove Files.

   A panel appears, giving you the option of removing the files from the project only or from the disk as well.

Web Components

A *component* represents a page, or part of a page, in your application. An application can have one or more components.

Every application starts with a component called Main, which is shown in the Web Components suitcase in the second column of the browser as **Main.wo**. All components have the **.wo** extension.

If you double-click a component, WebObjects Builder opens the component for editing. “Editing With WebObjects Builder” shows how to edit your component using WebObjects Builder.

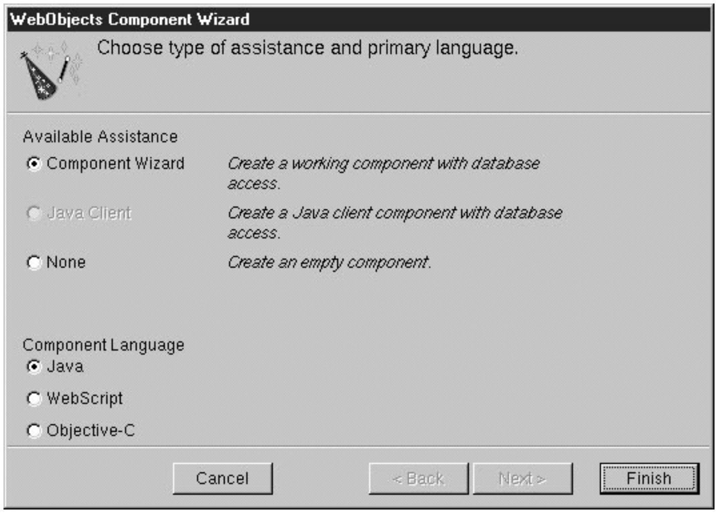
On disk, a component is represented as a folder with the **.wo** extension. Every component has several files that specify the component’s look and behavior. The name of each one is the component’s name followed by a specific file extension. These are the files in the Main component:

- **Main.html** is the HTML template for the component. This file contains HTML tags, just like any web page; in addition, it typically contains tags for dynamic WebObjects elements.
- **Main.wod** is the *declarations file* that specifies bindings between the dynamic elements and variables or methods in your code.
- **Main.woo** is used to store information about display groups (if your project accesses a database) and encodings for HTML templates. You should never edit this file (it does not appear in Project Builder’s browser).

To create a new component:

1. With Web Components selected in the first column of the browser, choose File ▸ New in Project.
2. In the New File panel, type the name of your project and click OK.

   The WebObjects Component Wizard appears.



WebObjects Component Wizard

Choose type of assistance and primary language.

Available Assistance

● Component Wizard — *Create a working component with database access.*

○ Java Client — *Create a Java client component with database access.*

○ None — *Create an empty component.*

Component Language

● Java

○ WebScript

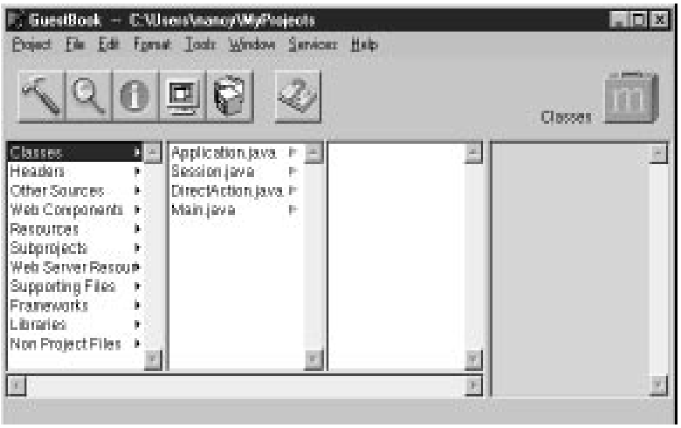
○ Objective-C

3. If you want the Wizard to assist you in creating a component with database access, choose Component Wizard from Available Assistance; otherwise choose None. See “Creating a WebObjects Database Application” in *Getting Started With WebObjects* for more information on using the Wizard with databases.

4. Specify the language for your component and click Finish.

Classes

The Classes suitcase contains Java, Web Script and Objective-C classes. For example, if your application’s primary language is Java, this suitcase contains the **Application.java**, **Session.java**, **DirectAction.java**, and **Main.java** files. The files have the extension **.wos** if the primary language is Web Script and **.m** if the primary language is Objective-C . There is a class file for each component, as well as any other classes you add to the project



You can specify that Java classes are client-side, server-side, or common classes. See "Subprojects" for more information on how to do this.

Headers

The Headers suitcase contains header files for projects that use Objective-C.

Other Sources

The Other Sources suitcase contains compiled code that doesn't belong to a particular class.

Resources

The Resources suitcase contains files that are needed by your application at run time, but which do not need to be in the web server's document root (and hence will not be accessible to users). It includes:

- Configuration files
- EOModel files
- API files containing the keys defined by a component (for example, **Main.api**) that other components can bind to (see "Reusable Components").

Web Server Resources

The Web Server Resources suitcase contains files, such as images and sounds that must be under the web server's document root at run time. When developing your application, you place these files in your project directory and add them to the project (see "Adding or Deleting Items From a Project"). When you build your project, Project Builder copies the files in this suitcase into the WebServerResources folder of your application wrapper (see “The Application Wrapper”).

Subprojects

A subproject has the same structure as a WebObjects Application project. You can use subprojects to divide large projects into manageable chunks.

When you create a new project, ProjectBuilder creates two subprojects (ClientSideJava and CommonJava) in your project folder. By default, they are not added to the Subprojects suitcase. If you need to use them, you must add them to the project. Then you can add your Java classes to the appropriate project as follows:

- Add server-side Java classes to your top-level project.
- Add client-side Java classes to the ClientSideJava subproject.
- Add Java classes that are common to both client and server to the CommonJava subproject.

Note: These subprojects have the makefile variables `JAVA_IS_CLIENT_SIDE` and `JAVA_IS_SERVER_SIDE` set in **Makefile.preamble** so that the appropriate Java code is generated when you build your project.

To create a subproject:

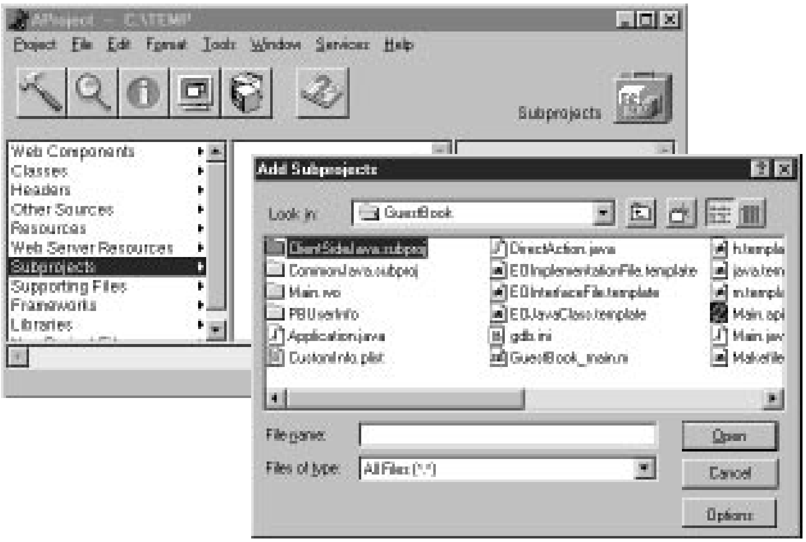
1. Choose Project ▸ New Subproject.

2. Specify the name of your subproject in the New Subproject panel, the type of project from the Type pull-down menu, and click OK.

   A subproject is created inside the project, with a similar structure to the top-level project. You can add items to the subproject in the same way that you add items to the top-level project.

To add an existing subproject (such as ClientSideJava or CommonJava) to your project:

1. Double-click Subprojects in the first column of the browser.



2. In the Add Subprojects panel, navigate to the directory of the subproject you want to add and click Open.

Supporting Files

The Supporting Files suitcase contains your project's **Makefile** (which you should not edit since this file is maintained by Project Builder), as well as **Makefile.preamble** and **Makefile.postamble**, which you can modify in order to customize the build. You can add other files your project may need (such as Read Me documents) to this suitcase so that they can be edited in Project Builder.

Frameworks

A *framework* is a collection of classes and resources that an application can use. By storing items such as components and images in frameworks, you can reuse them in multiple projects without having to create multiple copies.

Every WebObjects Application project includes several frameworks by default. When you build, your application links with these frameworks. They are:

- WebObjects: The basic WebObjects classes.
- WOExtensions: Extensions to the WebObjects framework.
- EOAccess: The Enterprise Objects Access Layer.
- EOControl: The Enterprise Objects Control Layer.

- Foundation: Basic object classes that most applications use (for example, strings, numbers, and arrays).

You can include additional system frameworks in your project if you need to. To add an existing framework to your project:

1. Double-click Frameworks in the first column of the browser.

2. In the Add Frameworks panel that appears, select a framework to add and click Open.

In addition, you can create your own frameworks in order to share WebObjects components and resources across multiple applications. To create a WebObjects Framework:

1. Choose Project ▸ New.

2. Select WebObjectsFramework from the pop-up menu.

3. Select the path where you want to create the framework.

Once you have created a framework, you can add components, images, and other items to it in the same way that you would add them to a project. To have your framework be accessible by other applications, you must install it (see "Installing Your Application" for more information). See "Reusable Components" for more information on using components that live in frameworks.

Libraries

The Libraries suitcase contains libraries that your application links to.

Non Project Files

The Non Project Files suitcase is used for files that you have opened that aren't part of the current project.

Opening an Existing Project

To open an existing project from Project Builder:

1. Choose Project ▸ Open.

2. In the Open Project panel, navigate to the project folder and click Open.

To open an existing project from the file system, double-click the **PB.project** file in the project directory. Project Builder launches (if it is not already running) and opens the project.

Editing Your Project's Source Files

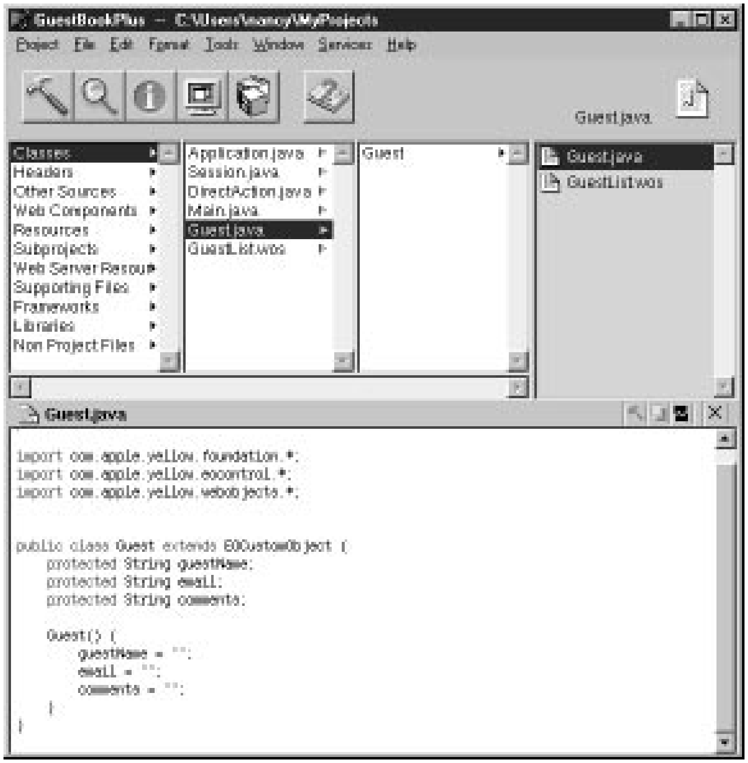
Every component in your project has a code file whose name is the name of the component followed by the appropriate extension (**.java** for Java, **.m** for Objective-C, and **.wos** for WebScript). Your project may use different languages for different components.

Each component's code specifies the component's behavior. Each component is actually a subclass of WOComponent. This class has standard methods (such as **awake** and **init**) that you may want to override (see *WebObjects Developer's Guide* for more information on these methods). You can also write your own methods and bind them to dynamic elements in your component (see "Working With Dynamic Elements", as well as the *Dynamic Elements Reference*, for information on binding dynamic elements).

In addition to the component's code, each project has an *application code file* (**Application.java**, **Application.m**, or **Application.wos**) and a *session code file* (**Session.java**, **Session.m**, or **Session.wos**). These files implement your applications custom subclasses of WOApplication and WOSession.

When you first create your project using the Wizard, you specify the language you want to use (see "Choosing the Programming Language"). This language applies to the application and session code, as well as to the code for your initial component, Main. Other components may be written in different languages.

Regardless of the language you select, all source code for classes appear in the Classes suitcase. On disk, they are located at the top level of the project directory.



```
import com.apple.yellow.foundation.*;
import com.apple.yellow.eocontrol.*;
import com.apple.yellow.webobjects.*;


public class Guest extends EOCustomObject {
    protected String guestName;
    protected String email;
    protected String comments;

    Guest() {
        guestName = "";
        email = "";
        comments = "";
    }
}
```

To save changes in your code, choose File ► Save.

Note: WebObjects Builder gets information from Project Builder about variables and methods in your code. If you add or delete a variable or method, WebObjects Builder doesn't get the updated information until you save the file.

Editing Your Component's HTML and Declarations Files

While you must use Project Builder to edit your components' code or script files, you typically use WebObjects Builder's graphical interface to generate the HTML and declarations files. You can, however, also edit these files using Project Builder.

To edit a component in WebObjects Builder:

1. Select Web Components in the first column of Project Builder's browser.

2. Double-click the component name (for example, **Main.wo**) in the second column.

WebObjects Builder launches and opens your component in a window. See "Editing With WebObjects Builder" for information on using WebObjects Builder to edit your component.

To edit a component in Project Builder:

1. Select Web Components in the first column of Project Builder's browser.

2. Select the component you want to edit in the second column.

3. Select *ComponentName*.**html** or *ComponentName*.**wod** in the third column.

   The text of the file appears in the lower pane of the browser, where it can be edited.

4. Alternatively, you can double-click the file name or its icon at the top right of the browser, and the file opens in a separate window.

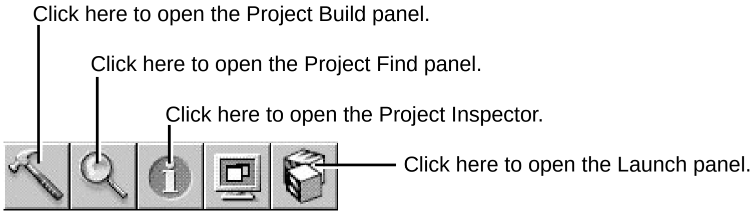
Building Your Application

You must build your application if your project contains any compiled code (Java or Objective-C). If your application uses WebScript only (and you do not modify any web server resources), you do not need to build. In this case, Project Builder runs a default executable (**WODefaultApp**) when you launch your application.

Once you have built your application, you do not need to rebuild unless you have made changes to your compiled code. You can make changes to your components (the **.html**, **.wod**, or **.wos** files) and test them without rebuilding.

For more information on how to build and run your application quickly, see the "Rapid Turnaround Mode".

Project Builder has a toolbar with buttons you use to build and launch your application.



Click here to open the Project Build panel.

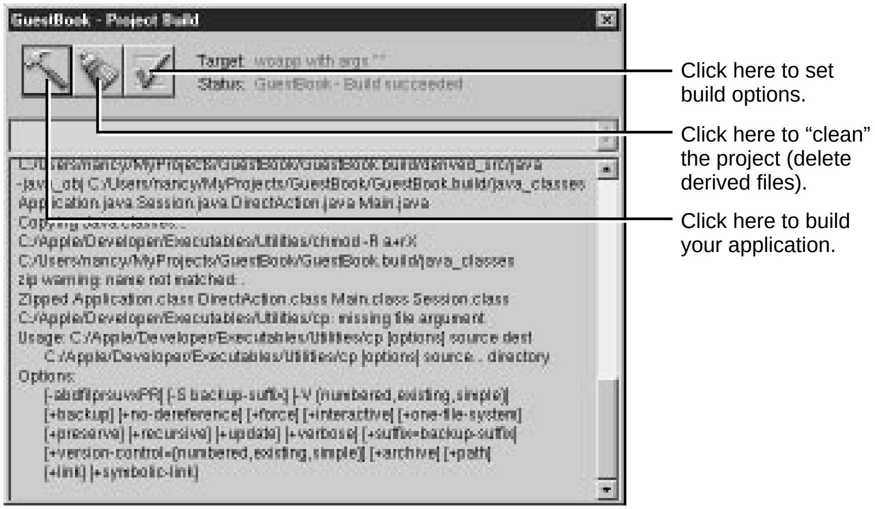
Click here to open the Project Find panel.

Click here to open the Project Inspector.

Click here to open the Launch panel.

1. Click 🔨 in the toolbar to open the Project Build panel.

2. Click 🔨 in the Project Build panel to build your project



GuestBook - Project Build

Target: woapp with args ""
Status: GuestBook - Build succeeded

```
C:/Users/nancy/MyProjects/GuestBook/GuestBook.build/derived_src/java
-java_obj C:/Users/nancy/MyProjects/GuestBook/GuestBook.build/java_classes
Application.java Session.java DirectAction.java Main.java
Copying java classes...
C:/Apple/Developer/Executables/Utilities/chmod -R a+rX
C:/Users/nancy/MyProjects/GuestBook/GuestBook.build/java_classes
zip warning: name not matched: .
Zipped Application.class DirectAction.class Main.class Session.class
C:/Apple/Developer/Executables/Utilities/cp: missing file argument
Usage: C:/Apple/Developer/Executables/Utilities/cp [options] source dest
    C:/Apple/Developer/Executables/Utilities/cp [options] source... directory
Options:
    [-abdfilprsuvxPR] [-S backup-suffix] [-V {numbered,existing,simple}]
    [+backup] [+no-dereference] [+force] [+interactive] [+one-file-system]
    [+preserve] [+recursive] [+update] [+verbose] [+suffix=backup-suffix]
    [+version-control={numbered,existing,simple}] [+archive] [+path]
    [+link] [+symbolic-link]
```

Click here to set build options.

Click here to “clean” the project (delete derived files).

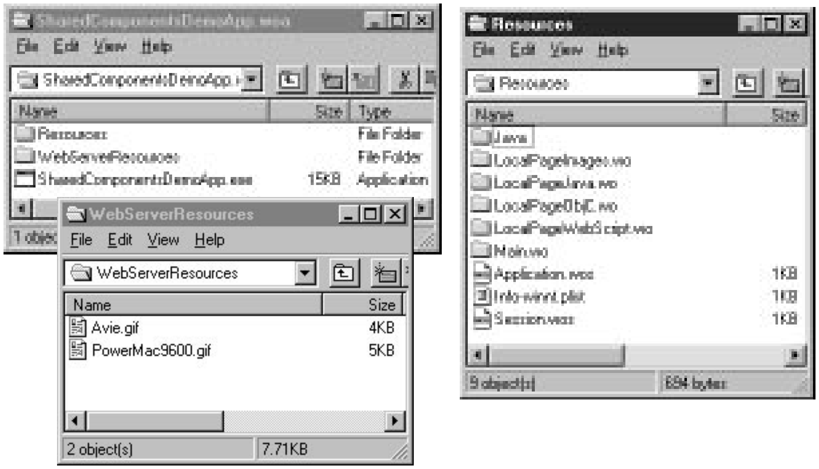
Click here to build your application.

The Project Build panel displays the commands that are being executed to build your project. If all goes well, it displays the status message “*Project Name* - Build succeeded”

3. Close the panel.

The Application Wrapper

When you build your project, Project Builder creates an *application wrapper*, which is a folder whose name is the project name plus the extension **.woa.**



Name	Size	Type
Resources		File Folder
WebServerResources		File Folder
SharedComponentsDemoApp.exe	15KB	Application

Name	Size
Avie.gif	4KB
PowerMac9600.gif	5KB

Name	Size
Java	
LocalPageImages.wo	
LocalPageJava.wo	
LocalPageObjC.wo	
LocalPageWebScript.wo	
Main.wo	
Application.wos	1KB
Info-winnt.plist	1KB
Session.wos	1KB

The application wrapper has a structure similar to that of a framework. It consists of the following:

- The executable application.
- The application's resources.

  These include the application's components as well as other files that are needed by your application at run time.
- The application's web server resources.

When you build and install your application, Project Builder copies all the files from your Web Server Resources suitcase to a folder called WebServerResources inside the application wrapper. If you have client-side Java components in your project, these are also copied to the WebServerResources folder.

Launching Your Application

To launch your application:

1. Click 🖥 in the toolbar to open the Launch panel.
2. Click 🖥 in the Launch panel to launch your application.

When you launch your application, your machine's web browser is launched by default and it accesses your application. To turn off this feature:

1. Click ✓ to bring up the Launch Options panel.

2. Select Environment and Command-Line Arguments from the pop-up menus.

3. Enter `-browser OFF` as a command line option.

You can also launch your application directly from a command line. See *Serving WebObjects* for more information on command line options.

You can also launch your application by double-clicking its executable file. When you build your application, Project Builder creates an executable file (*ProjectName*.**exe** on Windows NT platforms) inside your application wrapper (**.woa**) directory.

Installing Your Application

Some files in a web application (such as images and sounds) must be stored under the web server's document root in order for the server to access them. The remaining files (such as your components and source code) must be accessible to your application but not necessarily by the web server itself.

In previous versions of WebObjects, it was typical to store the entire project under the web server's document root. This practice has advantages for turnaround time during development. However, in deployment, it presents the possibility of allowing users access to your source code. WebObjects has a "split installation" feature that allows you to install only those files (such as images) that the web server must have access to under the document root. The remaining files can be stored elsewhere.

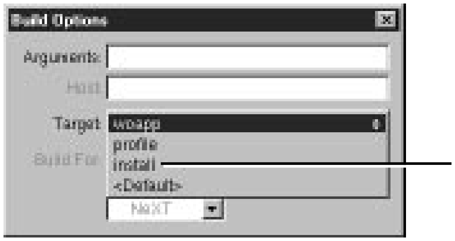
The same procedure applies to installing WebObjects applications and frameworks. To install:

1. Click ⓘ to open the Project Inspector.

2. Under "Install In:", set the path where the application wrapper will be installed.

3. In Project Builder's Build panel, click ✓.

4. From the Target pop-up menu, choose **install**. (By default, the target is set to **woapp**.)



Select “Install.”

5. Click 🔨 in the Build panel to install your application.

   The full application wrapper is copied into the “Install In:” directory, and a wrapper containing only the Web Server Resources is copied into the document root.

See *Serving WebObjects* for more information about installing your application.

Rapid Turnaround Mode

For the most part, WebObjects is an interpreted environment. The HTML templates, declarations files, and WebScript files each represent interpreted languages. One of the main benefits of an interpreted environment is that you don’t need to recompile every time you make a change to the project. The ability to test your changes without rebuilding the project is called “rapid turnaround” and, when using the rapid turnaround features, you’re said to be in “rapid turnaround mode.”

WebObjects supports rapid turnaround of **.html**, **.wod**, and **.wos** files within application projects, framework projects, and subprojects of either applications or frameworks.

To support rapid turnaround, WebObjects must be able to locate the resources of your application and its associated frameworks within your system’s projects rather than the built products (the **.woa** or **.framework** wrappers). To tell WebObjects where to look for your system’s projects you must define the NSProjectSearchPath user default. Set this default to an array of paths where your projects may be found. (Relative paths are taken relative to the executable of your project.) The order of the entries in the array defines the order in which projects will be located. The default NSProjectSearchPath is ("../.."), which causes WebObjects to look in the directory where your application's project resides for any other applicable projects. For example, if your application's executable resides in:

```
c:\web\docroot\WebObjects\Projects\MyProject\MyProject.woa
```

then from the executable's directory, "../.." would point to:

```
c:\web\docroot\WebObjects\Projects
```

If you've set your project's "Build In" directory to something other than the default, "../.." isn't likely to be appropriate; you should set your NSProjectSearchPath to point to the directories where you keep your projects while you work on them.

When your application is starting up, pay close attention to those log messages which indicate that a given project is found and will be used instead of the built product. Many problems can be solved by understanding how to interpret this output. If no such log message is seen for a given project, it won't be possible to use rapid turnaround for that project. As well, if you have several projects with the same name in the same directory, a conflict will be reported. This often happens when you have several copies of the same project as backups in your project directory. For example, you might have:

```
c:\web\docroot\WebObjects\Projects\MyApp
c:\web\docroot\WebObjects\Projects\Copy of MyApp
c:\web\docroot\WebObjects\Projects\MyAppOld
```

Even though the folders containing the projects have different names, the **PB.project** files within them might be identical. WebObjects uses the PROJECTNAME attribute inside your project's **PB.project** file to determine the name of the project, not the name of the directory for the project. If this happens, you'll need to move the backups to another directory to avoid the conflict.

Rapid Turnaround and Direct Connect Mode

Direct connect mode allows you to test your application without involving a web server. This means that you don't have to install your WebServerResources under the document root of your web server. The result is that rapid turnaround is even more convenient when in direct connect mode because you don't need to rebuild to install WebServerResources changes to the document root.

Testing With a Web Server

When you're working in direct connect mode, few issues arise with respect to rapid turnaround. If your application has features which require a web server be used even for testing, however, there are a couple of things to know to make rapid turnaround work for you. Specifically, since you are relying on the web server to locate files within WebServerResources, you must follow these guidelines:

1. Your projects must reside somewhere below your web server's document root.
2. NSProjectSearchPath should point to all projects of interest.
3. For application projects, the WOApplicationBaseURL user default should specify the directory containing the application project. For example, if your application's project folder is:

   ```
   c:\web\docroot\WebObjects\MyApp
   ```

   then the WOApplicationBaseURL user default must be "/WebObjects".
4. For framework projects, the WOFrameworksBaseURL user default should specify the directory containing all framework projects used by the application. For example, if your application uses MyFramework.framework and that project resides in:

   ```
   c:\web\docroot\WebObjects\Frameworks\MyFramework
   ```

   then the WOFrameworksBaseURL user default must be "/WebObjects/Frameworks".

Conveniently, the two examples above use the default locations for WOApplicationBaseURL and WOFrameworksBaseURL; if your projects reside in these default locations, you need only set NSProjectSearchPath.

Also, while it is possible to point WOApplicationBaseURL and WOFrameworksBaseURL to other locations, it is not suggested that WOFrameworksBaseURL be moved since all WebObjects applications use WOExtensions.framework, which resides in the default location. If you set WOFrameworksBaseURL to point elsewhere, one side effect will be that the images in the "Raised Exception" panel will not render.

Chapter 2

Editing With WebObjects Builder

Introduction

WebObjects Builder is an application that provides graphical tools for creating dynamic web pages (*components*). This chapter describes the basic procedures for creating your components' content with WebObjects Builder.

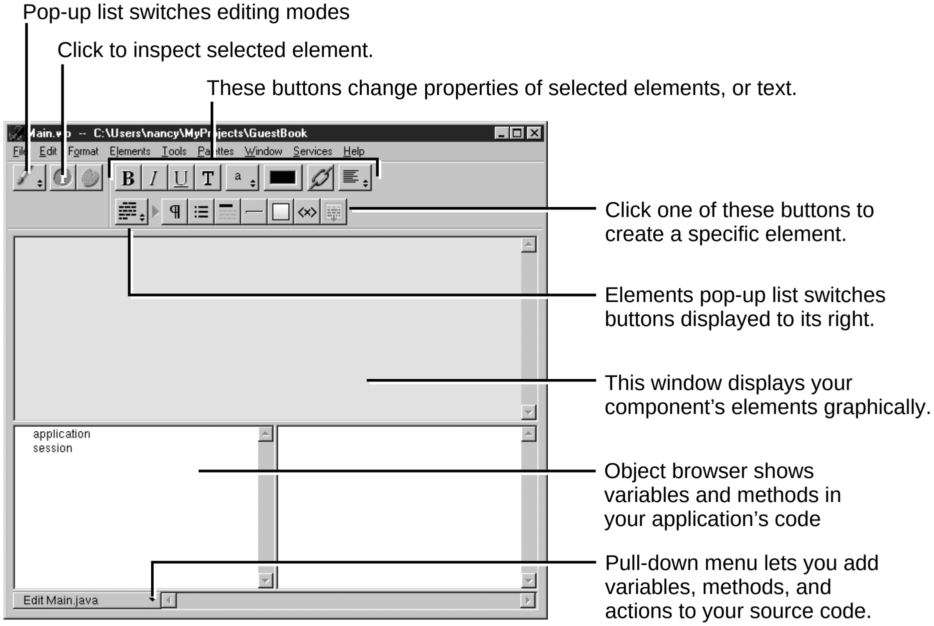
A web page consists of *elements*. WebObjects Builder allows you to add most of the common HTML elements to a component by using its graphical editing tools. You can type text directly into a component window and you can add additional HTML elements by using the buttons in the toolbar (or their menu equivalents).

In addition, WebObjects allows you to create *dynamic elements*, whose look and behavior are determined at run time. This chapter focuses on basic editing tasks and the use of standard HTML elements. The next chapter, "Working With Dynamic Elements", provides more specifics on using dynamic elements.

The Component Window

When you open a component, WebObjects Builder displays it in a *component window*. You create your component's appearance graphically in the upper pane of the component window. The browser at the bottom of the window (known as the *object browser)* displays variables and methods your component uses.

The toolbar at the top of the window contains several buttons you use to create the content of your component. WebObjects Builder also has menu commands corresponding to these buttons.


Main.wo -- C:\Users\nancy\MyProjects\GuestBook
File Edit Format Elements Tools Palettes Window Services Help
application
session
Edit Main.java

Pop-up list switches editing modes

Click to inspect selected element.

These buttons change properties of selected elements, or text.

Click one of these buttons to create a specific element.

Elements pop-up list switches buttons displayed to its right.

This window displays your component's elements graphically.

Object browser shows variables and methods in your application's code

Pull-down menu lets you add variables, methods, and actions to your source code.

Note: Depending on the width of the window, the toolbar may appear as two rows or one.

The WebObjects Builder Toolbar

At the left of the toolbar are three buttons:

The pop-up list allows you to switch editing modes. See "Editing Modes".

The button brings up the Inspector window, which allows you to set various attributes of the currently selected element. "The Inspector" section describes each type of element in more detail.

The button brings up the Palette window. See "Palettes" for more information on creating and using palettes.

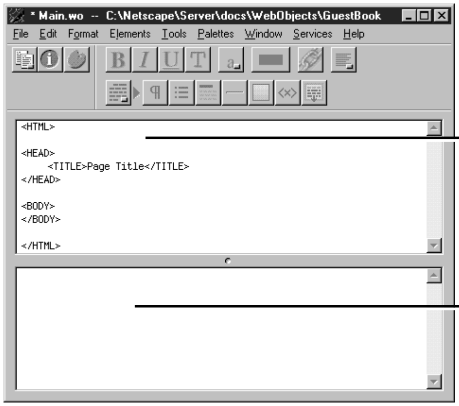
Editing Modes

WebObjects Builder allows you to view and edit your page in two modes:

- *Graphical mode* shows a visual representation of your component, including its dynamic elements. The bottom pane, called the object browser, lists the variables and methods that are defined in your scripts or code files.

- *Source editing mode* shows the text of your component's HTML template in the upper pane and the text of your declarations (**.wod**) file in the lower pane. In this mode, you can enter any HTML code. For example, you can include HTML elements that are not directly supported by WebObjects Builder's graphical tools. You can also add components using the toolbar.

The pop-up list at the left of the toolbar allows you to switch between graphical editing mode and source editing mode. When you choose source editing mode, the text of your HTML template (*ComponentName*.**html**) appears. When you add elements graphically, their corresponding HTML tags appear in this file.


* Main.wo -- C:\Netscape\Server\docs\WebObjects\GuestBook
File Edit Format Elements Tools Palettes Window Services Help
B I U T

```
<HTML>

<HEAD>
    <TITLE>Page Title</TITLE>
</HEAD>

<BODY>
</BODY>

</HTML>
```

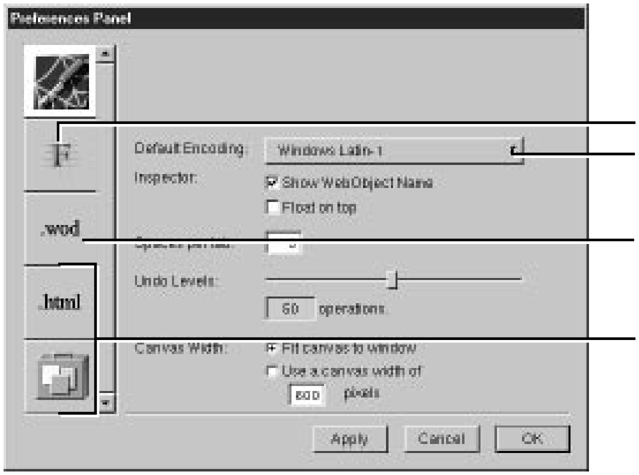
The HTML source for your component.

Information about bindings is displayed here.

As you can see, when you begin with a blank page, WebObjects Builder automatically inserts the necessary elements such as `<HTML>`, `<HEAD>`, and `<BODY>` for you.

The bottom pane shows your declarations (**Main.wod**) file. When you bind variables to your dynamic elements, this file stores the information. Normally, you don't edit this file directly. "Working With Dynamic Elements" shows how you use WebObjects Builder to create bindings. Refer to the *WebObjects Developer's Guide* for more information on working with the declarations file.

The Preferences panel provides several options for how text is displayed in both graphical and source editing modes. Choose Tools ▶ Options to bring up the panel. For information on resource-handling preferences, see "Dragging Elements into the Component Window".



Default Encoding: Windows Latin-1

Inspector: ☑ Show WebObject Name

□ Float on top

[illegible]

Undo Levels: 50 operations

Canvas Width: ● Fit canvas to window

○ Use a canvas width of 800 pixels

Click here to set the default fonts.

To change the encoding of your HTML document, choose one from this pop-up list.

Click here to display formatting preferences for HTML and declarations files.

Click here to display resource-handling preferences.

Entering Text

When you begin to edit a new component, the cursor (insertion point) appears at the upper left of the screen. You can begin typing text directly, and the text appears in the default font and size. If you press Enter, a line break (`<BR>` element) is inserted after the line. If you want a paragraph element (`<P>`), press Shift-Enter. See "Structure Elements" for information on other types of text elements.

The top row of the toolbar contains a set of buttons that operate on the currently selected text. If no text is selected, they change the setting for any text typed in at the insertion point.

B I U T: In graphical mode, these buttons allow you to toggle the style of the currently selected text. You can set any combination of bold (`<B>`), italics (`<I>`), underline (`<U>`) and typewriter (fixed-width) font (`<TT>`). In source mode, these buttons insert the code for the text style at the insertion point, or around selected text.

a.: This pop-up list allows you to set the font size of the currently selected text.

: This color well allows you to set the color of the currently selected text. To change the color, click on the border of the color well and select a color from the Colors panel. See “Setting Colors” for more information.

: This button changes the selected text to a hyperlink.

: This pop-up list allows you to center or justify text.

If you make a mistake, simply choose Undo from the Edit menu.

Creating Elements With the Toolbar

To create HTML elements, you use the buttons on the bottom row of the toolbar (or at the right of the toolbar if your window is large). There are four groups of buttons, only one of which is displayed at a time. The pop-up list lets you switch the group of buttons that are displayed to its right. The groups are:

- **Structures** . Use these buttons to create paragraphs, lists, images, and other static HTML elements. See “Structure Elements” for more information.

- **Tables** . Use these buttons to create and manipulate HTML table elements. See “Working With Tables” for more information.

- **Dynamic form elements** . Use these buttons to create form elements in which users enter information. WebObjects gives your application access to the data entered by users by allowing you to associate, or *bind*, these elements to variables in your application. See “Creating Form-Based Dynamic Elements” for more information.

- **Other WebObjects** . Use these buttons to create other dynamic elements, which you can bind to variables and methods in your program to control how they are displayed. Some of these (such as hyperlinks) have direct HTML equivalents. Others are *abstract dynamic elements*, such as repetitions and conditionals, which determine how many times an element is displayed or whether it is displayed at all. See “Creating Other WebObjects” for detailed information.

The general procedure for creating an HTML element is:

1. Place the cursor where you want the element to appear on the page.

2. Click the toolbar button representing the element you want.

The element is placed at the cursor position.

3. Select the element (see “Selecting Elements”). In most cases, the element is already selected when you create it.

4. Bring the Inspector to the front by clicking it. If it is not open, click ⓘ.

   In the Inspector, you can set various properties of the element. For example, you can change a paragraph’s type from plain to preformatted.

It’s important to be aware of what happens when you have text or other elements selected and you create a new element:

- If the new element is a *container* element (that is, it can contain other elements), the selected elements are “wrapped” or contained inside the new element.

- If the new element cannot contain other elements (for example, a horizontal rule or image), the new element replaces the selection.

Menu Equivalents For Toolbar Commands

All the toolbar buttons have menu equivalents. This document refers to the toolbar buttons, but of course you can use the menu commands as well:

- The Edit menu contains a View HTML or View Rendered menu item for switching between graphical and source editing modes (or use the Control-V keyboard equivalent).

- The Format menu contains equivalents for the buttons that affect the selected text.

- The Elements menu contains equivalents for all the buttons that create elements (that is, the switchable toolbar).

- The Tools menu contains commands to open the Inspector and Palette windows (and other commands).

Selecting Elements

There are several operations you perform in WebObjects Builder that require you to select an element, such as copying, deleting, inspecting, or “wrapping” one element inside another.

You select text elements as you would in most text-editing applications: by dragging, or by double-clicking words, or by triple-clicking lines, or by Shift-clicking. The selected text appears shaded.

Some elements (such as text fields and text areas) can be selected simply by clicking them; they appear with a line underneath.

Other elements (such as tables) require you to click outside the element and drag across it in order to select it.

To select a range of elements, drag across them, or press the Shift key while clicking at the end of the range.

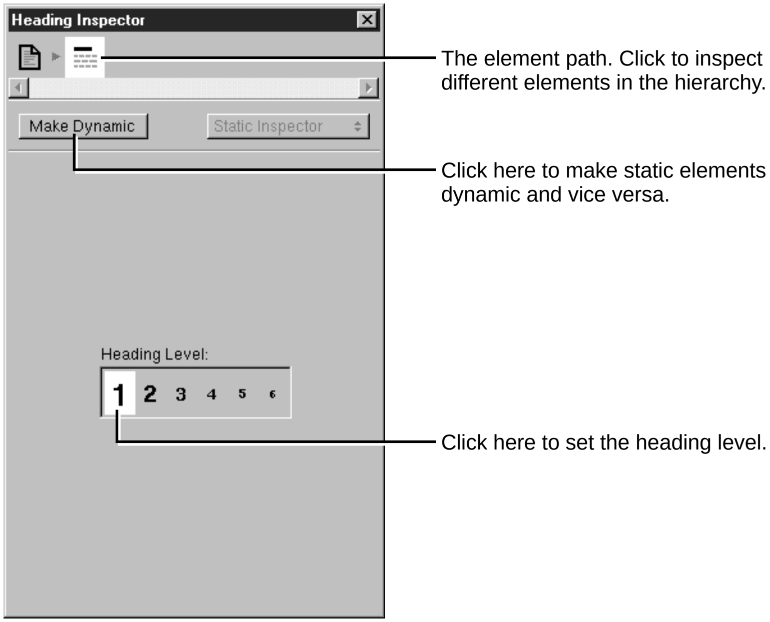
Hiding Editing Marks

Just like you might do in a word processor, you can hide the *editing marks*, the special graphics that denote returns and WOForm boundaries, by choosing Hide Editing Marks from the Format menu. Choose Show Editing Marks to display them again.

The Inspector

You use the Inspector to set HTML attributes of the elements in your component.

To open the Inspector, click ⓘ. The Inspector's title and contents reflect the element you've selected in the component window. Each element has its own Inspector that allows you to set properties appropriate for the element. For example, the Heading Inspector shown here allows you to set the level of a heading element. Other elements have different properties that you can set.



The element path. Click to inspect different elements in the hierarchy.

Click here to make static elements dynamic and vice versa.

Click here to set the heading level.

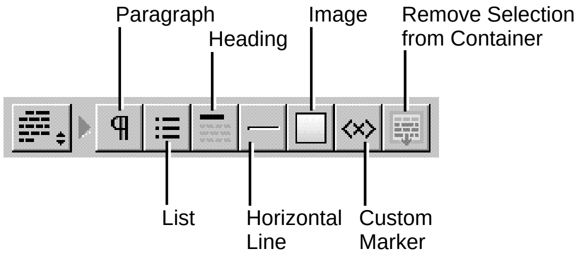
The top of the window shows the *element path* to the selected element. Any element can be contained in a hierarchy of several levels of elements and can in turn contain other elements. Here, the element path shows that the heading element is contained in the page element, which is the top level of the hierarchy. When you click an icon in the element path, the appropriate Inspector for that element appears. In this case, if you click the page icon, the Page Attributes Inspector appears. (**Note:** If no element is selected, the Inspector shows Page Attributes by default.)

The Make Dynamic button in the Inspector allows you to convert an HTML element into a dynamic WebObjects element. Dynamic elements have a Make Static button, which allows them to be converted to their static counterparts. This feature is discussed in more detail in “Dynamic and Static Inspectors”.

Important: When you type a value (such as number of pixels) in one of the Inspector’s fields, you must press Enter for the change to take effect. In other words, if you simply type the value and move to another field, the change does not take place.

Structure Elements

By default, the switchable toolbar displays the Structure elements.



The following sections describe the elements you can create with these buttons.

Paragraphs

Click ¶ to create a new paragraph. If there is a text selection, the entire selection becomes a paragraph.

You can use the Inspector to set the paragraph to one of the following tags:

- Plain (`<P>`)
- Preformatted (`<PRE>`)
- Address (`<ADDRESS>`)
- Block quote (`<BLOCKQUOTE>`)
- Division (`<DIV>`)

Lists

Click ☰ to create a new list. If there is a selection, each line in the selection becomes a list item (`<LI>`). By default the list is an unordered (bulleted) list (`<UL>`). You can use the Inspector to change the list to an ordered list (`<OL>`). You can also change the way in which lists appear; for example, displaying an ordered list in Roman numerals (on browsers that support this feature).

When typing in a list:

- Press Shift-Enter to create a second list item. (If you simply press Enter, you will create a line break but no new list item.)
- Press Tab to create a new list nested inside the original list.
- Press Shift-Tab to move the nesting back one level.

Headings

Click ☰ to create a heading. By default, an `<H3>` element is created. You can use the Inspector to change the level of the heading to between `<H1>` and `<H6>`.

Horizontal Rule

Click — to create horizontal rule (`<HR>`) element. You can use the Inspector to vary its height and width, and whether it is displayed in as a flat or shaded line.

Images

Click □ to add a static image (`<IMG>`). A Select Image panel appears, allowing you to select an image file to display at the insertion point. The Inspector allows you to change the image's properties, including its size, file path, and whether it uses an absolute or relative reference.

With static images, you must specify a known file path. You can also create a *dynamic image*, which refers to an image file that lives in your project or in a framework. See "Dynamic Images" for more information.

To set an image for the page background, see "Setting Page Attributes".

Custom Marker

Not all legal HTML elements can be created directly using WebObjects Builder's buttons or menu commands. However, you can create any type of element using the custom tag.

To create an HTML element using a custom marker:

1. Place the cursor where you want the element.

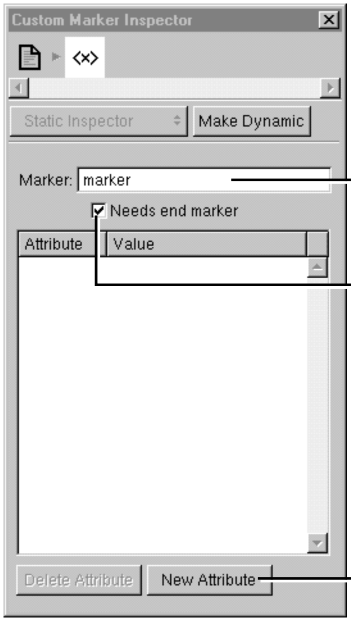
2. Click <•>.

   Custom Marker appears in the component window. You can replace the text "Custom Marker" with the content of the element (if any).

3. In the Inspector, enter the tag's name in the Marker field.

4. If the element doesn't require an end tag, uncheck "Needs end marker."

5. If the element has attributes you want to specify, click New Attribute, then enter the attribute's name and value.



Enter the element’s tag.

Check if element requires end tag.

Click to add an element attribute, then enter its value.

For example, if you want to create a `<DL>` element, you would create a custom marker and enter `DL` for its name in the Inspector’s Marker text field. Because “Needs end marker” is checked, the `</DL>` end tag is inserted for you.

You can also enter source editing mode and type the marker and its text directly.

Tip: To save a custom element so you can use it again, save it on a palette. See “Palettes”.

Removing Elements or Text From a Container

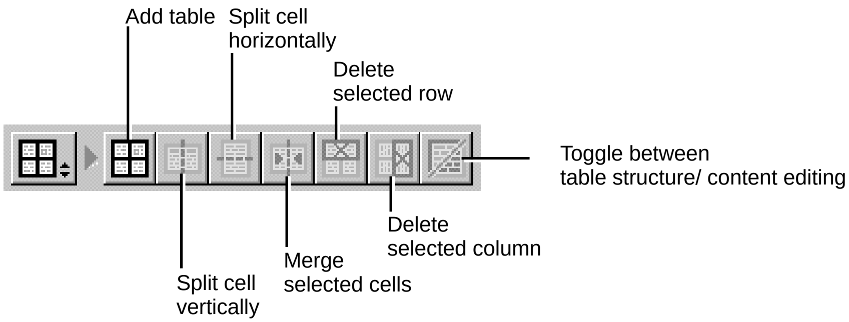
You can remove an element or text from a containing element. For example, if you’ve typed some text inside a form, but you decide you want the text to be *outside* the form:

1. Select the text.
2. Click or choose Elements ► Promote Selection.

   This causes the text to be removed from the form.

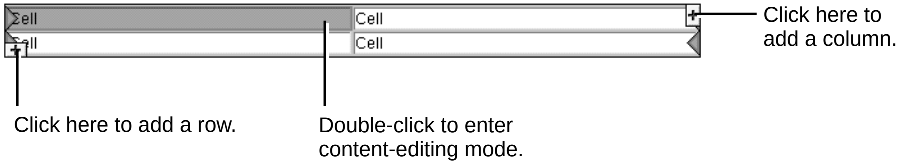
Working With Tables

To work with tables, you use the Tables section of the switchable toolbar (or the equivalent commands in the Elements ▸ Table menu).



Creating Tables

To create a table, click ⊞ from the toolbar. A 2x2 table is created at the insertion point. Its width is 100% of the window.


Cell
Cell
Cell
Cell
Click here to add a column.
Click here to add a row.
Double-click to enter content-editing mode.

To add a column, click the ⊞ icon at the upper right of the table. The column is added at the right of the table.

To add a row, click the ⊞ icon at the lower left of the table. The row is added at the bottom of the table.

Table Editing Modes

There are two “modes” that you can be in when working with tables. When you first create a table, you are in “structure editing” mode, indicated by the gray handles and ⊞ icons. In this mode, you can select cells, groups of cells, or the entire table, and perform operations on them.

The other mode is “content editing” mode, in which you can insert text or other elements (including other tables) inside table cells. In this mode, the gray handles and ⊞ icons are not present.

To change from structure editing to content editing mode, double-click in a cell. The cell’s contents are selected, and you can type or select an element from the toolbar to replace them. To change from content editing to structure editing mode, press Control and click in any cell other than the one that was selected.

Alternatively, you can switch from one mode to the other by clicking ▦ in the toolbar. Also, after you’ve clicked anywhere outside a table, clicking in the table puts you in content editing mode; Control-clicking puts you in structure editing mode.

In structure editing mode, you can:

- Select an individual cell by clicking it.
- Select a row by clicking one of the gray handles at the end of the row.
- Select a column by clicking the top cell in a column and dragging to the bottom.
- Select additional cells by clicking them while holding down the Shift key.
- Select the entire table, or any group of contiguous cells by clicking and dragging.
- Delete a row by selecting it (or any cell in the row) and clicking ⊠.
- Delete a column by selecting any cell in the column and clicking ⊠.
- Split a selected cell horizontally by clicking ⊟ or vertically by clicking ◫.
- Merge a group of selected contiguous cells into a single cell by clicking ⊞. **Note:** This command isn’t enabled unless the selected cells make up a group that could logically be merged into one cell.
- Wrap an abstract dynamic element (conditional or repetition) around a selected row or cell (see “Repetitions”) by clicking dynamic element’s icon in the toolbar.

In content editing mode, you can:

- Type text in the cell.
- Add another element inside a cell (by clicking its toolbar icon or using a menu command).

In either mode, you can press Tab to move to the next cell to the right (or the first cell of the next row if in the rightmost column). Pressing Shift-Tab moves in the opposite direction through the table.

A special case arises when you have embedded a table within a table cell. In this case:

- To edit text in a cell in the embedded table, just click in the cell.
- To select the embedded table or one of its elements, first click in the cell surrounding the embedded table, and then Control-click the embedded table to select it.

Sizing Tables

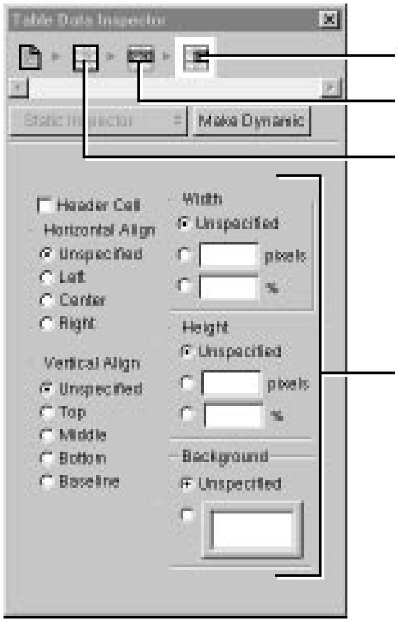
By default, the size of a table is determined by the contents of the table's cells. If you type text (or insert other elements) inside a table cell, the cell's width expands as necessary to fit the data. The width of any column, therefore, will be that of the widest cell in the column. **Note:** In WebObjects Builder, a cell does not resize until you have finished editing the cell and tabbed to another cell or moved out of the table. To update the cell immediately, press the Escape key.

If you want to set the size of a table or cell explicitly, use the Inspector:

- To set the width or height of a table, select the table and use the Table Inspector. You can enter values that correspond to HTML attributes controlling the size of the table.
- To set the width or height of a cell, select the cell and use the Table Data Inspector. Changing a cell's size affects the size of the column or row containing the cell.

Inspecting Tables, Rows, and Cells

An HTML table (`<TABLE>`) is a hierarchical structure, which contains rows (`<TR>`); rows in turn contain cells (`<TD>`). When you select any of them, the Inspector shows the path from the selected element up through the page, and you can inspect any element in the path by clicking its icon. For example, if you select a table cell, you can inspect the cell (with the Table Data Inspector), the row, or the table itself.



This icon denotes the table cell.

Click here to inspect the table row.

Click here to inspect the table.

Use these fields to set the table cell's HTML properties.

You can set the HTML properties of any table element (for example, its height or width) using the Inspector.

Creating Hyperlinks

There are two types of hyperlinks that you can use in a WebObjects application:

- A static hyperlink (which uses the HTML <A> tag), whose destination is constant.
- A dynamic hyperlink (WOHyperlink), whose destination can be specified at run time. See "Dynamic Hyperlinks" for more information about these.

To create a static hyperlink:

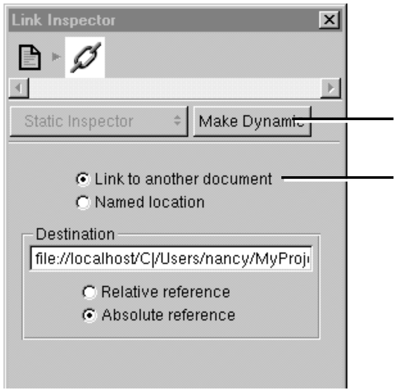
1. Click on the toolbar.

2. Type the text that the hyperlink should contain. As you type, the text is underlined.

3. Click 🔗 again.

   Alternatively, you can select existing text and then click 🔗 once to convert the text to a hyperlink.

4. Use the Inspector to set the destination of the link.



Link Inspector

Static Inspector | Make Dynamic

● Link to another document
○ Named location

Destination
file://localhost/C|/Users/nancy/MyProj

○ Relative reference
● Absolute reference

Click to make hyperlink dynamic.

Click to make this element an anchor that can be the destination of a link.

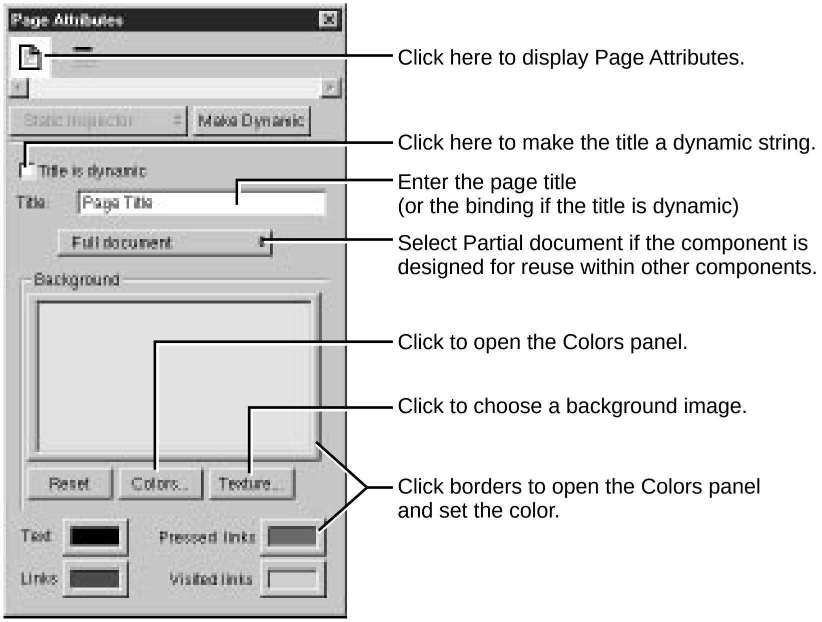
Note: While the destination of a static link cannot change, it's possible to vary its text at run time by using a dynamic string (see "Dynamic Strings") inside the hyperlink.

Setting Page Attributes

The top level in the element hierarchy is always the page itself. To inspect a page's attributes:

1. Select any element in the page.

2. In the Inspector, click the leftmost icon in the element path. (If necessary, click the Inspector button in the toolbar to display the Inspector.)



Click here to display Page Attributes.

Click here to make the title a dynamic string.

Enter the page title
(or the binding if the title is dynamic)

Select Partial document if the component is designed for reuse within other components.

Click to open the Colors panel.

Click to choose a background image.

Click borders to open the Colors panel and set the color.

The Title text field allows you to set the title of the document. If you click the “Title is dynamic” checkbox, the title becomes a dynamic string whose value is determined at run time. You enter its binding in the Title field. See “Dynamic Strings” for more information.

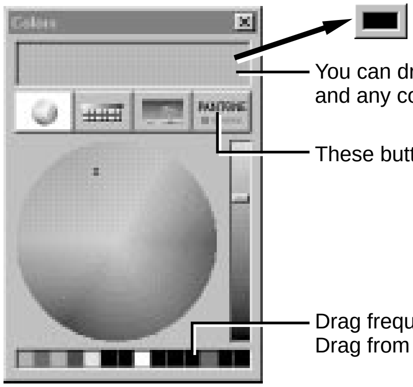
You can set the colors to be displayed for the page’s background, text, or links by clicking in the border of the appropriate color well (or by clicking Colors). (See “Setting Colors” for more information on using the Colors panel.) To select an image to use as the page’s background, click Texture.

Setting Colors

WebObjects Builder allows you to set the colors for a page’s background, selected text, and hyperlinks.

To set the color of selected text in the component window, click in the border of the color well ■ in the toolbar. To set other colors, use the Page Attributes Inspector.

Clicking the border of any color well brings up the Colors panel.



You can drag colors between this panel and any color well.

These buttons provide different ways to select colors.

Drag frequently used colors to these squares to save.
Drag from squares to a color well to apply.

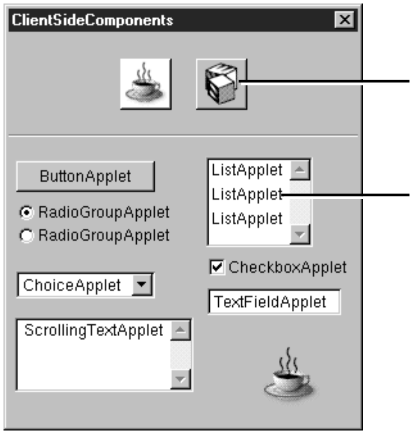
The Colors panel provides several methods of selecting colors. When you select a color, it appears in the currently selected color well.

You can drag colors from one color well to another, to the window at the top of the Colors panel, or to one of the squares at the bottom of the Colors panel to save it.

Palettes

A palette is a collection of resources (such as images, static or dynamic HTML elements, and components). You can drag elements from a palette to a component to use them. You can also drag elements from a component to a palette to store them.

Palettes appear in WebObjects Builder's palette window. To open the palette window, click ● on the toolbar or choose Tools ► Palette.



Click to display this palette.

Drag an item onto the window to insert into the component.

The icons at the top of the palette window show the available palettes. To select a palette, click its icon. Two pre-configured palettes are provided: Java client-side components and components from the WOExtensions framework.

You can create your own palettes to store frequently-used items, such as custom forms, tables, or images, and you can load palettes created by someone else.

To create a new palette, choose Palettes ▸ New Palette. A panel appears, asking you to specify a location to save the palette. (A palette is represented on disk as a folder with the extension **.wbpalette**.) The palette appears in the palette window with the default palette icon . To change the palette's icon, see "Changing a Palette Icon".

To add an existing palette to the palette window:

1. Choose Palettes ▸ Open Palette.
2. Navigate to the palette's location and click Open.

To remove a palette from the palette window:

1. Select the palette in the palette window.
2. Choose Palettes ▸ Close Palette.

Creating and Using Palette Items

To add an item from a component to a palette:

1. Make the palette editable.

If the palette's background is gray, you can't make any changes to it. To enable editing, choose Palettes ▸ Make Editable. The palette's background changes to white and its title is appended with "Alt-drag to insert item."

2. In the component window, select the element or elements that you want to add to the palette.
3. Hold down the Alt key and drag the selection to the palette.

   The cursor changes to html and displays in the palette when you are done dragging. You can change the title of the item by selecting its name and typing. To change the item's icon, see "Changing a Palette Icon".

You can also add any item from the file system to a palette (including such things as a component, an image, or an EOModel). To do so:

1. Make the palette editable.
2. Locate the item in the file system.
3. Drag the item onto the palette.

   For example, to add a component to a palette, you would drag its **.wo** folder to the palette.

When you are done adding elements to your palette, choose Palettes ▸ Save Palette or choose Palettes ▸ Save Palette As.

To copy an item from a palette to the component window:

1. Make sure the palette is not editable (if its background is white, choose Palettes ▸ Make Uneditable).

   Note: If the palette is editable, you can drag the item to the window, but it will disappear from the palette.

2. Drag the item from the palette to the location in the component window where you want it to appear.

Changing a Palette Icon

You can replace the icon of any palette, or any item in a palette, with an image of your own choosing. To do so:

1. Open the palette window and select the palette whose icon you want to change.

2. Make the palette editable.

3. Drag an image from the file system onto the palette's icon.

   You can use any image file recognized by WebObjects Builder (such as a **.gif**, **.tif** or **.jpg** file) to change the icon of a palette or of any item in the palette.

4. Save the palette.

Chapter 3

Working With Dynamic Elements

Introduction to Dynamic Elements

A *dynamic element* is an element whose exact HTML representation isn't determined until run time. Dynamic elements are represented in the HTML template by the tag `<WEBOBJECT>`.

There are several types of dynamic elements that you can use in your WebObjects applications. Some of them (such as dynamic forms or images) have counterparts in standard HTML (`<FORM>` and `<IMG>`) and are always translated into those counterparts at run time. Others (such as conditionals and repetitions) are *abstract* dynamic elements, which don't translate directly into HTML but control the generation of other elements.

This chapter describes the techniques you use to add dynamic elements to your components and to bind them to variables and methods in your code. For more information on programming with dynamic elements, see "Dynamic Elements" in the *WebObjects Developer's Guide*. For details about specific dynamic elements, see the *Dynamic Elements Reference*.

Attributes

Every dynamic element has one or more *attributes*. These attributes are used for several purposes:

- Some attributes are used to determine the exact HTML to be generated when the element is displayed.

  For example, the **value** attribute of a dynamic string element (WOString) determines what text is generated in its place. At run time, WebObjects replaces the WOString with the value of the variable or method that is bound to it.

- Other attributes are used to capture information provided by users. In particular, form elements have attributes used for this purpose.

  For example, when the user submits a form, text typed by the user into a dynamic text area (WOText) inside the form is assigned to the variable bound to the **value** attribute of the text area.

- Other attributes are used to specify actions to be taken when an event occurs.

For example, a dynamic hyperlink (WOHyperlink) has an **action** attribute that specifies an *action method* in the application that is executed when the user clicks the link.

The process of associating an attribute with a variable or method in your code is called *binding*. WebObjects Builder provides tools to make it easy for you to create bindings. Information about your bindings is stored in the declarations (**.wod**) file in your component.

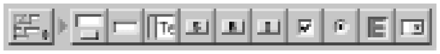
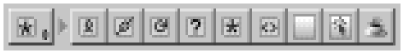
Most dynamic elements have a number of attributes that you can bind. Some are required and others are optional. For complete information about WebObjects' dynamic elements and their attributes, see *Dynamic Elements Reference*.

Creating Dynamic Elements

There are several ways to add dynamic elements to your component.

Using the Toolbar

You create dynamic elements in the same way that you create other elements: by clicking buttons in the toolbar or using the menu commands. In WebObjects Builder, there are two groups of buttons in the switchable toolbar that allow you to create dynamic elements:

- The Forms toolbar  allows you to create dynamic form elements. See "Creating Form-Based Dynamic Elements" for more detailed information about working with forms.
- The Other WebObjects toolbar  allows you to create all other types of dynamic elements. See "Creating Other WebObjects" for more details on each type of element.

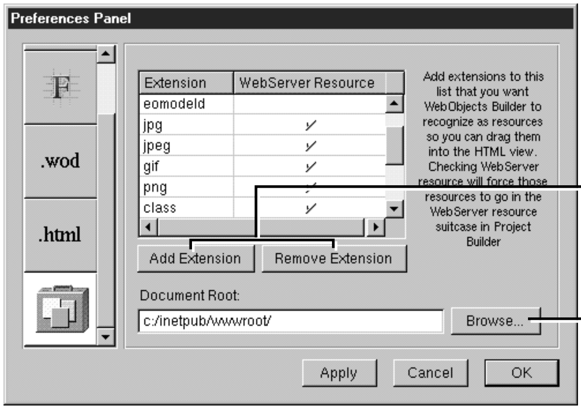
Dragging Elements into the Component Window

Some elements can be created by dragging an item from the file system into a component window. These include:

- Components (see "Reusable Components")
- Client-side Java components (see "WOApplets")
- Image files and image maps (see "Dynamic Images")

In addition, you can also drag a model file (of type **.eomodeld**) into a component to create a variable of type WODisplayGroup (see "Adding Display Groups").

Certain file types (such as **.gif**, **.jpeg**, **.tif**, **.eps**, and **.bmp**) are automatically recognized by WebObjects Builder. The Preferences Panel (which you display by choosing Tools m Options) shows a list of file extensions that WebObjects Builder accepts. You can drag any item with one of those file extensions into a component window, and the item will be added to your project. You can add file types if you need them.



Extension	WebServer Resource
eomodeld	
jpg	✓
jpeg	✓
gif	✓
png	✓
class	✓

Add extensions to this list that you want WebObjects Builder to recognize as resources so you can drag them into the HTML view. Checking WebServer resource will force those resources to go in the WebServer resource suitcase in Project Builder

Document Root: c:/inetpub/wwwroot/

Click here to add or remove extensions that WebObjects Builder recognizes.

If you've changed your document root, click here to inform WebObjects Builder.

Using the Add WebObject Panel

The Add WebObject panel is an advanced feature for those who wish to work in source editing mode. It allows you to add a dynamic element and set its bindings by hand.

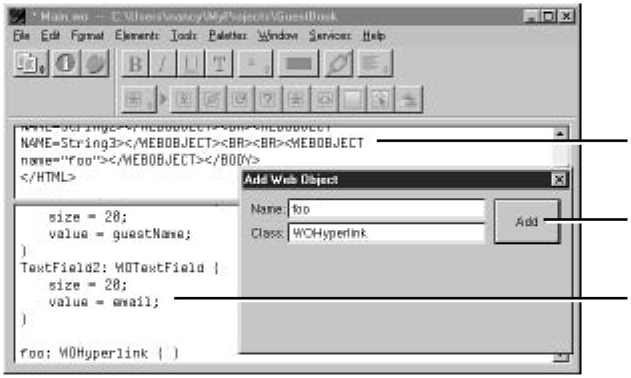
1. In other source editing or graphical mode, place the cursor at the point in the HTML template where you want to add the element.

2. Choose Tools m Add WebObject.

   A panel appears that allows you to create a dynamic element by entering its class and its name. The name is used by the HTML template and declarations (**.wod**) file to uniquely identify the element. (Normally, you allow WebObjects Builder to generate names for you, but if you add elements in source editing mode, you must specify their names.)

3. Click Add.

The element appears in the HTML template.



```
NAME=String3></WEBOBJECT><BR><BR><WEBOBJECT
name="foo"></WEBOBJECT></BODY>
</HTML>
```

```
    size = 20;
    value = guestName;
}
TextField2: WOTextField {
    size = 20;
    value = email;
}

foo: WOHyperlink { }
```

Element appears in HTML source view.

Click here to add element at cursor position.

Enter the element's bindings here.

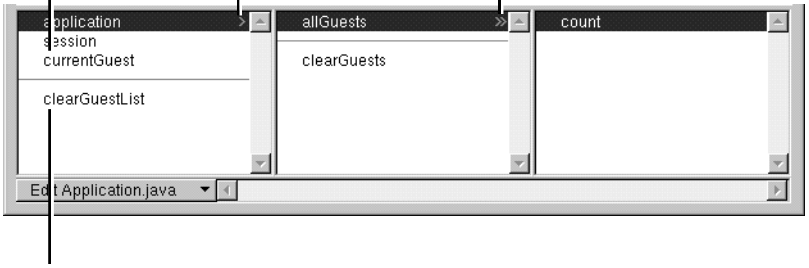
The Object Browser

The bottom part of the component window is the *object browser*, which displays your application's variables and methods. This display provides a graphical method of binding objects in your code to dynamic elements in the component.

Keys (variables and methods) appear above the line.

Select key to display its keys and actions in next column (indicated by ">".

">>" indicates an array. Select it to show its keys (for example, count) in next column.



Actions appear below the line.

The first column of the object browser displays two types of objects:

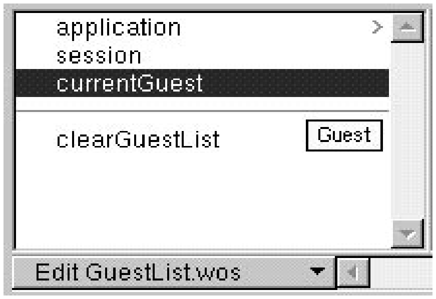
- *Keys* are displayed above the horizontal line. A key can be either an instance variable or a method that returns a value.

- *Actions* are displayed below the line. An action (or action method) is a method that takes no parameters and returns a component (the next page to be displayed).

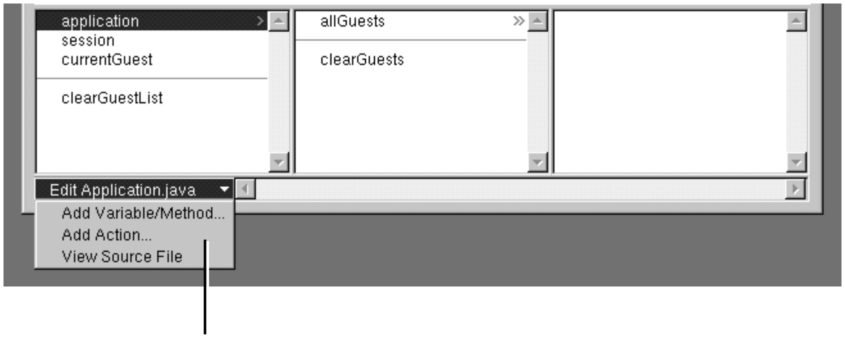
A “>” next to an object’s name in the browser indicates that it contains additional keys and actions, which are displayed in the next column when you select it.

In the figure, for example, the **application** object is selected, showing that there are keys and actions defined in the session code. One of these, **allGuests**, is an array (indicated by the “>>”), and the array’s **count** method is displayed in the next column.

Note: If you rest the mouse pointer on a key, WebObjects Builder displays its type.



When you create a new project, the only keys that appear in the object browser are **application** and **session** (unless you use the Wizard to create a database application). These are methods that allow you to access variables in your application and session code.



Choose a command from this menu to add objects to your source code or view the code.

There are several ways to add items to the object browser:

- Use Project Builder to add keys and actions to your component's source file.

  When you save changes to a source file, WebObjects Builder parses the file, detects items that have been added and deleted, and updates the object browser's display to reflect the changes. The source code can be written in any of the languages that WebObjects supports (Java, Objective-C, or WebScript).

- Use the menu at the bottom of the object browser to add items to your code directly from WebObjects Builder. See the next section, "Creating Variables and Methods in WebObjects Builder", for more information.

- Drag a *model file* into the browser to create a *display group* variable. See "Adding Display Groups" for more information.

Creating Variables and Methods in WebObjects Builder

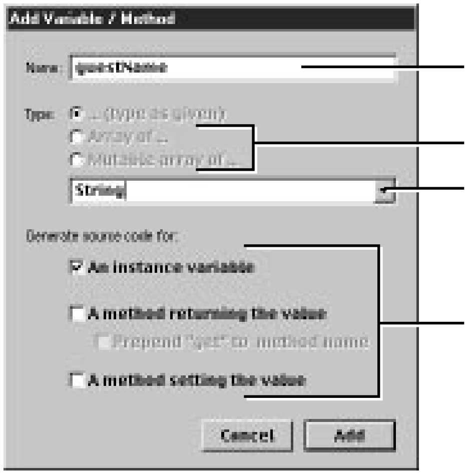
At the bottom of the object browser, there is a pull-down menu called Edit *sourcefile*. It has three items:

- **Add Variable/Method** allows you to add a key (an instance variable or a method that returns a value) to your source file.

- **Add Action** allows you to add the template for an action (a method that takes no parameters and returns a component).

- **View Source File** opens the source file in a Project Builder window.

When you choose Add Variable/Method, the following panel opens:



Add Variable / Method

Name: guestName

Type: ● ... (type as given)
○ Array of ...
○ Mutable array of ...

String

Generate source code for:

☑ An instance variable

□ A method returning the value

□ Prepend "get" to method name

□ A method setting the value

Type variable name here.

Click one of these buttons if your variable is an array.

Choose variable's type from this pop-up menu.

Check one or more of these boxes.

In this panel, you specify:

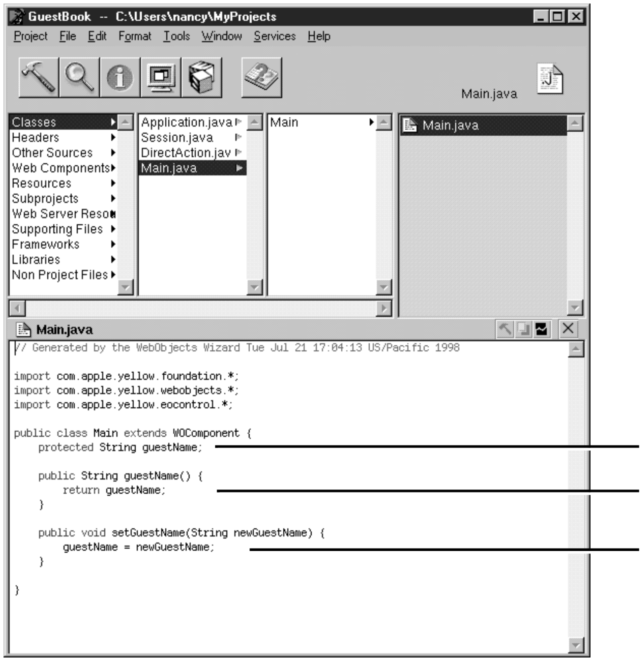
- The name of the key.
- Its type.

  You can choose the type from the pop-up list or type it in directly. You can also use the radio buttons to specify whether the variable is an array.

- How the key is implemented.

  The key can be an instance variable whose value is accessed directly, or a method that returns a value (not necessarily associated with an instance variable). You can also create a method that sets the value of an instance variable.

When you click Add, the key's name appears in the object browser (below **application** and **session**). To see what was added to your source code, choose View Source File from the pop-up menu in the object browser. You'll see something like the following:



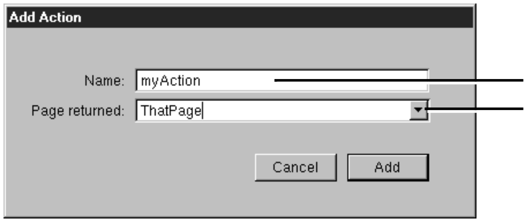
```
// Generated by the WebObjects Wizard Tue Jul 21 17:04:13 US/Pacific 1998

import com.apple.yellow.foundation.*;
import com.apple.yellow.webobjects.*;
import com.apple.yellow.eocontrol.*;

public class Main extends WOComponent {
    protected String guestName;

    public String guestName() {
        return guestName;
    }

    public void setGuestName(String newGuestName) {
        guestName = newGuestName;
    }

}
```

Instance variable.

Method returning value of instance variable.

Method setting value of instance variable.

When you choose Add Action, the following panel appears:



Enter the action method’s name here.

Select response page name from pop-up menu.

When you click Add, the following code is added to your source file:

```
public ThatPage myAction()
{
  ThatPage nextPage = (ThatPage)pageWithName(“ThatPage”);

  // Initialize your component here

  return nextPage;
}
```

WebObjects Builder provides these ways to add variables and methods for your convenience. Of course, you can add variables and methods directly to your component’s code by editing them in Project Builder.

The Add Variable/Method and Add Action menu items apply to the code file that appears in the menu’s title, as in “Edit Main.java.”. To add variables and methods to the application or session code files, select **application** or **session** in the object browser first. Notice that the pull-down menu title changes accordingly. Then choose Add Variable/Method or Add Action from the pull-down menu. Deselect the keys in the object browser to return to the main component (On Mac OS X Server, command-click to deselect, and on Windows NT control-click).

To delete a key or action, you must delete it from the source code in Project Builder.

Adding Display Groups

A *display group* is an important type of variable that you use in WebObjects applications that access databases. A display group is an object that can fetch, insert, delete, display, update and search records in a database.

This section describes the mechanics of adding display groups to a WebObjects project. For detailed information about display groups, see the WODisplayGroup class specification in the *WebObjects Class Reference*. To learn more about how to create a WebObjects database application, see “Creating a WebObjects Database Application” in *Getting Started With WebObjects*.

WebObjects applications access databases through the Enterprise Objects Framework, which represents database rows as *enterprise objects*. Enterprise object classes typically correspond to database tables, and an enterprise object instance corresponds to a single row or record in a table. For detailed information on enterprise objects, read the *Enterprise Objects Framework Tools and Techniques*.

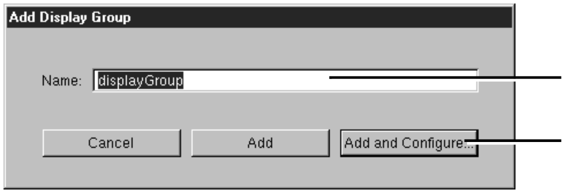
In a database application, you use *entity-relationship models*. A model associates database columns with instance variables of objects. You create a model with the EOModeler application, or you can specify one when you use the Wizard to set up your application (when you add a model to your project, it is added to the Resources suitcase). A model is stored in a *model file*. For more information on creating models, see the chapter “Using EOModeler” in *Enterprise Objects Framework Developer’s Guide*.

A model contains *entities*, *attributes*, and *relationships*. An *entity* associates a database table with an enterprise object class. Display groups manage objects associated with a single entity. An *attribute* associates a database column with an instance variable. A *relationship* is a link between two entities that’s based on attributes of the entities.

If you used the Wizard to set up your application, a display group was set up for you based on the model you specified. There are several other ways to create a display group:

- Drag a model (a folder with the extension **.eomodeld**) from the file system into the object browser in your component window, or drag an entity from the EOModeler application into the object browser.

  When you do this, a panel asks you if you want to add the model to your project. If you reply Yes, the Add Display Group panel appears.



Name: displayGroup

Enter the display group’s name.

Click here to add the display group and configure it.

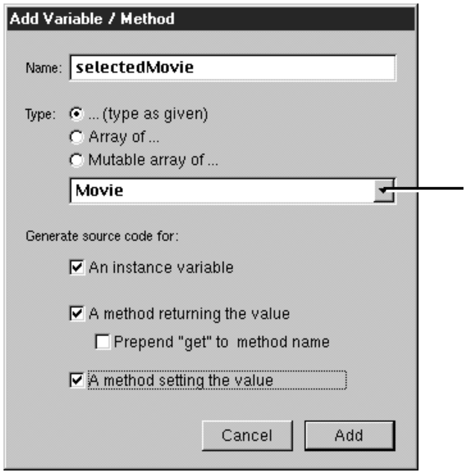
  It allows you to specify a name for your display group and decide if you want to simply add the display group, or configure it as well. “Configuring the Display Group” describes the configuration process.

- Use Add Variable/Method to define a variable of typeWODisplayGroup, or declare the display group directly in your code:

  ```
  protected WODisplayGroup myDisplayGroup; //this is a Java example
  ```

  When you add a display group this way, you are responsible for making sure your project contains the appropriate model file. (For example, once a model file has been added, you can create any number of display groups based on it). In addition, you need to configure the display group.

When you use the Add Variable/Method panel, you can create not only display group variables, but also enterprise objects associated with any of the entities in your project's models.



Add Variable / Method

Name: selectedMovie

Type: ● ... (type as given)
○ Array of ...
○ Mutable array of ...

Movie

Generate source code for:

☑ An instance variable

☑ A method returning the value

□ Prepend "get" to method name

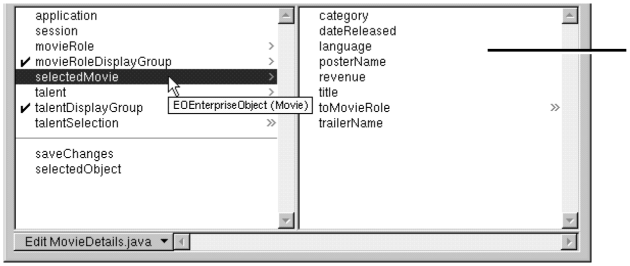
☑ A method setting the value

Choose an entity from the project's models to create an enterprise object based on that entity.

In the figure, if you choose the entity Movie as the variable's type, the following code gets added to your source file:

```
/** @TypeInfo Movie */
protected EOEnterpriseObject selectedMovie;
```

The variable **selectedMovie** is declared as type EnterpriseObject. The comment `/** @TypeInfo Movie */` is a *structured comment* that WebObjects Builder uses to identify the entity associated with the object (don't edit it). It is then able to display the attributes in the object browser as shown here:



The browser displays the attributes of the entity.

Configuring the Display Group

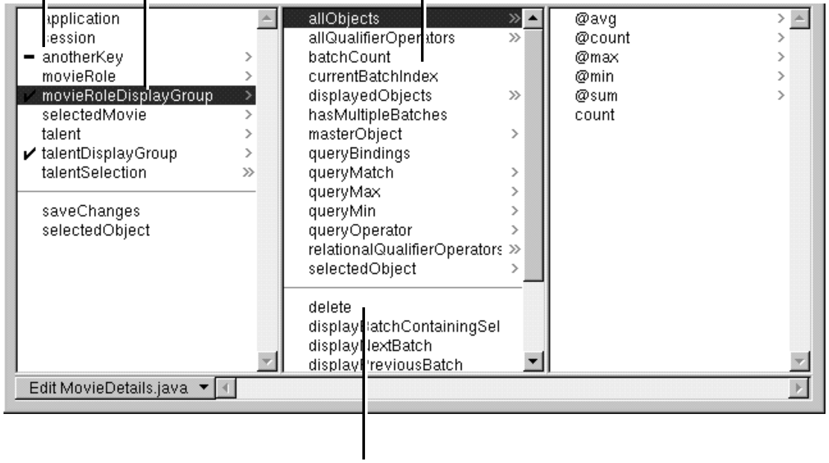
A display group must be configured in order for it to be created and initialized automatically when the component is initialized. Display groups are instantiated from an archive file (with the extension **.woo**) that's stored in the component. You shouldn't edit **.woo** files by hand; they're maintained by WebObjects Builder.

In the object browser, ✓ means that the display group has been configured. A ⊟ means that it has not been configured, and so the variable isn't automatically created. A configured display group shows its keys and actions in the second column of the object browser. You can bind them to elements in your program.

Unconfigured display group (double-click to configure).

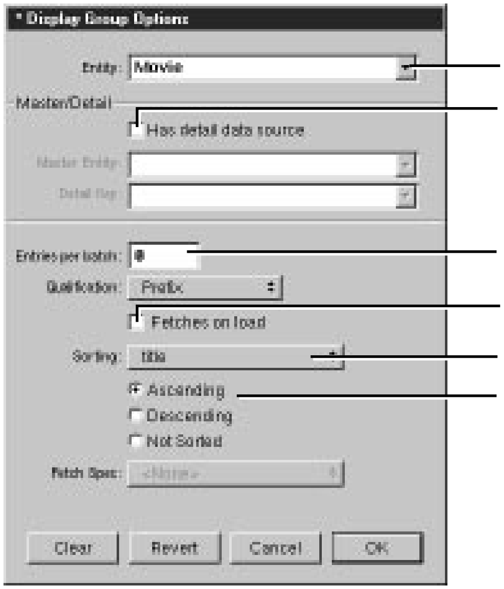
Configured display group

Display group's keys



Display group's actions.

To configure a display group (or change its configuration), double-click its name to open the Display Group Options panel.



Entity: Movie

□ Has detail data source

Entries per batch: 0

Qualification: Prefix

□ Fetches on load

Sorting: title

● Ascending

○ Descending

○ Not Sorted

Fetch Spec: <None>

Select entity name

Check to create detail display group.

Enter non-zero value to batch records.

Check to fetch records when component is loaded.

Specify attribute to sort by.

Specify sort order.

In this panel, you specify the following information:

- *Entity:* The Entity combo box contains entities from the models in your project. You can select one from the list or type the name.
- *Has detail data source:* Check this to create a detail display group. See "Creating a Detail Display Group" for more information.
- *Entries per batch:* Set a non-zero value here to specify the number of records to be displayed at once. When the value is zero, all records are displayed.
- *Qualification:* When displaying records according to a query, this setting determines whether to display records that begin with, end with, or contain the item specified.
- *Fetches on load*: When you check this option, the display group fetches all its objects as soon as the component is loaded into the application.
- *Sorting:* You select an attribute by which to sort your displayed objects from the pop-up list, and use the radio buttons to select the order of sorting.
- *Fetch Spec*: The Fetch Spec pop-up list contains all the fetch specification defined in the correpsonding model file. A fetch spec is simply a predefined query.

Creating a Detail Display Group

While a display group manages objects associated with a single entity, you can access other kinds of objects through an entity's relationships. In a *master-detail* configuration, a master display group holds enterprise objects for the source of a relationship, while a detail display group holds records for the destination. As individual records are selected in the master display group, the detail display group gets a new set of enterprise objects to correspond to the selection in the master.

To create a detail display group, you can use the Display Group Options panel:

1. Check "Has detail data source."

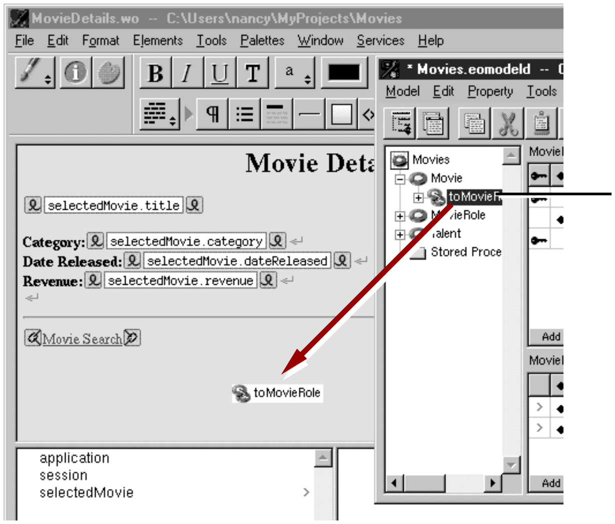
   The Master Entity pop-up list is enabled. It lists all entities in the models in your project.

2. Select the Master Entity from the pop-up list.

   The Detail Key pop-up list now contains the keys representing the master entity's relationships.

3. Select the Detail Key from the pop-up list.

You can also create a detail display group by dragging a to-many relationship from EOModeler into your component.



selectedMovie.title

Category: selectedMovie.category
Date Released: selectedMovie.dateReleased
Revenue: selectedMovie.revenue

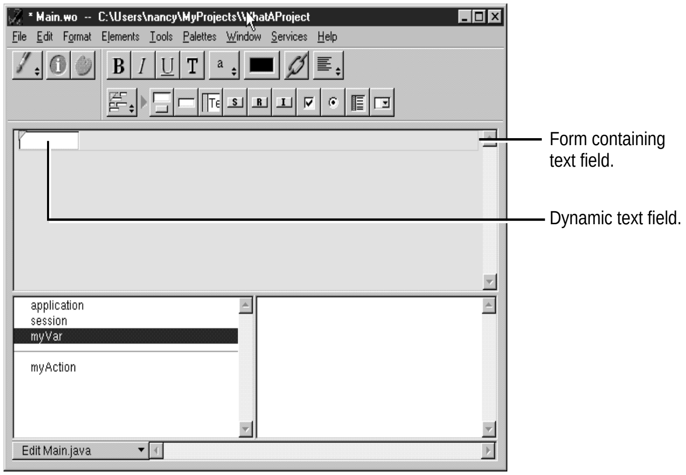
Drag relationship from EOModeler into component to create detail display group.

This example creates a detail display group based on the toMovieRole relationship, with Movie as the master entity and MovieRole as the detail entity.

As with other display groups, you can use the Display Group Options panel to immediately configure the newly created display group.

Binding Elements

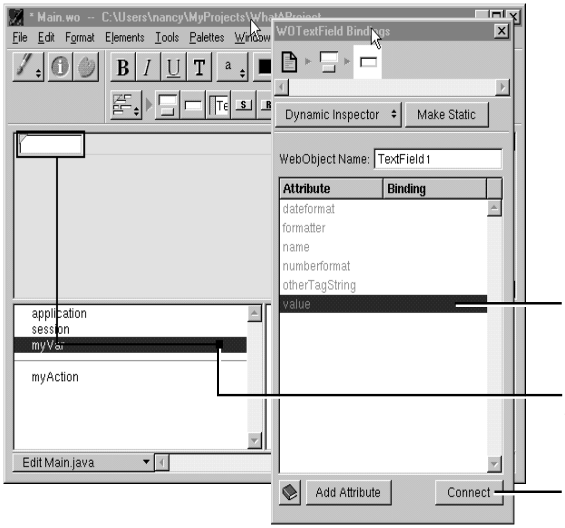
This section discusses the basic techniques you use to bind elements. Further detail is presented in the sections that discuss specific dynamic elements.


* Main.wo -- C:\Users\nancy\MyProjects\WhatAProject
File Edit Format Elements Tools Palettes Window Services Help
application
session
myVar
myAction
Edit Main.java
Form containing text field.
Dynamic text field.

In the figure, you have added a form (WOForm) containing a dynamic text field (WOTextField) to your component. Note the triangle in the top left corner, which distinguishes the dynamic text field from a static HTML text field. The long rectangle surrounding the text field represents the containing form.

To bind the text field to the variable **myVar**:

1. Press mouse down on **myVar** in the object browser and drag to inside the text field.



WebObject Name: TextField1

Attribute	Binding
dateformat	
formatter	
name	
numberformat	
otherTagString	
value	

Default attribute is selected automatically.

Bind by dragging from the key to the element.

Click to complete binding.

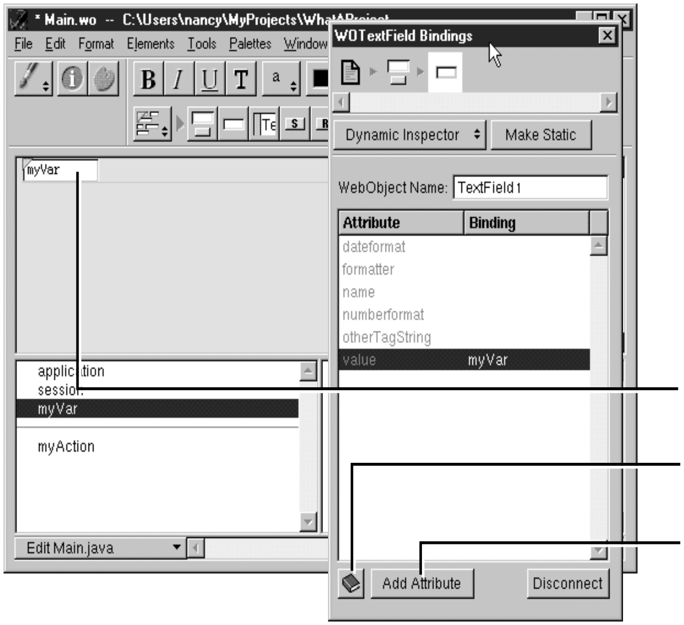
A black line appears as you drag, and a black border appears around the text field, indicating that you can bind to it.

2. Release the mouse button.

   The Inspector for that element appears, listing its attributes. The **value** attribute is selected by default. (This attribute represents the value that the user enters into the text field.) If this isn't the attribute you wish to bind, click another attribute to select it.

3. To complete the binding, click the Connect button.

   The name of the variable appears in the Binding column next to the attribute. Note that it also appears inside the text field in the component window. Some (not all) dynamic elements display the binding for their default attribute inside the element itself.



WebObject Name: TextField1

Attribute	Binding
dateformat	
formatter	
name	
numberformat	
otherTagString	
value	myVar

Binding of text field's default attribute.

Click to see documentation on this dynamic element.

Click to add attribute to element.

4. If you change your mind, you can click the Inspector's Disconnect button (which changed from Connect) to undo the binding.

There are two other buttons on the bottom of the Inspector window:

- Click 📖 to view documentation on this dynamic element.

  The relevant page from the *Dynamic Elements Reference* is displayed in your web browser.

- Click Add Attribute to create a new attribute for this element.

  Typically, you don't add attributes for standard dynamic elements such as WOTextField or WOString. You use this feature when working with your own custom WebObjects (see "Custom WebObjects").

To create an additional binding for the same element:

1. Drag from a key in the object browser to the element as before.

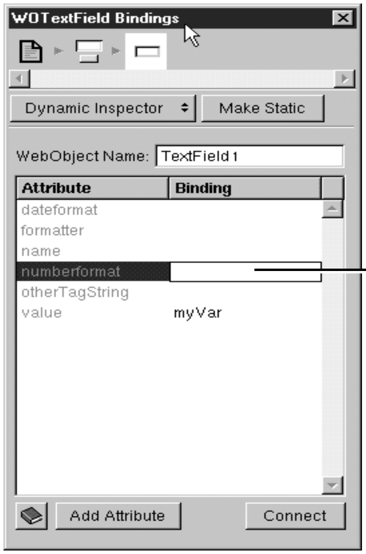
   This time, a different attribute is selected, since the default attribute has already been bound.

2. Click Connect to bind the selected attribute.

3. If, instead, you want to bind an attribute that has already been bound, double-click its row, and the old binding is replaced with the new one.

You can also bind an element's attributes by typing in the Inspector directly. To do this:

1. Double-click in the binding column of the row for the attribute you want to set.



WebObject Name: TextField1

Attribute	Binding
dateformat	
formatter	
name	
numberformat	
otherTagString	
value	myVar

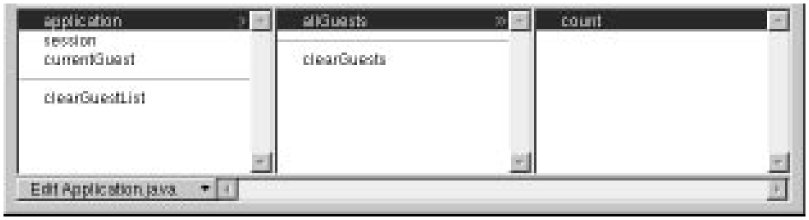
Double-click here to get a cursor, then type the binding.

A cursor appears in the Binding column, allowing you to type.

2. Type the binding in the text field, then press Enter.

When entering bindings this way, the following rules apply:

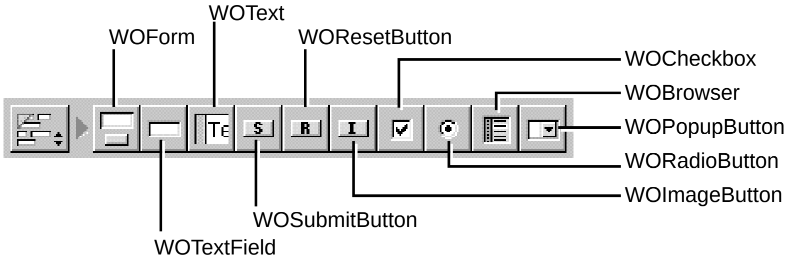
- Constant strings (such as `"Joe"`) must be in double quotes.
- Variable and method names (such as **Joe**) must not be in quotes.
- Symbolic constants (such as `YES` and `NO`) must not be in quotes.
- Keys must specify their full *key path*. For example, to bind the key that is selected in the following figure, you would type `application.allGuests.count`.



Creating Form-Based Dynamic Elements

In HTML, a form is a container element (one that can contain other elements). Typically, forms contain input elements (such as text fields, radio buttons and checkboxes) to capture user information, a button or active image to submit the form data, as well as display elements such as text and images.

In WebObjects Builder, you create form elements by clicking one of the buttons in the Form Elements portion of the switchable toolbar (or using their menu equivalents).



All the form elements you create in the toolbar are dynamic equivalents of standard HTML elements. You can convert any dynamic form element to its static equivalent (and vice versa) by using the Inspector (see “Dynamic and Static Inspectors”).

Most form elements have a **value** attribute that represents the information entered by the user. You bind this attribute to a variable so that your application can work with it. Others, such as WOSubmitButton, WOImageButton, or WOForm itself, don’t receive information but have an **action** attribute representing an action to be taken when the form is submitted. You bind form-based elements by the process described in “Binding Elements”.

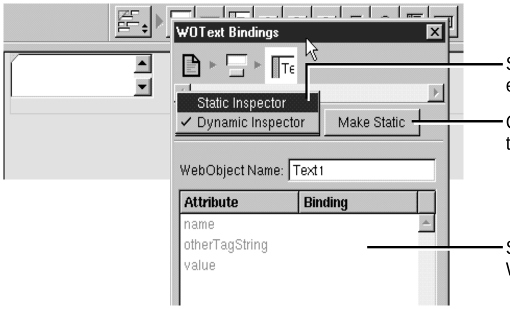
Usually you create a WOForm element to contain other form elements, including buttons. The submit and reset buttons will apply to all other elements inside the same form.

By default, only one submit button is allowed in a single form. If you want multiple submit buttons, use the WOForm Inspector to set the **multipleSubmit** attribute to **YES**.

Dynamic and Static Inspectors

Most dynamic elements have static HTML counterparts (with the exception of abstract dynamic elements, such as: WOString, WORepetition, WOConditional, and WOCustom.) The Inspector for these elements has two states:

- The Dynamic Inspector, which you use to set the bindings for the element (see “Binding Elements”).
- The Static Inspector, which you use to set the HTML attributes for the element’s static counterpart.



WebObject Name: Text1

Attribute	Binding
name	
otherTagString	
value	

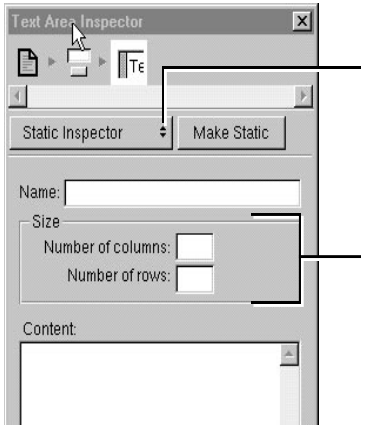
Select Static Inspector to edit HTML attributes.

Click here to convert WOText to a static text area.

Set bindings for the WOText element here.

This example shows the Inspector for a dynamic text area element. It displays the bindable attributes for this element. If you select Static Inspector from the pop-up list, the Text Area Inspector appears. This is the same Inspector you would see for a static text area element (`<TEXTAREA>`) and allows you to set its HTML attributes (such as `COLS` or `ROWS`).

Note: You can also set the HTML attributes using the Dynamic Inspector. The Static Inspector is provided for convenience only.



Select Dynamic Inspector to set the WOText's bindings.

Set HTML attributes of text area here.

To switch back to the WOText Inspector, select Dynamic Inspector from the pop-up list.

In addition, you can convert any dynamic element into its static counterpart, or vice versa:

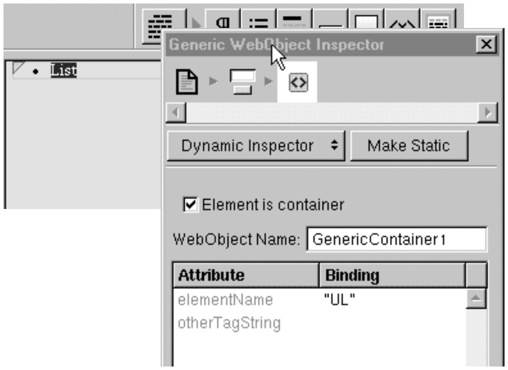
- When inspecting a dynamic element, if you click Make Static, the element becomes its static counterpart (if it has one), and the Static Inspector appears.
- When inspecting a static element, if you click Make Dynamic, the element becomes its dynamic counterpart. Both the Static and Dynamic Inspectors are now available.

The following table shows the dynamic counterpart for each static element.

Static Element	Dynamic Counterpart
Image	WOImage, WOActiveImage
Form	WOForm
Textfield	WOTextField
Text Area	WOText
Button	WOSubmitButton, WOResetButton, WOImageButton
Checkbox	WOCheckBox
Radio Button	WORadioButton

Static Element	Dynamic Counterpart
Select	WOBrowser, WOPopupButton
Hyperlink	WOHyperlink
Applet	WOApplet
Other	Generic WebObject

If you convert a static element to its dynamic counterpart by clicking Make Dynamic, and there is no direct counterpart, the element becomes a generic WebObject whose element name is the HTML tag for the static element (see "Generic WebObjects"). In this figure, a list element (<UL>) has been converted to a generic WebObject element.

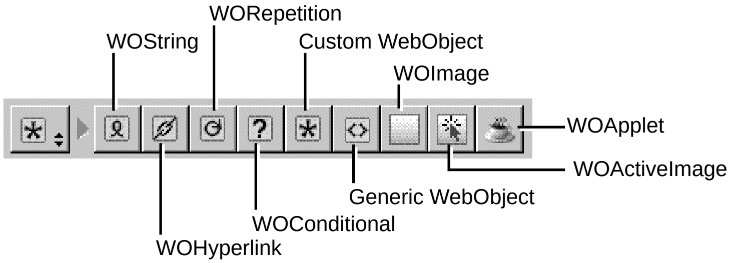


☑ Element is container

WebObject Name: GenericContainer1

Attribute	Binding
elementName	"UL"
otherTagString	

Creating Other WebObjects



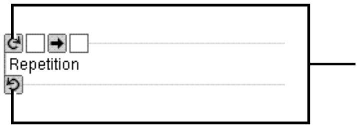
You use this toolbar to create all dynamic elements other than form-based elements. This section provides some general information about using these elements. Each element is described in more detail in its own section.

To create a dynamic element, you click its toolbar icon. One thing to be aware of is what happens when there are already elements selected when you create the element:

- Some dynamic elements (WOHyperlink, WOConditional, WORepetition, custom WebObjects and generic WebObjects) can contain other elements. In this case, the selected elements appear with the new element "wrapped" around it.

- Other dynamic elements (WOString, WOImage, WOActiveImage, and WOApplet) can't contain other elements. When you create one, it replaces whatever was selected.

The first six dynamic element types (all those except for WOImage, WOActiveImage, and WOApplet) display with a pair of icons surrounding the element (and possibly other icons in between). For example, when you create a repetition, it appears like this in the component window:



Drag from the object browser to one of the outer icons to bind (brings up Inspector).

Double-click icon to collapse or expand.

To bind a dynamic element, you drag from an item in the object browser to one of the outer icons. The Inspector appears, allowing you to complete the binding. See "Binding Elements" for more information.

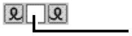
You can double-click one of the icons to collapse the element into a single icon:

Collapsing can be desirable when you have dynamic elements that contain other elements and take up a lot of space on the screen. You can double-click again to expand the element. In addition, you can use the menu commands Elements m WebObjects m Expand All or Elements m WebObjects m Collapse All to expand or collapse all the dynamic elements in the window.

Dynamic Strings

A WOString element represents a dynamically generated string. You bind the **value** attribute of a WOString to a variable or method that returns a string at run time. A WOString is abstract in that it doesn't represent any specific element, but it can be contained in any other HTML element that can contain text.

WebObjects Builder provides a shortcut for binding the **value** attribute of commonly used elements such as WOString.



Drag to here to bind **value** attribute directly.

Instead of dragging to one of the icons, drag to the center binding box. The binding appears directly in the box, and the Inspector doesn't come to the front.

Dynamic Hyperlinks

Dynamic hyperlinks (WOHyperlink) allow you to specify the link's destination at run time rather than at compile time. There are several ways to do this:

- You can specify the name of a page in your application as the destination of the link. To do this, bind the name to the WOHyperlink's **pageName** attribute. This is useful since pages in a WebObjects application don't have predictable URLs that you can specify in an HTML hyperlink.
- You can specify an action to be performed when the hyperlink is clicked by binding WOHyperlink's **action** attribute to an action method in your code. This method can perform any sort of action, as well as returning a page as the destination.
- You can also specify a URL as the destination by binding to the **href** attribute.

To create a dynamic hyperlink:

1. Click in the toolbar.
2. Replace the word `Hyperlink` with the text of the link.
3. Create the element's bindings.

To learn how to create a static hyperlink, see "Creating Hyperlinks".

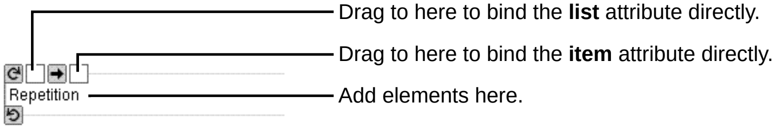
Repetitions

A repetition (WORepetition) is a container element that repeats its contents a certain number of times. It is like a loop in a structured programming language. Repetitions are one of the most important elements in WebObjects, since it is quite common for applications to display repeated data (often from databases) when the amount of data to be displayed isn't known until run time. Typically, a repetition is used to generate items in a list, multiple rows in a table, or multiple tables.

To create a repetition:

1. Click .

   The repetition appears in the component window.



Drag to here to bind the **list** attribute directly.

Drag to here to bind the **item** attribute directly.

Add elements here.

2. Add elements inside the repetition (replacing the word "Repetition").

   A repetition can contain any other elements, either static HTML or dynamic WebObjects elements.

3. Alternatively, you can select existing elements, then click to wrap the repetition around the elements. This is necessary in some cases, such as wrapping a repetition around a table row.

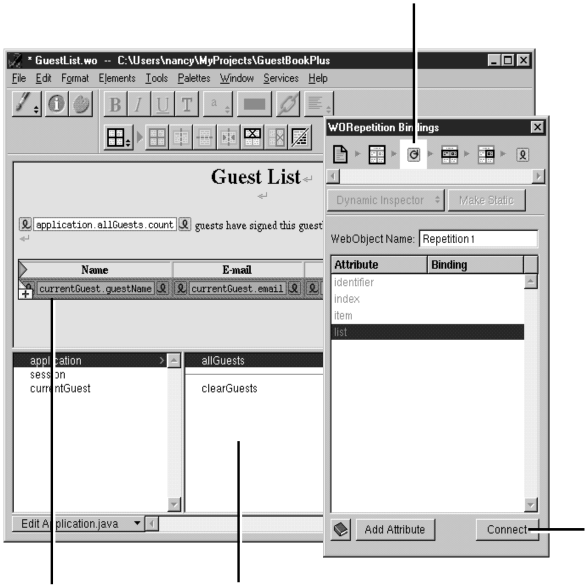
You usually bind two attributes of a repetition: **list** and **item**. The **list** attribute must be bound to an array. WebObjects generates the elements in the repetition once for each item in the array. Each time through the array, the **item** attribute points to the current array object. Typically, you bind **item** to a variable and then use that variable in the bindings of the elements inside the repetition.

When you drag an item from the object browser to the WORepetition to bind it, the default attribute shown in the Inspector depends on whether the item is an array. If it is, **list** is the default attribute; otherwise, **item** is the default attribute.

In addition, as with WOStrings, WebObjects Builder provides a shortcut for binding repetitions so that you don't have to use the Inspector. Drag to the first binding box to bind the **list** attribute; drag to the second box to bind the **item** attribute.

When you wrap a repetition around a table row, the repetition symbol doesn't appear. Instead, a shaded background appears behind the row. To bind the repetition, drag from the object browser to anywhere in the row (but not to a dynamic element inside the row). The Inspector appears, allowing you to complete the binding as usual.

Element path shows that the WORepetition is contained by the table and contains a table row.



Click here to bind allGuests to the repetitionÕs list attribute.

The shaded background means the row is in a repetition.

Drag variable to the table row to bind to the repetition.

Note: You can also wrap a repetition around a single cell in a table. In addition, this same procedure of wrapping a repetition around a table row or cell also works for conditionals (see next section).

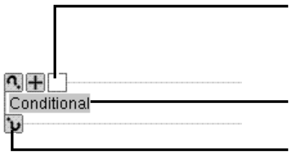
Conditionals

A conditional (WOConditional) is a dynamic container element that displays its contents only if a particular condition is true. WOConditional's main attribute is **condition**, which takes a Boolean value. If **condition** is true (1), the WOConditional's contents are displayed. If **condition** is false (0), the contents aren't displayed.

condition must be bound to a variable or a method that returns a boolean value. (WebScript and Objective-C use the constants **YES** and **NO**; Java uses **true** and **false**.) To bind **condition** (or any other attribute that takes a boolean) to a constant value, enter **YES** or **NO** in the bindings Inspector.

To create a conditional, click ? in the toolbar.

Note: Any selected elements will be contained within the conditional.



Drag from the object browser to this box to bind the condition attribute without opening the Inspector. The binding appears inside the box.

Contents of the conditional display if condition is true.

Drag from the object browser to here to bind (opens the Inspector).

To bind to a conditional, click a variable or method and drag to one of the conditional's outer icons. The Inspector appears, displaying the bindings for the WOConditional, with the **condition** attribute selected by default. Complete the binding by clicking Connect, or choose a different attribute to bind.

There is a shortcut for binding the condition attribute similar to the WOString shortcut. Drag from a key in the object browser to the binding box in the conditional.

Sometimes, you want the equivalent of an "if-then-else" structure; that is, "if the condition is true, display this text; if not, display this other text." To accomplish this, you can use the **negate** attribute. If **negate** is true, then the contents of the conditional are displayed only if **condition** is false. To create an if-then-else structure, do the following:

1. Create two WOConditionals.
2. Bind the **condition** attribute of both of them to the same variable or method.
3. Bind the **negate** attribute of the second one to `YES` (true).

   By default, **negate** is false, so you do not explicitly need to bind the first conditional's negate attribute.

As with repetitions, you can "wrap" a conditional around a table row (see "Repetitions"). When you do this, the conditional symbol doesn't appear but the row appears with a blue background.

Custom WebObjects

You use custom WebObjects for two main purposes:

- To implement WebObjects element classes not directly supported by WebObjects Builder.

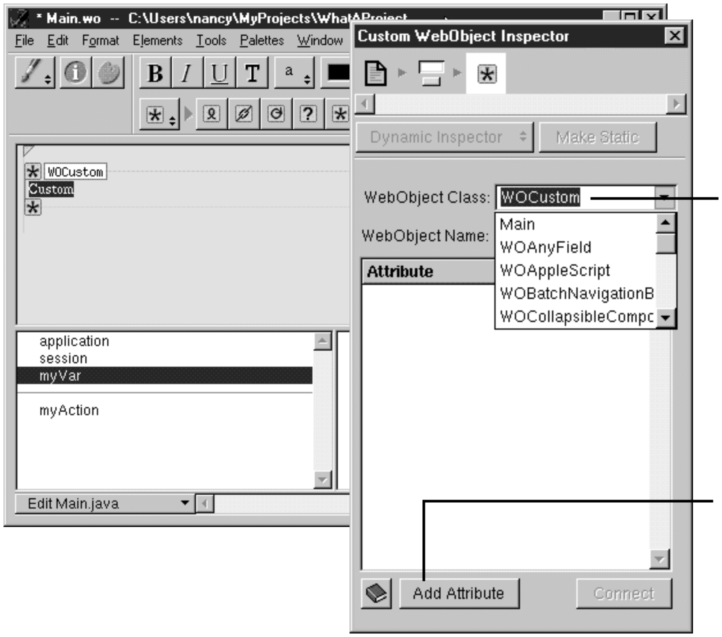
- To implement reusable components (see "Reusable Components" for more details).

To create a custom WebObject:

1. Click ✱ in the toolbar.

   A template for a custom WebObject appears at the insertion point.

2. In the Custom WebObject Inspector, specify the element class.



Select class name from the list or type it.

Click to add the element's attributes.

The WebObject Class combo box allows you to type the class name or select it from the components listed in the pop-up menu. This menu lists all components that are in the current project and frameworks. For example, the components listed in the menu above (WOSimpleArrayDisplay, WOSortOrder, and so forth) are defined in the WOExtensions framework, which is included in your project by default.

If WebObjects Builder recognizes the element class, it automatically displays its attributes. Otherwise, you can add them by clicking Add Attribute.

The WOExtensions palette (see “Palettes”) contains several pre-defined custom WebObjects elements you can use in a component.

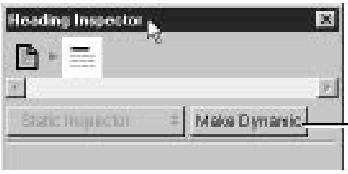
Generic WebObjects

You can use the generic WebObject element to create a dynamic version of any HTML element.

To create a dynamic version of a standard HTML element:

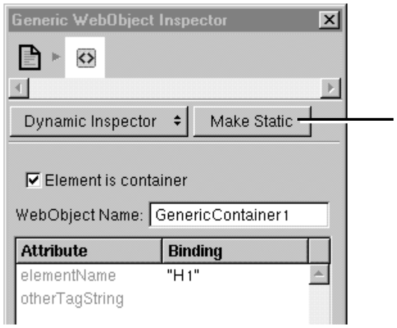
1. Create the element (say, a heading).

2. In the Inspector, click Make Dynamic.



Click here to convert the heading to a dynamic element.

If the element has no specific dynamic counterpart, it becomes a generic WebObject element.



Click here to convert back to a heading.

☑ Element is container

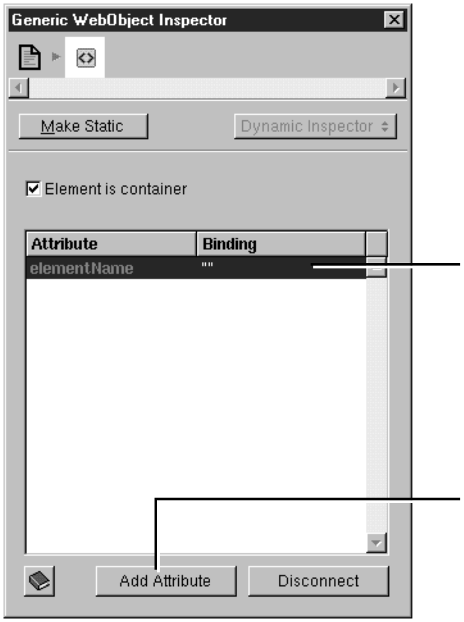
WebObject Name: GenericContainer1

Attribute	Binding
elementName	"H1"
otherTagString	

To create a generic WebObject corresponding to any HTML element (even ones not supported directly by WebObjects Builder):

1. Click in the toolbar.

2. Bring up the Inspector.



☑ Element is container

Attribute	Binding
elementName	""

Enter the element name here.

Click to add attributes.

A generic WebObject element has one required attribute, **elementName**, which specifies what type of element should be generated at run time.

For example, imagine that a future version of HTML adds a new container element, which you would like to generate dynamically in your component. You would:

3. Type *container name* between the quotes in the Binding column.

4. Check "Element is container".

5. Use the Add Attribute button to specify any additional properties of the element.

Dynamic Images

The elements WOImage and WOActiveImage are dynamic images. At run time, WOImage is rendered as a passive image and WOActiveImage as a mapped, active image. To create them, click □ or ▣ in the toolbar, respectively.

A static image element requires you to specify its pathname directly in the HTML. With dynamic images, you bind the **filename** attribute to specify the name of an image file in your project, or in a framework. You can bind this attribute to a variable or method so that the filename is dynamically generated at run time.

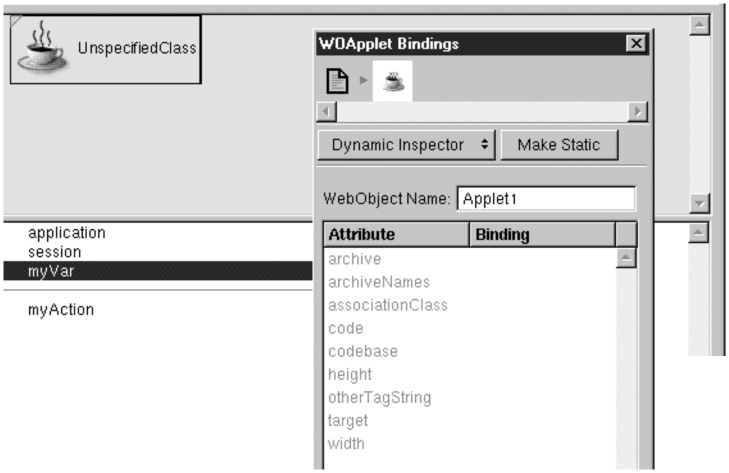
You can also create a WOImage by dragging an image from the file system into your component (see “Dragging Elements into the Component Window” for more information). An alert appears, asking whether you want to add the image to the project (if it is not already in the project). If you do, the file is added to the Web Server Resources suitcase of your project.

WOApplets

The WOApplet dynamic element represents a Java applet or client-side component. There are several ways to create a WOApplet. You can:

- Click in the toolbar.

  This creates a WOApplet, whose bindings you must set.



WebObject Name: Applet1

Attribute	Binding
archive	
archiveNames	
associationClass	
code	
codebase	
height	
otherTagString	
target	
width	

- Drag a file of type **.class** into your component.

  You are asked whether you want to add the **.class** file to your project. If you reply Yes, it is added to the Web Server Resources suitcase. A WOApplet appears in your component, with its **code** attribute set to the name of the file.

- Drag an element from the Client-Side Components palette to your component (see “Palettes”).

Reusable Components

One of the strengths of the WebObjects architecture is its support of reusable components. Any component that you define, whether it represents an entire page or part of a page, can be reused by any WebObjects application. A component can be used in multiple pages or even multiple times in the same page. Reusable components can be used for such items as headers, footers, and navigation bars.

When a reusable component is used inside another component, it is referred to as a *child component*; the containing component is called the *parent component*.

To reuse a component, you can either:

- Add the component to a framework and include the framework in any project that wants to use the component. The component is a *shared component* and doesn't need to be copied into each application that uses it.

- Add the component directly to your project (in the Web Components suitcase).

See "Frameworks" for information on creating frameworks and adding them to a project. To add a component directly to a project, you can:

- Drag a component (a folder with the **.wo** extension) from the file system onto a component window.

  You are asked whether you want to add the component to your project. If you respond Yes, the component is copied to the project and placed in the Web Components suitcase, along with all the other components.

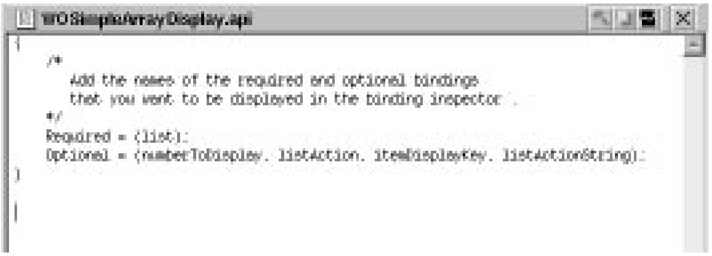
  The child component then appears in the window at the insertion point. It is displayed graphically inside a custom WebObject element.

- Use the toolbar to add a custom WebObject element (see "Custom WebObjects") to your page, then use the Inspector to set its type to the name of the reusable component.

- Drag a component that has been stored on a palette to the component window (see "Palettes").

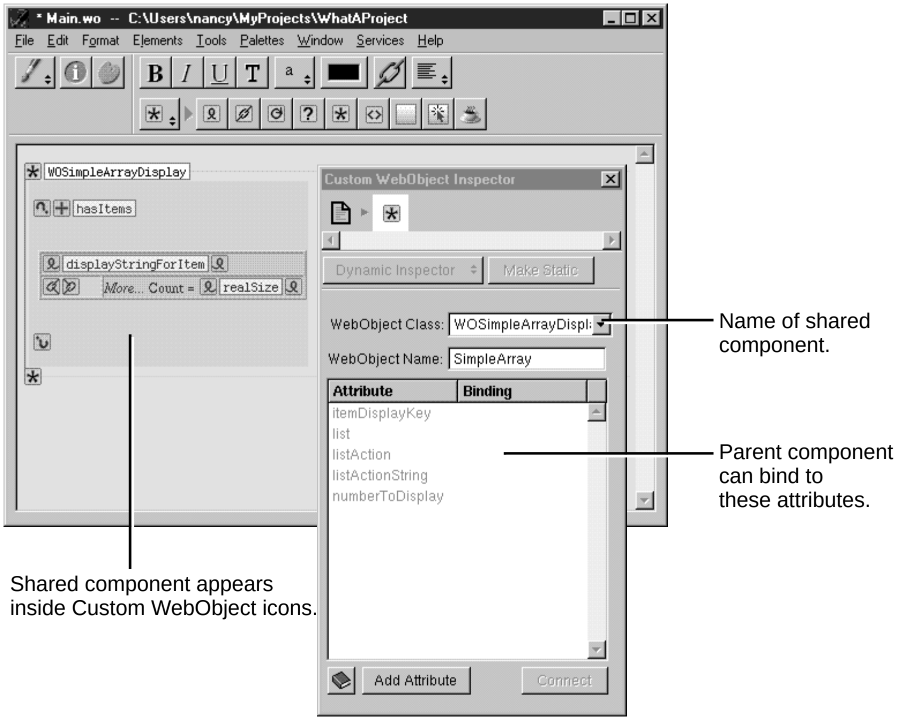
A component that is designed for reuse can *export* keys and actions, which become attributes that the parent component can bind, just as it would set the attributes of any other dynamic element. When the component is added to a parent component, these attributes show up in the Custom WebObject Inspector. The attributes must be enumerated in the **.api** file for the component.

For example, the WOSimpleArrayDisplay shared component that lives in the WOExtensions framework exports the following attributes, as defined in its **.api** file:



```
{
    /*
       Add the names of the required and optional bindings
       that you want to be displayed in the binding inspector .
    */
    Required = (list);
    Optional = (numberToDisplay, listAction, itemDisplayKey, listActionString);
}
```

When you use this component in one of your pages, it looks like this:



WebObject Class: WOSimpleArrayDispl
WebObject Name: SimpleArray

Attribute	Binding
itemDisplayKey	
list	
listAction	
listActionString	
numberToDisplay	

Name of shared component.

Parent component can bind to these attributes.

Shared component appears inside Custom WebObject icons.

The Inspector shows the child component's attributes. As with any other dynamic element, you can bind the child component's attributes to keys and actions in the parent component's code.

Note: When you create a component that is specifically designed to be used within other pages, specify "Partial document" in the Page Attributes Inspector popup list (see "Setting Page Attributes"). This way WebObjects Builder does not wrap `<HTML>`, `<HEAD>`, and `<BODY>` tags around your component.

If your reusable component is complex and you want to declutter the display, you can assign an image to the component that is displayed when the element is collapsed. Assign an image to your component by simply placing the graphics file (named after your component) in the **.wo** component directory. For example, if your component name is **MyComponent**, place **MyComponent.tif** in your **MyComponent.wo** directory.

For more information, see "Reusable Components" in the *WebObjects Developer's Guide*.

Chapter 4

Direct To Web

Direct to Web is a technology that provides a quick and easy method of creating a web application that accesses a database. It lets you experiment and prototype, while also allowing you the flexibility to access the full power of WebObjects.

There are several stages you can go through, depending on your needs:

- First, you create a WebObjects project and specify a *model* to use. Direct to Web uses the model, which defines the mapping between your database and enterprise object classes, to generate an application that provides an interface to your database. This application consists of a set of pages that allow you to do queries on the entities in your database, display results, and add and delete records.

  A complete and correct model file with all the right relationships defined is key to creating a WebObjects application with Direct to Web.

- To change the way the pages are presented, you can use the WebAssistant, which is a Java applet that runs in your web browser. For each page in your application, the WebAssistant allows you to specify which pages are shown, which properties are shown, how these properties are displayed, and the order in which they are listed. You can experiment with different configurations until you are satisfied, without writing any code.

- If you want to do further customization beyond what the WebAssistant provides, you can "freeze" any or all of the pages in your application as WebObjects components. This gives you the full power of WebObjects: you can modify a component's layout using WebObjects Builder, and you can customize its behavior by writing Java code using Project Builder.

You can also use Direct to Web in other types of WebObjects applications. Your application can take two approaches:

- Embedding Direct to Web components in your pages; these include query forms, lists, or edit/inspect forms.

- Linking to dynamically generated Direct to Web pages

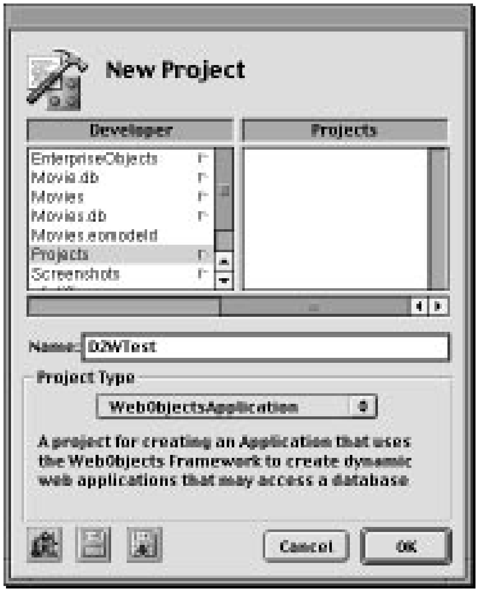
This document describes the elements that make up a Direct to Web application, and shows you the steps you follow when creating and modifying an application. See *WebObjects Tools and Techniques* for more information on using Project Builder and WebObjects Builder to develop WebObjects applications. For more information about using WebObjects with database applications, see "Creating a WebObjects Database Application" in *Getting*

Started With WebObjects, as well as the *Enterprise Objects Framework Developer's Guide*.

Creating a Direct to Web Project

To create a Direct to Web application, begin by using Project Builder to create a WebObjects application project. Follow these steps:

1. Launch Project Builder.
2. Choose Project ▸ New.
3. In the New Project panel, choose the WebObjectsApplication project type from the pop-up list and specify the project path where you want to save the project.



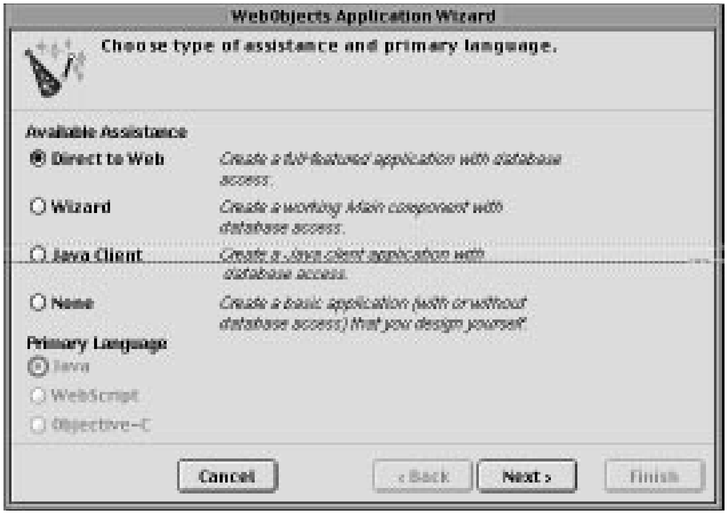
Name: D2WTest

Project Type: WebObjectsApplication

A project for creating an Application that uses the WebObjects Framework to create dynamic web applications that may access a database

4. Click OK.

   The first screen of the WebObjects application wizard appears.



WebObjects Application Wizard

Choose type of assistance and primary language.

Available Assistance

● Direct to Web — *Create a full-featured application with database access.*

○ Wizard — *Create a working Main component with database access.*

○ Java Client — *Create a Java client application with database access.*

○ None — *Create a basic application (with or without database access) that you design yourself.*

Primary Language

● Java

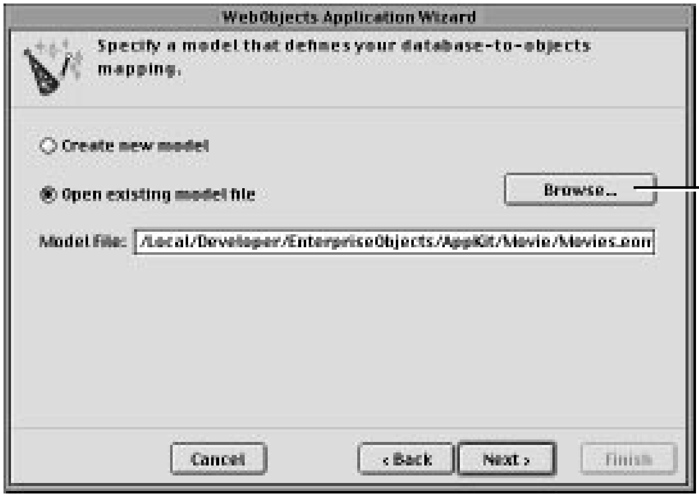
○ WebScript

○ Objective-C

5. Under Available Assistance, select Direct to Web.

   You cannot select a language when the type of WebObjects application is Direct to Web; when you create a Direct to Web project, Java is the only available language.

6. Click Next.



WebObjects Application Wizard

Specify a model that defines your database-to-objects mapping.

○ Create new model

● Open existing model file

Model File: /Local/Developer/EnterpriseObjects/AppKit/Movie/Movies.eom

Click here to navigate to your model file.

7. Choose “Open existing model file.”

   You can also create a new model file. If you choose “Create new model,” you are led through a series of screens that prompt you to create a new model. For more information about creating a new model file, see the chapter “Using EOModeler” in *Enterprise Objects Framework Developer’s Guide*.

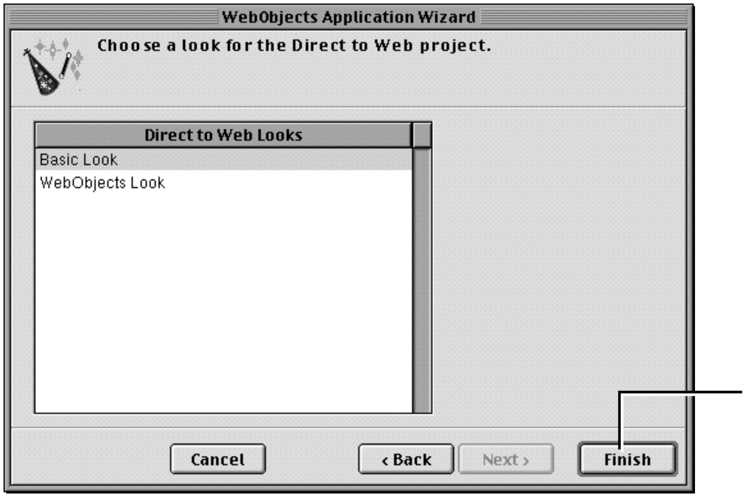
If the model you add to your project references entities in another model, you must add the other model to your project manually. The wizard doesn't include it automatically.

8. Click Browse, then navigate to the model file you want to use and select it.

   If you are just exploring Direct to Web, you can use a model file from one the Enterprise Objects example projects, such as **Movies.eomodel** in the Movies project.

9. Click Next.

   The next screen offers a selection of user-interface styles (“looks”) for your Direct to Web application; see “The Different Looks for WebObjects Applications” (page 97) for more information. Click an item in the browser to select a look.



WebObjects Application Wizard

Choose a look for the Direct to Web project.

Direct to Web Looks
Basic Look
WebObjects Look

Click here to finish creating your application.

10. Click Finish to complete the WebObjects application wizard procedure.

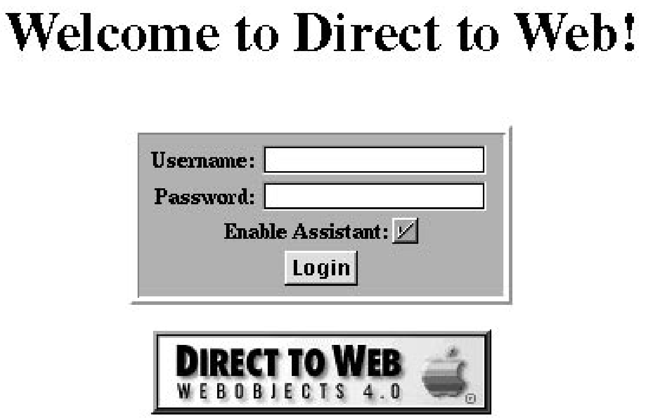
You can now launch the Direct to Web application from Project Builder, in the same way you would launch any other project. “Using Your Direct to Web Application” (page 101) tells you how to launch your WebObjects application and describes what you see when you launch it.

The Different Looks for WebObjects Applications

In this release, Direct to Web offers two different user-interface styles, or “looks,” for WebObjects applications: Basic and WebObjects. More looks will be added in future releases. Currently the only simple way to change the look of an application is to re-create a project using Project Builder and then redefine the project with the WebObjects application wizard. Therefore it is advisable to know which look you want in advance.

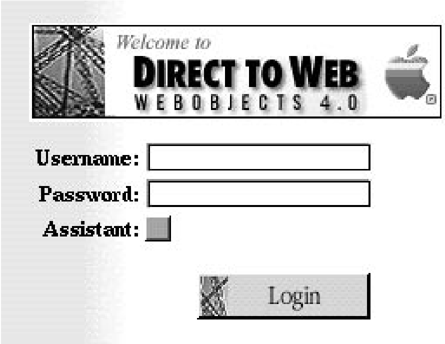
The essential difference between the Basic look and the WebObjects look is that the latter look uses more graphics, particularly the spider-web image. But there are also differences in the style and placement of user-interface elements. The HTML in the Basic look is simple and straightforward, which makes the Basic look more suitable if you intend to freeze your pages and then customize them..

The login page for the Basic look has a panel-like submit form for the entry of user name and password:



Welcome to Direct to Web!

The login page for the WebObjects look presents the submit form without the enclosing panel:

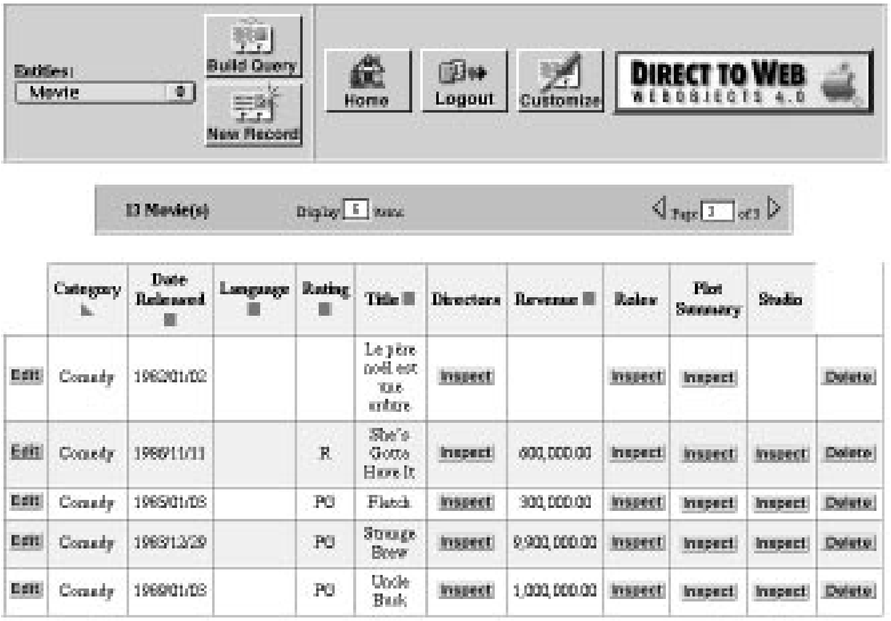


Username:

Password:

Assistant: □

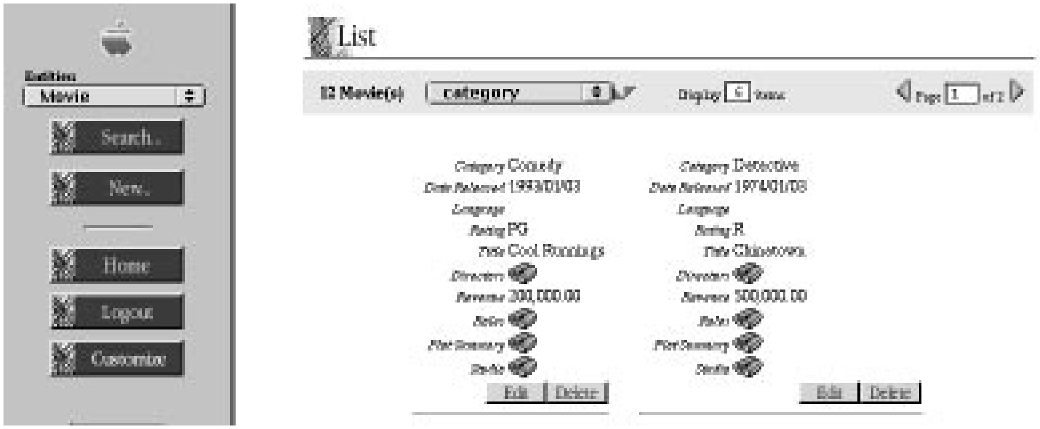
In the dynamically-generated pages (query, list, inspect, and so on), the differences between the Basic look and the WebObjects look are even more striking. In the Basic look the control header runs across the top of the page whereas in the WebObjects look it appears on the left side of the page. In addition, the Basic look is more tabular while the WebObjects look tends to present records in visual "blocks." For example, the following is an example of a list page in the Basic look:



13 Movie(s) Display 5 items Page 1 of 3

	Category	Date Released	Language	Rating	Title	Directors	Revenue	Roles	Plot Summary	Studio	
Edit	Comedy	1982/01/02			Le père noël est une ordure	Inspect		Inspect	Inspect		Delete
Edit	Comedy	1986/11/11		R	She's Gotta Have It	Inspect	600,000.00	Inspect	Inspect	Inspect	Delete
Edit	Comedy	1985/01/03		PG	Fletch	Inspect	300,000.00	Inspect	Inspect	Inspect	Delete
Edit	Comedy	1983/12/20		PG	Strange Brew	Inspect	9,900,000.00	Inspect	Inspect	Inspect	Delete
Edit	Comedy	1989/01/03		PG	Uncle Buck	Inspect	1,000,000.00	Inspect	Inspect	Inspect	Delete

The following illustrates what a list page looks like in the WebObjects look.

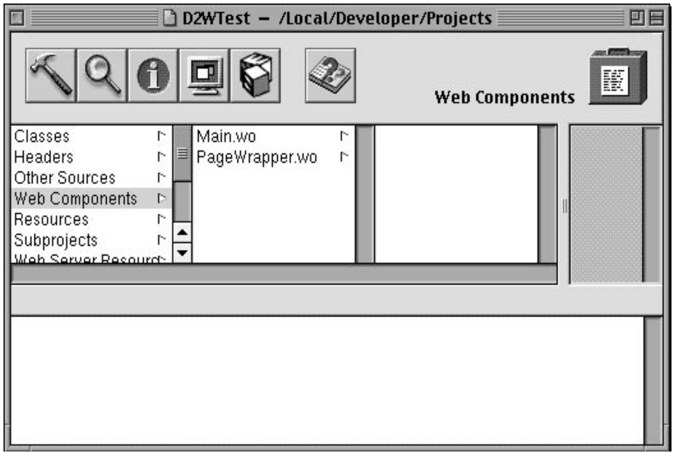


Category Comedy
Date Released 1993/01/03
Language
Rating PG
Title Cool Runnings
Directors
Revenue 200,000.00
Roles
Plot Summary
Studio

Category Detective
Date Released 1974/01/03
Language
Rating R
Title Chinatown
Directors
Revenue 500,000.00
Roles
Plot Summary
Studio

The Structure of a Direct to Web Project

A Direct to Web project has a structure similar to other WebObjects application projects. A newly created project contains two components:

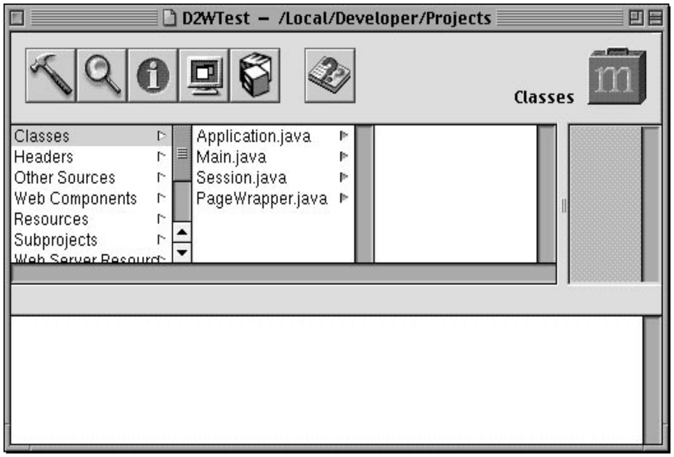


- **Main.wo** is the main component, representing the login page of the application.

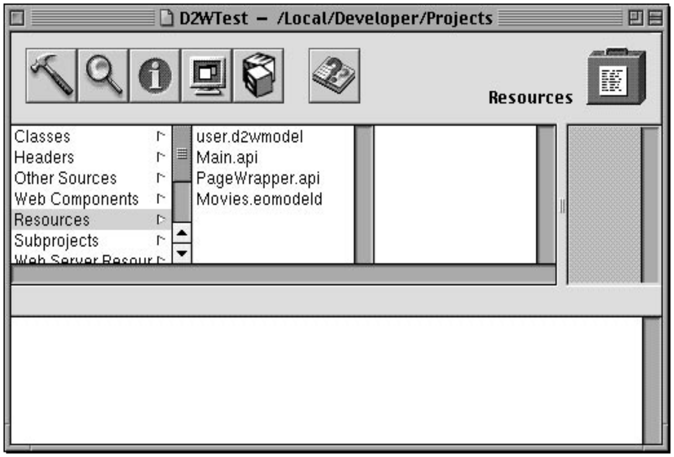
- **PageWrapper.wo** is a reusable component that wraps the content of the pages of the application (except for **Main.wo**). It contains the header and footer text and elements common to these pages. The header, by default, consists of control buttons that are displayed at the top of each page (or the left side of the page in the WebObjects look). If you choose, you can add text or other elements to the header and footer areas of **PageWrapper.wo**.

As you run your application, Direct to Web creates additional pages, using information in your model file and the settings specified in the WebAssistant. These pages do not show up as components in your project. Rather, Direct to Web creates them dynamically using a set of reusable components in the Direct to Web framework. However, you can save any page as a component. When you do that, you are then able to modify the component just as you would with any other WebObjects component. See “Generating Components” (page 126) for more information.

In your project’s Classes suitcase, you’ll see a Java file for each of the components, as well as the Session and Application objects. You can add code to any of these files to extend their functionality. See “Modifying Your Application’s Code” (page 129) for more information on the Direct to Web API.



The Resources suitcase contains the model file you specified when you created the project (in this example, **Movies.eomodeld**). It also contains **user.d2wmodel**, which stores the preferences you have specified using the WebAssistant (you should never need to edit this file directly). The Resources suitcase also holds files specifying the exported keys, both optional and required, for each type of component used in the application; these files have an extension of **.api**.



Using Your Direct to Web Application

Once you have created a Direct to Web application using Project Builder and the WebObjects application wizard, and have compiled the resulting project files, you can launch the application using Project Builder's Launch panel. The application pages are displayed in a web browser, where you can test the application's presentation of data and, with the WebAssistant enabled, modify the layout of that data.

Launching a Direct to Web Application

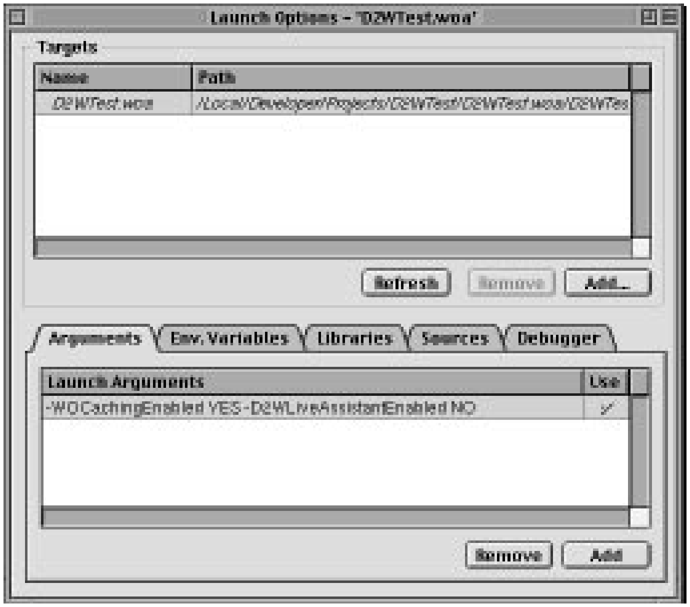
To launch your application from Project Builder:

1. Click 🖥 in the toolbar in Project Builder's main window to open the Launch panel.

2. Click 🖥 in the Launch panel to launch your application.

Before you launch the application you might want to set some command line options. For example, when running a Direct to Web Application for deployment, you should turn on caching and disable the WebAssistant (to prevent anyone from connect to the appliation using WebAssistant). To do this, set the `-WOCachingEnabled` and `-D2WLiveAssistantEnabled` options, respectively:

1. Click ✓ to bring up the Launch Options panel.



Name	Path
D2WTest.woa	*/Local/Developer/Projects/D2WTest/D2WTest.woa/D2WTes*

Launch Arguments	Use
-WOCachingEnabled YES -D2WLiveAssistantEnabled NO	✓

2. Click the Arguments tab.

3. Click Add to create a new command line and type the entries as shown in the above example. If there is no checkmark under the Use column, double-click the line under Use to set it.

For other command-line options for WebObjects applications, such as `-WOPort`, see *Serving WebObjects*.

You can test the Direct to Web application using a web browser on a machine remote from the machine on which the application is running (that is, the server). When you launch the application, look in the console output, which is displayed in the Launch panel, for the line containing application's URL.

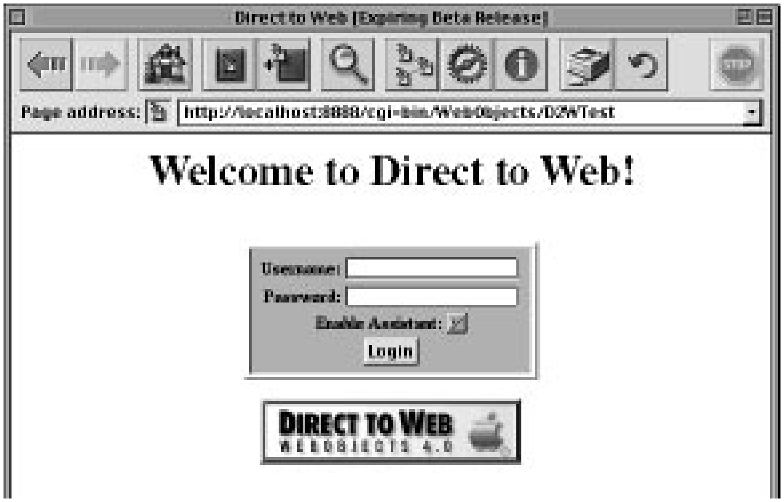
```
Jul 28 09:48:52 D2WTest[2777] Your application's URL is:
http://localhost:1234/cgi-bin/WebObjects/D2WTest
```

Enter the URL in your browser, after substituting the host name of the server machine for "localhost". In fact, you can exclude every thing in the URL after the application port number. For example, if the server host name is "foobar" you would enter the following URL in the browser to load the WebObjects application:

```
http://foobar:1234/
```

The Login Page

When you launch your application, your web browser displays the Direct to Web login screen:



Direct to Web [Expiring Beta Release]

Page address: http://localhost:8888/cgi-bin/WebObjects/D2WTest

Welcome to Direct to Web!

The login page is the default implementation of your Main component, **Main.wo**. It contains text fields to enter a name and password, as well as a submit button (Login) and an Enable Assistant checkbox. To go to the application's default first page, check Enable Assistant and click the Login button. You don't need to enter a name and password, because the default application provides no password-checking logic. If you don't check Enable Assistant before clicking the Login button, you won't have access to the WebAssistant.

You can modify the login page (**Main.wo**) to provide any behavior or appearance you like. For example, you can add your own password-checking logic. See "Modifying Your Application's Code" (page 129) for more information.

Dynamically Generated Pages

Besides the login page, there are nine types of dynamically-generated pages (or reusable components) in a Direct to Web application:

- A *query-all page* that displays all entities that are currently exposed and lets users construct queries on the attributes (but not the relationships) of those entities; see "Query Pages" (page 105). This properties of this page cannot be customized.

- A *query page* that allows the user to construct a query for a particular entity; see “Query Pages” (page 105).

- A *list page* that displays one or more records of a particular entity in tabular form; see “List Pages and Select Components” (page 107). The result of a query is always a list page.

- An *inspect page* that displays a single record of a given entity; see “Inspect and Edit Pages” (page 109).

- An *edit page* that displays a single record of a given entity and also allows you to make changes to the record and save it to the database; see “Inspect and Edit Pages” (page 109).

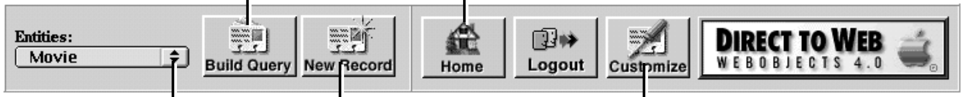
- A *select component* that lets users select a record from a list, thereby adding it to a to-many relationship or populating an edit component with it; see “List Pages and Select Components” (page 107).

- A *master-detail page* consists of a select component and an edit component; it allows you to select and edit a record without having to switch to another page. See “Master-Detail Pages” (page 112).

- An *edit-relationship page* is a multiple component page for removing and adding objects to a to-many relationship. See “Edit-Relationship Pages” (page 111).

- An *error page* for displaying information related to exceptions and other errors. This properties of this page cannot be customized.

All pages in your application contain the standard Direct to Web header (defined in **PageWrapper.wo**) at the top of the page. This header provides a number of controls, described in the following figure.



Click here to build a query for the selected entity.

Click here to return to the first page of your application.

Click here to activate the WebAssistant..

Click here to create a new record of the selected entity type.

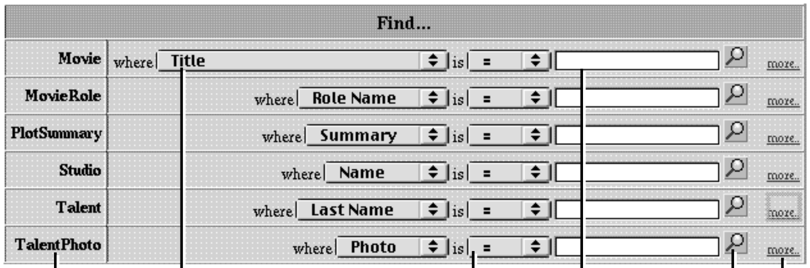
Select an entity to query on from this pop-up list.

For best results when navigating through a Direct to Web application, don't use your web browser's backtrack buttons. Instead:

- To return to the previous page from an edit or inspect page, click Cancel.
- To return to a query page from a list page, select the entity in the Entities pop-up menu and click Build Query.

Query Pages

Direct To Web has two kinds of pages for constructing queries on the properties of entities: a query-all page and a query page. When you log into a Direct To Web application, the query-all page is displayed first by default.



Find...

Movie	where	Title	is	=		more..
MovieRole	where	Role Name	is	=		more..
PlotSummary	where	Summary	is	=		more..
Studio	where	Name	is	=		more..
Talent	where	Last Name	is	=		more..
TalentPhoto	where	Photo	is	=		more..

Choose property for query

Query value

Displays the query page for the entity

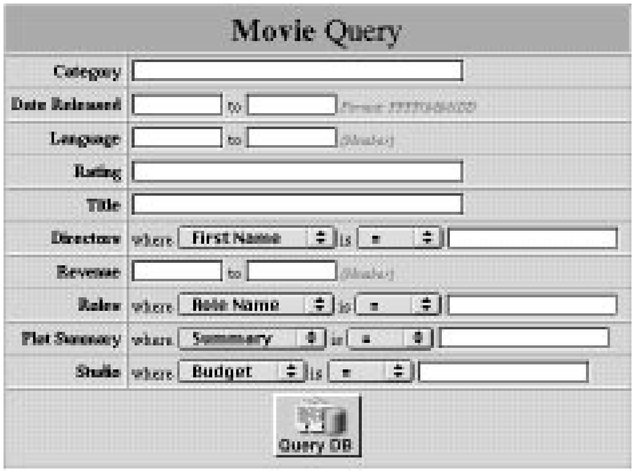
Database entities

Query operator (equals, less than, and so on)

Execute query

The query-all page enables you to construct a query on an attribute of a particular entity (queries on relationships are not allowed). To use this page, select a property from an entity's pop-up menu, specify the comparison operator, type the string to search on. and click the magnifying-glass button.

The query page, on the other hand, is tied to a particular entity but allows you to construct queries on relationships as well as attributes. The following example illustrates a query page:



Movie Query

Category	
Date Released	to
Language	to
Rating	
Title	
Directors	where First Name is =
Revenue	to
Roles	where Role Name is =
Plot Summary	where Summary is =
Studio	where Budget is =

The first column in the table lists the current entity's properties. The second column contains pop-up menus and text fields that let you enter values to construct queries on single and multiple properties.

A property is either an *attribute* (a value stored directly in this entity's table) or a *relationship* (an association between this entity and another entity). For example, in the figure above, Title is an attribute and Studio is a relationship. You can use the WebAssistant to hide properties that you don't want users to see.

Note: Direct to Web only displays properties that are class properties. In addition, primary keys and attributes marked as the source of a relationship are hidden by default.

Properties are represented in various ways. For example, in the figure, you enter a single string value for Title, while you enter a range of values for Date Released. You can change the representation of most properties using the WebAssistant. In particular, you may want to change how relationships are shown, since by default, you query them by specifying an ID, which is something the user is unlikely to know. See "Changing How Properties Are Displayed" (page 119) for more information on the different ways of representing properties in your application's pages.

You can use initial characters and special characters in query fields for string searches. For example, you could enter “sh” in the Movie entity’s Title to search for all movies that begin with those characters. You can also use the asterisk character to indicate “all occurences.” For instance, “*love” would return all movies that contain the substring “love”.

In the Movie query, to get a list of all dramas released in the 1990’s, you would:

1. Enter `Drama` in the Category field.
2. Enter `1980/1/1` and `1989/12/31` in the Date Released fields.
3. Click Query DB.

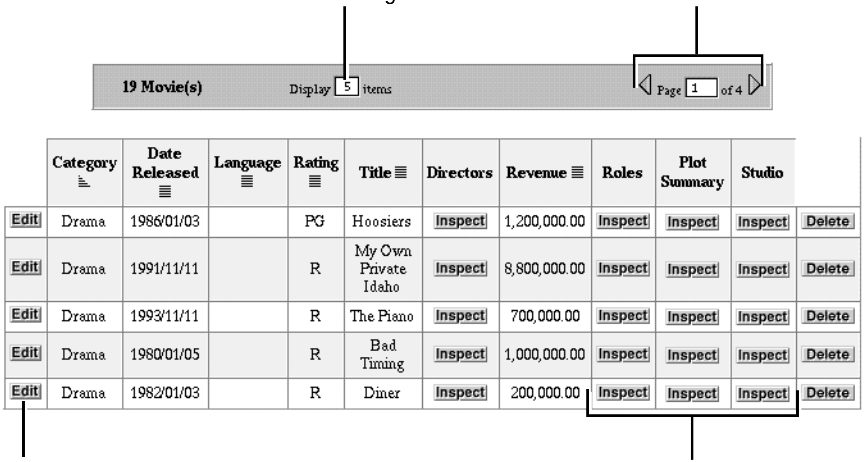
   The results are displayed in a list page; see “List Pages and Select Components” (page 107).

List Pages and Select Components

A list page displays a table showing multiple records of an entity. List pages are used to display the results of a query, or to show the records satisfying a to-many relationship in another list or inspect page.

Type a number here and press Enter to change batch size.

Click arrows to back and forward a batch, or enter a batch number.



19 Movie(s)

Display 5 items

◁ Page 1 of 4 ▷

	Category ⊵	Date Released ≣	Language ≣	Rating ≣	Title ≣	Directors	Revenue ≣	Roles	Plot Summary	Studio	
Edit	Drama	1986/01/03		PG	Hoosiers	Inspect	1,200,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1991/11/11		R	My Own Private Idaho	Inspect	8,800,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1993/11/11		R	The Piano	Inspect	700,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1980/01/05		R	Bad Timing	Inspect	1,000,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1982/01/03		R	Diner	Inspect	200,000.00	Inspect	Inspect	Inspect	Delete

Click here to bring up an Edit page for the record shown in this row.

Click Inspect to display a list page showing the relationshipÕs destination records.

Each row in the table represents a record. By default, a batch of ten records are shown in a page. To change the batch size, type a number in the "Display _ Items" field and press Return or Enter. To display additional records in either direction, click the triangle buttons or enter the page number you want to go to.

Each column in the list represents one of the entity's properties. By default, all properties are shown in alphabetical order. You can hide columns and change their order by using the WebAssistant; see "Customizing Your Application With WebAssistant" (page 113).

The symbols to the right of attribute names represent their sort order:

- ↑: ascending order
- ↓: descending order
- ≡: unsorted

To change the sort order for any attribute, click the title to cycle between ascending, descending, and unsorted. By default, the records are sorted in ascending order by the attribute in the first column. You can specify up to three columns to sort on; the last one specified becomes the primary sort key.

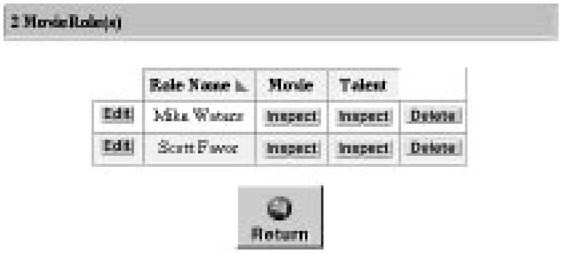
For properties that represent relationships, an Inspect button appears in the cell by default (DisplayToManyFault). When you click the Inspect button one of two things happen, depending on the type of relationship:

- If it is a to-one relationship, an inspect page appears, showing the destination record.

  In the above example, the Movie entity's Studio relationship is a to-one relationship to the Studio entity. If you click the Inspect button, an inspect page appears for the Studio entity corresponding to the selected movie; see "Inspect and Edit Pages" (page 109).

- If it is a to-many relationship, another list page appears, showing all the destination records in the relationship.

  In the above example, the Movie entity's Roles relationship is a to-many relationship to the MovieRole entity. If you click the Inspect button, a list page appears, showing all the roles in the selected movie.

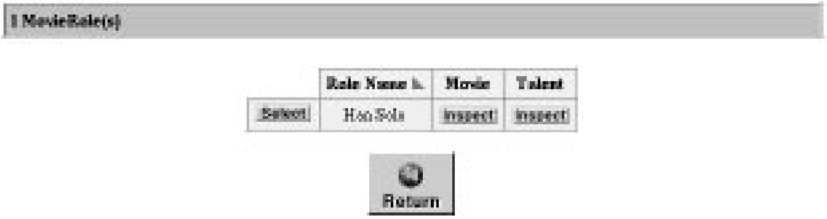


2 MovieRole(s)

	Role Name	Movie	Talent	
Edit	Mike Waters	Inspect	Inspect	Delete
Edit	Scott Favor	Inspect	Inspect	Delete

You can use the WebAssistant to display the related records directly in the table instead of with an Inspect button; see “Customizing Your Application With WebAssistant” (page 113).

The select component looks a lot like the list page, but instead of the Edit button there is a Select button. The select component occurs in multiple-component pages. In the edit-relationship page you click Select to add a record to a to-many relationship. In the master-detail page you click Select to add a record to an edit component. A select component looks like this:



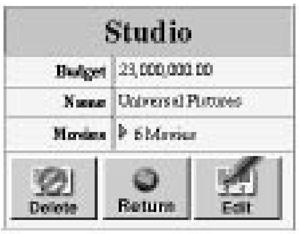
1 MovieRole(s)

	Role Name	Movie	Talent
Select	Han Solo	Inspect	Inspect

Inspect and Edit Pages

Inspect pages and edit pages display the data for a single record of an entity. An edit page allows you to make changes to the record and save the changes, while an inspect page is read-only.

An inspect page looks like this:



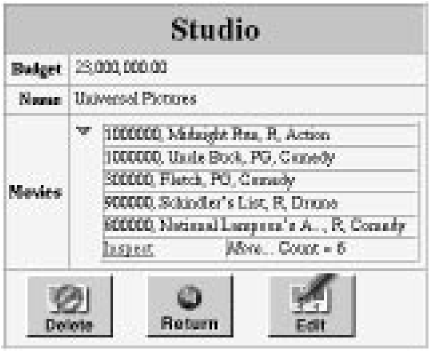
Studio

Budget	23,000,000.00
Name	Universal Pictures
Movies	▸ 6 Movies

Note the buttons at the bottom of the page:

- Delete allows you to delete the record from the database.
- Cancel takes you back to the page from which you accessed this inspect page.
- Edit brings up the equivalent edit page for this record, so that you can make changes. (However, if your application specifies a particular entity as read-only, you won't be able to edit it.)

Also note the Movies property in the example above. You click the triangle to display the movies of this studio in a list, browser, or table, as in the following example:



Studio

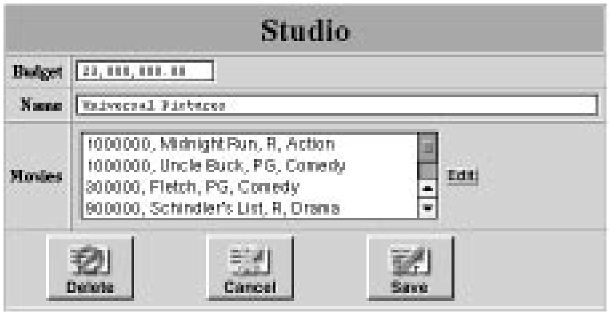
Budget 23,000,000.00

Name Universal Pictures

Movies
1000000, Midnight Run, R, Action
1000000, Uncle Buck, PG, Comedy
300000, Fletch, PG, Comedy
900000, Schindler's List, R, Drama
600000, National Lampoon's A..., R, Comedy
Inspect More... Count = 6

This property is configured with the DisplayToManyTable component. For more on how this is done, see "Representation of Relationships" (page 122).

An edit page (or edit component) looks like this:



Studio

Budget 23,000,000.00

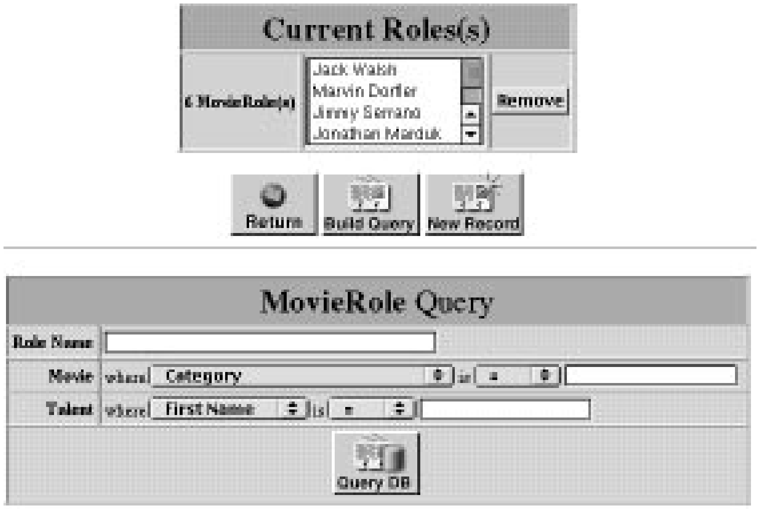
Name Universal Pictures

Movies
1000000, Midnight Run, R, Action
1000000, Uncle Buck, PG, Comedy
300000, Fletch, PG, Comedy
900000, Schindler's List, R, Drama

It is similar to the inspect page, except that it has a Save button (for saving changes to the database) instead of an Edit button. If you click the Edit button next to the list of Movies, an edit-relationship page is displayed for editing the records in the to-many relationship. Edit components can occur in multiple-component pages, such as the master-detail page.

Edit-Relationship Pages

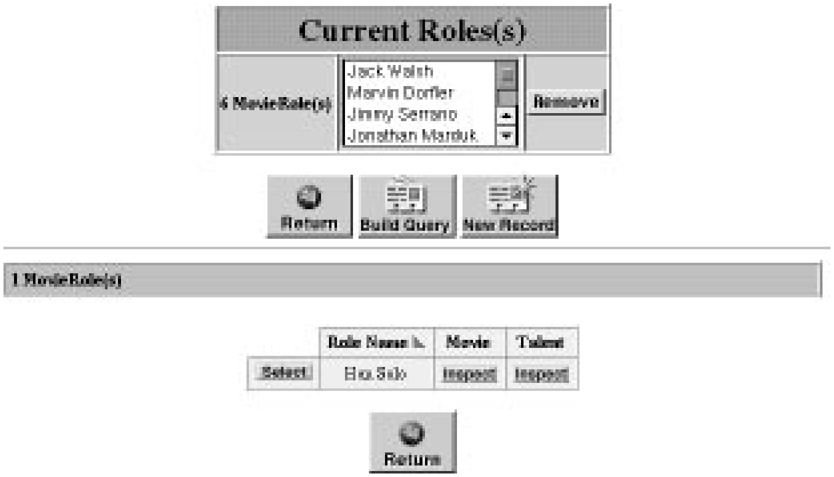
An edit-relationship page allows users to add records to a relationship and remove records from the relationship. Users typically come to these pages when they click an Edit button next to a relationship in an edit page. Edit-relationship pages consist of three separate components, of which two are shown at any one time. The first component is a browser that lists the to-many relationships of a particular property and contains several controls. In addition to the browser, a query component initially appears for locating another object to link to for that property.



This user interface facilitates the following tasks:

- To remove a record from the property, select the key identifying the record in the browser and click Remove.
- To add a new record to the property, click New Record. An edit component appears underneath the list of relationships; fill out the fields of the edit component and click Save to add the new record to the database *and* the new relationship to the property above.
- To locate an existing record to add to the relationship, enter the properties to search on in the query component and click Query DB.

When a query is executed (assuming matching records are found) a select component replaces the query component.



Current Roles(s)

6 MovieRole(s)

Jack Walsh
Marvin Dorfler
Jimmy Serrano
Jonathan Marduk

1 MovieRole(s)

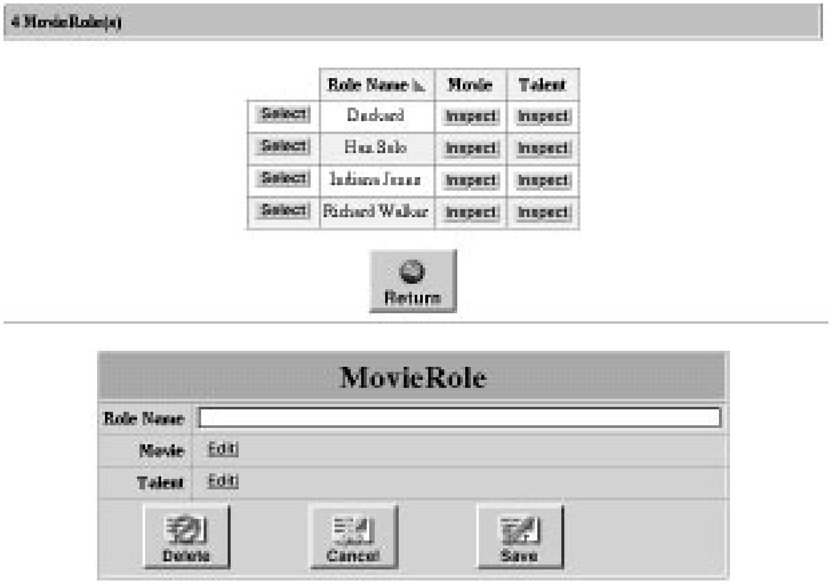
	Role Name	Movie	Talent
Select	Han Solo	Inspect	Inspect

To add a listed record to the to-many relationship, click the Select button. To construct a new query, click the Build Query button.

When you have finished editing a to-many relationship, click the Return button under the browser to return to the original edit page. You must click the Save button in this page to store the changed relationship in the database.

Master-Detail Pages

Master-detail pages put a select component and an edit component on the same page, thereby allowing users to select and edit records without having to go to another page. The following is an example of a master-detail page:



4 MovieRole(s)

	Role Name	Movie	Talent
Select	Deckard	Inspect	Inspect
Select	Han Solo	Inspect	Inspect
Select	Indiana Jones	Inspect	Inspect
Select	Richard Walker	Inspect	Inspect

MovieRole

Role Name	
Movie	Edit
Talent	Edit

To use a master-detail page, click Select next to a record in the list component. The information in that record is written to the edit component. See “Inspect and Edit Pages” (page 109) for usage information.

The master-detail page does not appears under Tasks in the WebAssistant (expert mode). This is because it is defined as a type of list page (BASMasterDetailPage) of the list task.

Customizing Your Application With WebAssistant

The WebAssistant allows you to customize each page of your application. You can specify:

- Which entities of the model the application displays and, of these, which are read-only
- Global attributes of pages, such as style, color, and border thickness
- Which properties are displayed, and in what order

  By default, an entity’s properties are listed in alphabetical order. Often, you’ll want to change the order, as well as hiding some properties.
- How number and date strings should be represented

- How relationships should be represented

To activate the WebAssistant, click Customize in the Direct to Web header. A Java applet window appears showing the WebAssistant.

When you have activated the WebAssistant in your browser, a frame appears at the bottom of each page in your application in the browser (assuming it supports Java applets), containing a "Show WebAssistant" button and a status field. To bring the WebAssistant to the front, click the Show WebAssistant button (rather than clicking Customize again).

Running WebAssistant With appletviewer

If you browser is incapable of running applets (such as WebAssistant), or if you want to run WebAssistant in a different machine from your browser, you can launch WebAssistant using the Java program **appletviewer**. To do this:

1. Launch your application with the command-line option `D2WLiveAssistantEnabled` set to `YES`.

2. In the console output look for a line similar to the following:

   ```
   Jul 23 10:29:48 D2WTest[527] Server-side Live Assistant launch line:
   appletviewer http://localhost:8888/cgi-
   bin/WebObjects/D2WTest.woa/wa/D2WActions/openLiveAssistant
   ```

3. Open a shell such as provided by the Terminal application on Mac OS X Server systems or the Bourne Shell on Yellow Box for Windows systems.

4. Copy the string from "appletviewer" to "openLiveAssistant" to the shell and press Return (or Enter).

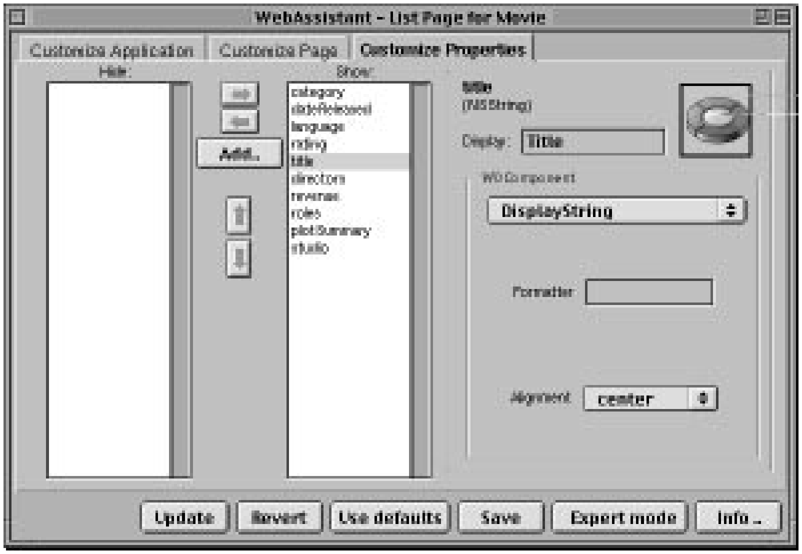
   If the port number is -1, look in the console output for the actual port number of the application and substitute that.

When you complete this procedure, WebAssistant launches and is connected to your application. If you stop and restart the Direct to Web application, the WebAssistant will re-connect to it on the same port.

A standalone WebAssistant has exactly the same functionality as one launched inside your browser. However, if the browser you are using is not Java-enabled, your pages are not automatically refreshed after you click Update. You must either click your browser's "reload" or "refresh" button or (when you are picking a new type of page, such as a MasterDetails page instead of a ListPage), you will have to re-navigate to the same page.

WebAssistant Overview

When the Web Assistant applet is launched, it appears in a window whose title indicates the current page and entity:



category
dateReleased
language
rating
title
directors
revenue
roles
plotSummary
studio

title
(NSString)

Display: Title

WO Component: DisplayString

Formatter:

Alignment: center

The WebAssistant has three displays, each selectable by clicking a tab:

- **Customize Application.** Allows you to select which entities of the model are hidden, which are shown, and which are read-only.

- **Customize Page.** Allows you to customize global page properties, such as overall style, color, and border thickness. In expert mode, allows you to “freeze” customized pages as reusable components.

- **Customize Properties.** Allows you to set which properties of an entity are shown in a page, the order in which they’re displayed, and the display characteristics of properties (for example, color and alignment).

The WebAssistant stays synchronous with your browser. When you navigate to a new page, it displays the settings for that page.

The Web Assistant has two modes, Standard mode and Expert mode. By default the Web Assistant opens in Standard mode, which lets you customize the current page in your application. When you customize a page in Standard mode, the changes apply to all occurrences of that page, and that page only. For example, if you change the order of properties in an edit page for the Movie entity, then any time a Movie edit page is displayed, those changes are in effect. However, the changes don’t apply to a Movie query, list, or inspect page; if you want to customize those in the same way, you must do so explicitly.

Using Web Assistant's Expert mode, you can customize any page in the application, regardless of whether it is currently displayed. Thus, by specifying the "*all*" setting in Expert mode, you could change all pages of a given entity at once. For more information, see "WebAssistant Expert Mode" (page 124).

When you've made changes to a page, you can use the buttons at the bottom of the WebAssistant to apply them:

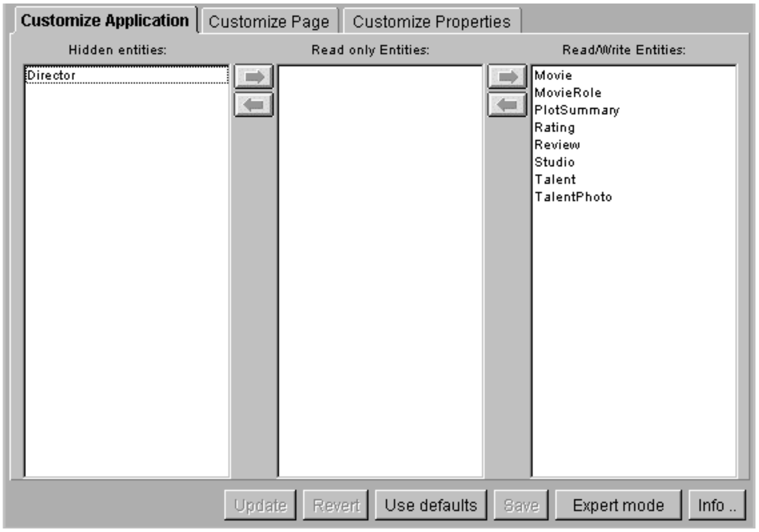
- *Update:* Sends your changes to the server and causes the page to be refreshed.
- *Revert:* Causes all settings to revert to their last saved values.
- *Save:* Saves the changes to disk. You need to save your changes in order for them to persist beyond the current session.
- *Use Defaults:* reverts all settings to the values they had when the project was created.

The *Info* button displays a brief description of the currently selected Direct to Web component.

Restricting Access to Entities

The Customize Application display of the WebAssistant enables you to specify which entities of the database model appear in the application. Of those entities, it further allows you to specify which are read-only and which the user can write data do. Records from read-only entities are restricted from appearing in edit pages.

The user interface for accomplishing these tasks is simple, as the following example illustrates:



Hidden entities:

Director

Read only Entities:

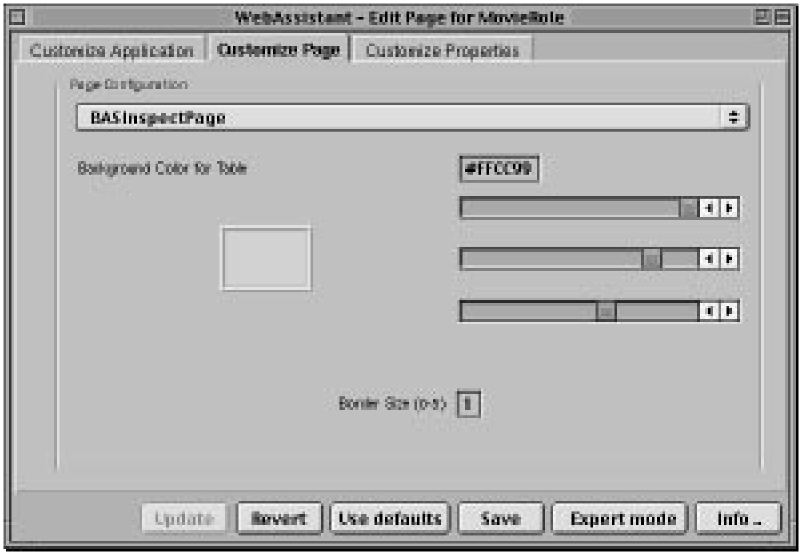
Read/Write Entities:

Movie
MovieRole
PlotSummary
Rating
Review
Studio
Talent
TalentPhoto

To specify an entity that shouldn't appear in the application, select it and use the arrow keys to move it to the Hidden Entities column. To specify an entity that should be read-only, select it and use the arrow keys to move it to the Read-only Entities column. You can also press Enter (or Return) to move selected entities right to left. By default, all entities initially appear in the Read/Write Entities column.

Customizing Pages

The Customize Page display of the WebAssistant enables you to set global attributes for the current page. These attributes include the page style (as determined by the page component), the color of the table, whether this color alternates with white in lists, and the size of the border enclosing the page. The following is an example of the Customize Page display:



Page Configuration: BASInspectPage

Background Color for Table: #FFCC99

Border Size (0-5): 1

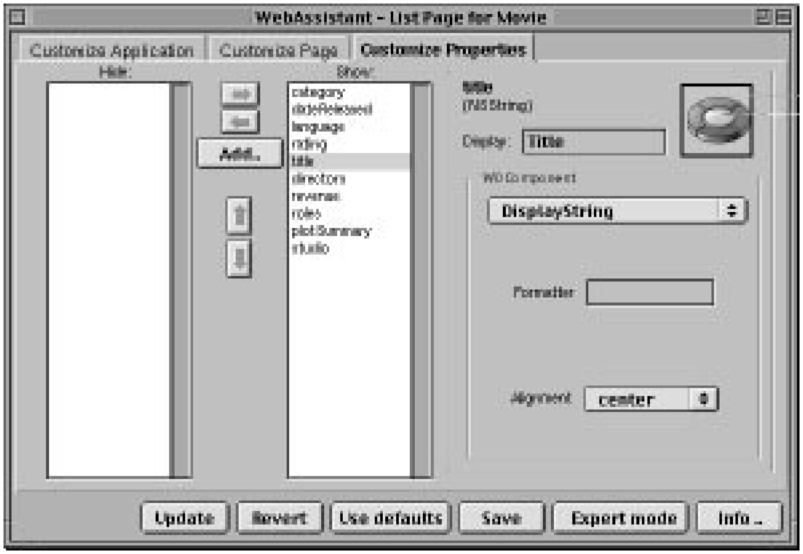
- To change the component defining the page style, choose another component from the pop-up menu.

- To change the thickness of the border around the page, type a number in the Border Size field, replacing the current number. (A border thickness of five pixels is the maximum allowed.)

- To change the color of the table, move the sliders to the right of the sample color. The color specification is RGB-based (that is, a specific mixture of red, green, and blue). The top slider manipulates red saturation, the middle slider is for green, and the bottom slider is for blue. The three pairs of hexadecimal digits after the number sign in the field represent (left to right) saturation levels of red, green, and blue.

Setting Which Properties are Displayed

The Customize Properties display of the WebAssistant enables you to specify which properties of an entity appear in a page (or component) and the order in which these properties appear. Most of the user-interface elements for accomplishing these things are in the left half of the display; note the Hide and Show columns along with their associated buttons in the following example:



Show: category, dateReleased, language, rating, title, directors, revenue, roles, plotSummary, studio

title
(NSString)

Display: Title

WO Component: DisplayString

Formatter:

Alignment: center

All the entity's properties (attributes and relationships) are listed in the Show column, in the order in which they are displayed in the page. Properties in the Hide column are not displayed in the page. For each property, you can:

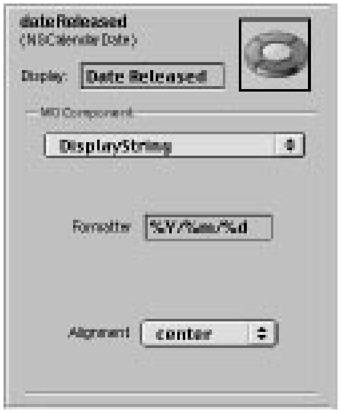
- Move it to the Hide column it by double-clicking it or by selecting it and clicking the left arrow. Likewise, if a property is hidden, you can show it by double-clicking it or by selecting it and clicking the right arrow.
- Move it up or down in the list by clicking the up and down arrows. This changes the order of appearance of the properties in the page (left to right or top to bottom, depending on the component).

By default, the WebAssistant shows only class properties. If you want to show a custom method or a keypath, click the Add button. A dialog box is displayed in which you can entery your custom key or key path (for example, "studio.budget").

You can also change the title for a property by editing the string in the Display Name field. This change only affects the way the entity is labeled in the page, and has no effect on the actual entity name.

Changing How Properties Are Displayed

You can use the Customize Properties display of the WebAssistant to specify various display characteristics of properties, such as formatting, color, alignment, and the representation of to-many relationships. The fields and controls for setting these characteristics are on the right half of the display. Here is an example:



dateReleased
(NSCalendarDate)

Display: Date Released

WOComponent

DisplayString

Formatter: %Y/%m/%d

Alignment: center

Let's go over the various elements of this part of the user interface:

- At the top is the name of the selected property and under this, in parentheses, is its data type. The data type determines the set of display components available for use. You cannot edit this information directly (however, you can edit where it is specified in the model file by using EOModler).

- Under the property name and data type is the Display field, which holds the title of the property for the current page and entity. As discussed in "Setting Which Properties are Displayed" (page 118), you can edit this string.

- The icon to the right of the Display field shows whether the selected property is an attribute or a relationship . The list of available display components differs depending on whether the property is an attribute or a relationship.

- The WOComponent group (or "box") contains a pop-up menu showing the name of the component that is used to display the selected property in the current page. From this menu you can choose a different component to display the property. When you choose a display component, the set of controls and fields in the WOComponent group can change.

The items in the WOComponent pop-up menu identify reusable components in the Direct to Web framework which are used to generate the pages you see in your application. Each property in a page of any type is initially shown in a default way for that type and is based on a certain component.

Textual Attributes and Formatting

The display components available for the currently selected property offer characteristics suitable to the data type and function of the attribute. A few examples might help to clarify this statement:

- If the data type of the attribute is an NSString (or String in Java) but it is a URL, then the DisplayHyperlink or DisplayMailTo components could be what you want.
- If the attribute is a date (NSCalendarDate), then you might choose the DisplayString component and provide format specifiers to have the date formatted in a certain way.
- Similarly, if the attribute is a currency value (NSNumber), you might want to use the DisplayNumber component and format the display of the attribute with two decimal positions and a leading dollar sign.
- If you want to highlight a certain column of values in a table by giving them a different color, then you could choose the DisplayStyledString component which lets you apply a color to a property.

You can click the Info button in the WebAssistant to get a short description of the currently selected display component.

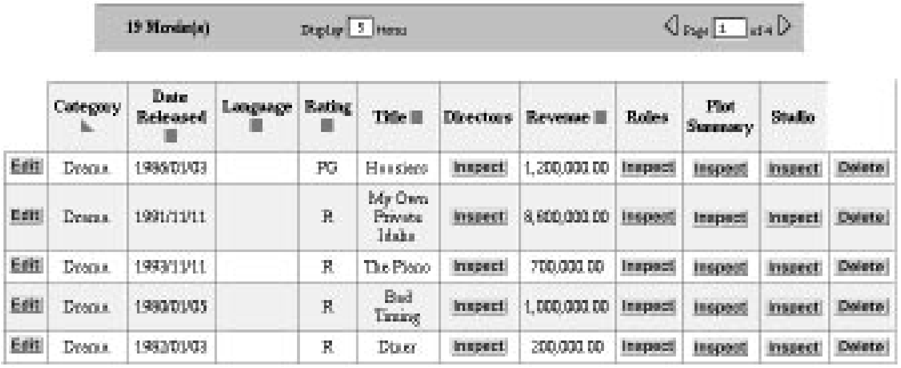
The three most common display characteristics for properties are alignment, formatting, and color. Each of these has their own controls or fields in the WOComponent group:

- **Alignment.** Choose Right, Center, or Left from the pop-up menu to specify the alignment of text within a cell of a table.
- **Formatter.** You can have your application display some types of data, such as dates and numbers, as formatted strings. For example, the date "Sat 4 Jul 98" can be also represented as "July 4, 1998." The number one thousand can be represented either as "1,000" or "1.000", depending on the locale. There are different format specifiers for dates and numbers; check the reference documentation for the NSDateFormatter and NSNumberFormatter classes for details.
- **Color.** To change the color of text, either move the sliders to the right of the sample color or enter hexadecimal numbers in the field above the sliders. The color specification is RGB-based (that is, a specific mixture

of red, green, and blue). The top slider manipulates red saturation, the middle slider is for green, and the bottom slider is for blue. The three pairs of hexadecimal digits after the number sign in the field represent (left to right) saturation levels of red, green, and blue.

Representation of Relationships

Properties that are relationships (instead of attributes) have their own set of display components that you can use. Take the following list page as an example:

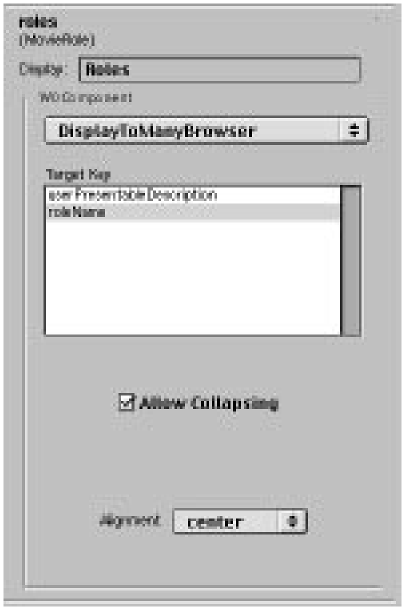


19 Movie(s) Display 5 Items ◁ Page 1 of 4 ▷

	Category ◣	Date Released ■	Language ■	Rating ■	Title ■	Directors	Revenue ■	Roles	Plot Summary	Studio	
Edit	Drama	1986/01/03		PG	Hoosiers	Inspect	1,200,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1991/11/11		R	My Own Private Idaho	Inspect	8,600,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1993/11/11		R	The Piano	Inspect	700,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1980/01/05		R	Bad Timing	Inspect	1,000,000.00	Inspect	Inspect	Inspect	Delete
Edit	Drama	1982/01/03		R	Diner	Inspect	200,000.00	Inspect	Inspect	Inspect	Delete

There are four relationships on this page. Two are to-one relationships (Studio and Plot Summary) and two are to-many relationships (Directors and Roles). By default, all to-many relationships are displayed using DisplayToManyFault, and to-one relationships use DisplayToOneFault. “Fault” indicates that the records in the relationship aren’t displayed until they are asked for; that is, until the user clicks Inspect. When you click Inspect, a list page appears, showing all the records in the relationship (such as all roles in the movie).

You can change the display component for the relationship to get a different presentation. Consider the Roles relationship in the Movie-List page example above. Using your browser, navigate to the list page for the Movie entity and select the roles property; then, in the WebAssistant, select the DisplayToManyBrowser component from the WOComponent pop-up menu. The right side of the WebAssistant should look similar to the following example:



roles
(MovieRole)

Display: Roles

WOComponent

DisplayToManyBrowser

Target Key

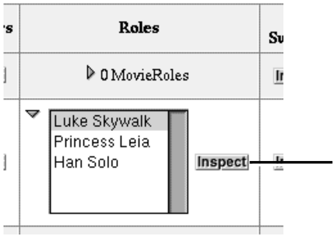
userPresentableDescription
roleName

☑ Allow Collapsing

Alignment: center

In addition to the Alignment pop-up menu, the WOComponent group includes two controls specific to the display of relationships. The items in the Target Keys browser are selected attributes of the destination entity; these “target keys” are used as labels for a to-many relationship. In this case the Movie Roles entity has one target key, **roleName**. In addition, Direct to Web provides a default key called **userPresentableDescription**, which is usually a combination of the relationship’s keys, if there are multiple keys.

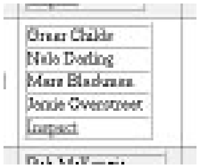
The Allow Collapsing checkbox, when checked, causes the relationship initially to be presented as a disclosure triangle followed by a number and the plural form of the display name for the destination entity (for example, “6 Movie Roles”). When the user clicks the triangle, the table cell expands to display the items in the form appropriate to the display component; in this case, a browser:



Click to display records in their own list page.

To get a better sense of the control you have over the presentation of relationships, set the display component for the Movie Roles relationship to

DisplayToMany and uncheck the Allow Collapsing checkbox. When you update your browser, a cell in the Roles table should look similar to this:



Omar Childs
Nels Darling
Marc Blackman
Jamie Overstreet
Inspect

To-one relationships by their nature offer fewer possibilities for presentation.The DisplayToOneFault component presents an Inspect button which, when clicked, displays the relationship record in an inspect page. The other choice of component, DisplayToOne, displays the target key for the single destination record as a hyperlink which, when clicked, brings you to the same inspect page.

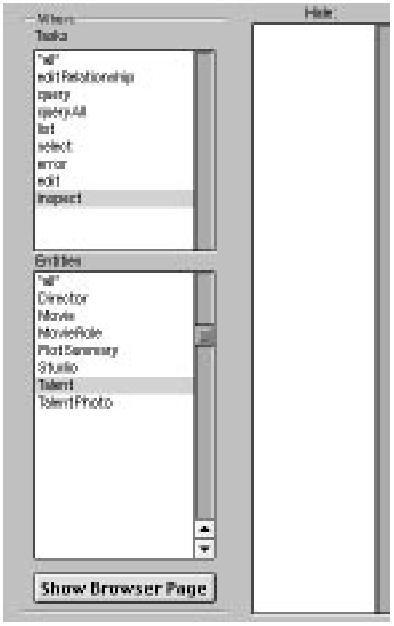
A note of caution: The type of display component appropriate to a relationship depends on the likely number of records in that relationship. For example, the Studio entity has a Movies to-many relationship; if some studios have produced hundreds of movies, it might make more sense to use DisplayToManyFault (that is, the Inspect button) rather than display the titles of all those movies in a cell in the table.

To find out more about a display component for a relationship, click the Info button in the WebAssistant after selecting the component.

WebAssistant Expert Mode

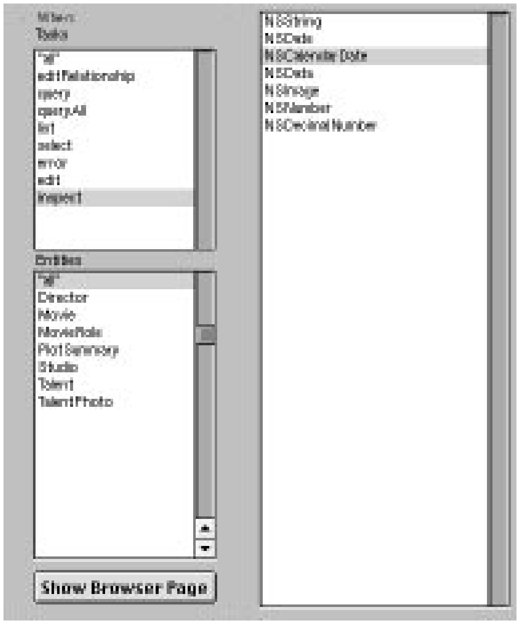
Expert mode is similar to standard mode, except that it allows you to make changes to any page in your application whether it is currently displayed in your browser or not. If you click the Expert mode button at the bottom of the WebAssistant, the window expands to show two additional lists:

- Tasks shows the types of pages available in Direct to Web.
- Entities shows all the entities in the model.



To customize any page in your application, simply select the type of page and the entity. The figure above shows an example of choosing the inspect page for the Talent entity, making the WebAssistant focus on this page rather than the page currently showing in the browser.

If you select "*all*" under Tasks, any changes you make affect all customizable pages for the selected entity. If you select "*all*" under Entities, you'll see a list of data types that exist in the application, as shown in the following figure.



Any changes you make affect all occurrences of that type. For example, the figure shows NSCalendarDate selected. You can specify a formatter, and pick a component to use anywhere in the application that an NSCalendarDate object is displayed.

If you click Show Browser Page, the task and entity for the current browser page are selected in the WebAssistant.

You can also select the Customize Page display of the WebAssistant while in Expert mode and change the underlying component, color, and border thickness of whatever page for whatever entity you select in the Tasks and Entities browsers.

Generating Components

When you have worked with the WebAssistant and customized your pages to your liking, you may still want to add more features to your application. To do so, you can "freeze" a page; that is, save it as a WebObjects component. When you do this, the component becomes part of your project and is no longer created "on the fly" by Direct to Web. This has several advantages:

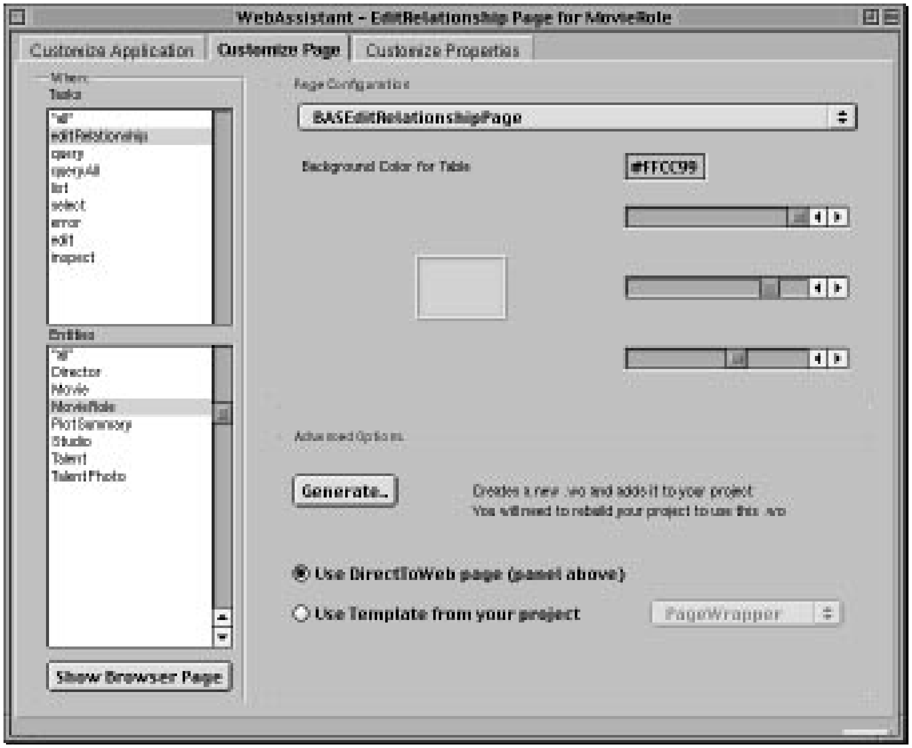
- You have complete control over the visual appearance of the page. You can add any static or dynamic HTML elements you like, using a tool such as WebObjects Builder.
- You can add functionality to the page by editing the component's Java code, as well as by editing the bindings of the page's dynamic elements.
- Your application's performance improves because Direct to Web doesn't have to go through the process of creating the page "on the fly."

The main disadvantage of generating components is that you lose the ability to modify settings with the WebAssistant. Therefore, you should try to get your settings as close as possible to what you want before generating the component.

To save a page as a component:

1. Click the Expert Mode button at the bottom of the WebAssistant to enter Expert mode.

1. Click Customize Page at the top of the WebAssistant.



Page Configuration: BASEditRelationshipPage

Background Color for Table: #FFCC99

Creates a new .wo and adds it to your project
You will need to rebuild your project to use this .wo

● Use DirectToWeb page (panel above)

○ Use Template from your project

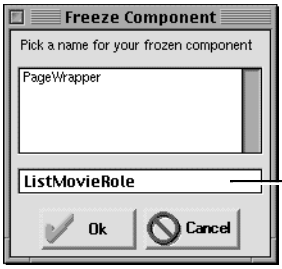
2. Select the task and entity corresponding to the page you want to generate.

   You can't select "*all*" to generate multiple components. You must generate the components one at a time.

3. In the Advanced Options group of controls, make sure the "Choose DirectToWeb page" radio button is selected.

4. Click Generate.

   The Freeze Component window appears. It contains a text field with a default name for your page (the page name followed by the entity name). You can edit the name if you choose.



Freeze Component

Pick a name for your frozen component

PageWrapper

ListMovieRole

Edit this field to change the componentÕs name.

5. Click the Ok button.

   Direct to Web generates a component and adds it to your project. (You may have to wait a few moments for this process to complete.) Your settings are automatically saved.

6. Rebuild your project.

To "un-freeze" a component, select the "Choose DirectToWeb page" radio button but do not click the Generate button.

When you generate a page and click Update, the browser's current page doesn't reflect the changes. To use the new component, you must rebuild the application, relaunch it, and then navigate to a new instance of the page. For example, if the current page is a Movie query page, and you use the WebAssistant to freeze it, you must rebuild the project with the frozen component, then launch the application and navigate to a new instance of Movie query (by clicking Build Query); the new instance uses the frozen component.

The generated component is like any other WebObjects component. You can edit your component graphically using WebObjects Builder. You can also examine the HTML and bindings (**.wod** file) of the new component in Project Builder.

Direct to Web also generates Java code for your component, which you can modify appropriate to your needs. Each component implements an interface that is appropriate to the page: QueryPageInterface, ListPageInterface, InspectPageInterface, and EditPageInterface. For example, the **QueryMovieRole.java** file shown below implements the QueryPageInterface. For example, it contains an action method called **queryClicked** that returns a component when the Query DB button is clicked. (Note that the component's submit button is bound to **queryClicked** in **QueryMovieRole.wod**.)

Modifying Your Application's Code

You can modify your application's code just as you would in any other WebObjects application. In addition, there is an API for you to use specifically in Direct to Web applications. This consists of a set of methods defined in the D2W class. Some of these methods allow an object to control the WebAssistant. Others return various components (inspect, query, list, and so on) defined for an entity in a session; the component objects returned must implement the appropriate interface:

```
QueryPageInterface queryPageForEntityNamed (String entity, WOSession
session);
ListPageInterface listPageForEntityNamed (String entity, WOSession
session);
EditPageInterface editPageForEntityNamed (String entity, WOSession
session);
InspectPageInterface inspectPageForEntityNamed (String entity,
WOSession session);
SelectPageInterface selectPageForEntityNamed (String entity,
WOSession session);
EditRelationshipPageInterface editRelationshipPageForEntityNamed
(String entity, WOSession session);
QueryAllPageInterface queryAllPage (WOSession session);
```

You can override these methods to customize the component returned. The **defaultPage** method of the D2W class is also one you might want to override; this method returns the application's default page which, by default, is the query-all page.

If you make a subclass of D2W to override certain methods, make sure you call the **setFactory** class method with an instance of the new class as argument.

The following example overrides **defaultPage**:

```
import com.apple.yellow.foundation.*;
import com.apple.yellow.eocontrol.*;
import com.apple.yellow.directtoweb.*;
import com.apple.yellow.webobjects.*;


public class D2WExtendedFactory extends D2W {

    static {
        D2W.setFactory(new D2WExtendedFactory());
    }

    public WOComponent defaultPage (WOSession session) {
        return WOApplication.application().pageWithName("MyDefaultPage",
session.context());
    }


}
```

Using Direct to Web in Other WebObjects Applications

Other WebObjects applications (that is, applications not using the Direct to Web option in the wizard) can use the Direct to Web framework to display query, list, edit, and other pages in the Direct to Web repetoire. Making use of Direct to Web can be a convenient shortcut for many applications when all they need is a standard database-related page. They can use Direct to Web in one of two ways:

- By embedding Direct to Web components in the pages of their application
- By linking to a dynamically-created Direct to Web page and appropriately implementing the action method invoked when the link is clicked

Embedding Direct to Web Components

Using a Direct To Web component is not much different than using any other off-the-shelf component. The procedure is the following.

1. Add the **DirectToWeb** framework to your project. You can find this framework in *NEXT_ROOT*/**System/Library/Frameworks**.

2. Decide which Direct to Web component you want to use and become familiar with its API.

   See “Direct to Web Component Reference” (page 132) for summaries of these components.

3. Put a WebObjects tag for the component in the page that is to display it.

   ```
   <webObject name=MyD2WQuery></webObject>
   ```

   This is a step you can complete in WebObjects Builder.

4. Make the appropriate bindings for the component.

   ```
   MyD2WQuery: D2WQuery {
     entityName="Movie";
     displayKeys="( title, roles, studio.budget )";
     queryDataSource=movieDisplayGroup.dataSource;
   }
   ```

   All embedded components require an **entityName** binding to specify the entity the page will be dealing with. Extra bindings could be required, depending on the functionality of the page. For example, List pages require a **dataSource** binding.

   You can also complete this step in WebObjects Builder.

5. If necessary, implement the action method for the component.

6. You can customize embedded Direct to Web components using the WebAssistant. But first you must add a file named u**ser.d2wmodel** to the Resources category of your application project. The WebAssistant uses this file to maintain your settings. In addition, before you launch the WebAssistant, make sure rapid-turnaround is enabled for your application. You can then launch the WebAssistant using the **appletviewer** tool; see “Running WebAssistant With appletviewer” (page 114).

When the WebAssistant acts upon a non-DirectToWeb application, it does not automatically track which page is displayed. Thus you must point it at the page you want to modify in Expert mode. For example, if you want to customize a list page for Movies, you will have to click Expert Mode and then select “list” as the Task and “Movie” as the entity. You can then customize a component in the same way you customize DirectToWeb pages. Also, when you click Update to send the new settings to the application, the browser does not automatically refresh your page. You must either click the “Reload” button in your browser or (especially in cases where you pick a new type of component) you must re-navigate to the page.

Direct to Web Component Reference

The current release defines five Direct to Web components in the **DirectToWeb** framework.

D2WQuery

For information on the behavior and appearance of this component see "Query Pages" (page 105).

Bindings	Comments
entityName	The name of the entity for this query (NSString)
displayKeys	The properties of the entity to display for the query (NSArray or NSString)
queryDataSource	The data source for the query
action	The action method to invoke when Query DB is clicked. The **queryDataSource** is pushed onto your page before this action is invoked.

Example:

```
myQuery : D2WQuery {
  entityName = “Movie”;
  displayKeys = “(title, roles)”;
  queryDataSource = displayGroup.dataSource;
  action = displayGroup.fetch;
}
```

D2WList

For information on the behavior and appearance of this component see "List Pages and Select Components" (page 107).

Bindings	Comments
entityName	The name of the entity for this list (NSString)
dataSource	The data source for the list
displayKeys	The properties of the entity to display (NSArray or NSString)

Example:

```
myList : D2WList {
  entityName = “Movie”;
  dataSource = displayGroup.dataSource;
  displayKeys = “(title, roles)”;
}
```

D2WSelect

For information on the behavior and appearance of this component see "List Pages and Select Components" (page 107).

Bindings	Comments
entityName	The name of the entity for this list (NSString)
displayKeys	The properties of the entity to display (NSArray or NSString)
selectedObject	Returns the object associated with the clicked Select button.
dataSource	The data source for the list
action	The action method to invoke when the Select button is clicked. The **selectedObject** is pushed onto your page before this method is invoked

Example:

```
mySelect : D2WSelect {
  entityName = "Movie";
  selectedObject = displayGroup.selectedObject;
  dataSource = displayGroup.dataSource;
  action = selectAction;
}
```

D2WInspect

For information on the behavior and appearance of this component see "Inspect and Edit Pages" (page 109).

Bindings	Comments
entityName	The name of the entity for this record (NSString)
object	Returns the object associated with the clicked Inspect button.
action	The action method to invoke when the Return button is clicked
displayKeys	The properties of the entity to display (NSArray or NSString)

Example:

```
myInspect : D2WInspect {
  entityName = "Movie";
  object = displayGroup.selectedObject;
  action = editAction;
}
```

D2WEdit

For information on the behavior and appearance of this component see “Inspect and Edit Pages” (page 109).

Bindings	Comments
entityName	The name of the entity for this record (NSString)
object	Returns the object associated with the clicked Edit button.
action	The action method to invoke when the Edit button is clicked
displayKeys	The properties of the entity to display (NSArray or NSString)

Example:

```
myEdit : D2WEdit {
  entityName = “Movie”;
  object = displayGroup.selectedObject;
  action = editAction;
}
```

Linking to a Direct to Web Page

In addition to embedding static Direct to Web components, your application can link directly to a dynamically-generated page of the appropriate type. The technique for doing this has two basic requirements:

- A page-wrapper component for the dynamically-generated page
- An action method that returns a Direct to Web component implementing the appropriate page interface

For pages whose next page is dynamically determined (such as query pages), the action method must do more than simply return the page component. See “Setting Up a Next-Page Callback” (page 136) for detals.

Setting Up the Page Wrapper

Every application that links to a dynamically-created Direct to Web page must have a component called **PageWrapper.wo**. This component acts as a “wrapper” for the dynamically-generated content, and can have customized header and footer material. The following example shows how to set up the **PageWrapper.wo** component. You can use a text editor, Project Builder, or (preferably) WebObjects Builder to construct this component.

PageWrapper.html example:

```
<html>
<webObject name=Head></webObject>
<webObject name=BodyContainer>
<webObject name=Body></webObject>
</webObject>
 </html>
```

PageWrapper.wod example:

```
BodyContainer: WOBody {
    filename = "Images/bkg.jpg";
    framework = "DodgeDemo";
    bgcolor="#c0c0c0";
    TEXT = "#000000";
    LINK = "#0000F0";
    VLINK = "#0000F0";
    ALINK = "#FF0000";
}

Head : D2WHead {
    _unroll = YES;
}

Body: WOComponentContent {
    _unroll = YES;
};
```

The only required component in **PageWrapper.wo** is the WOComponentContent. The other components shown in the example are optional, and you can create your own header, footer, and body-container components for your dynamically-generated pages.

The **_unroll** attribute, when YES, enables the WebAssistant to generate a static component from the dynamically-generated one.

Implementing the Action Method

To implement the action methods needed for linking to Direct to Web pages you must use methods of the D2W class and the page-specific Direct to Web interfaces. You also need to specify a hyperlink, active image, or similar HTML control with which to invoke the action method. Take the following example of a hyperlink; first, the HTML WebObjects tag:

```
<webObject name=D2WListPage>D2W list page</webObject>
```

Then, in the **.wod** file, bind the hyperlink to the action:

```
D2WListPage: WOHyperlink {
    action = d2wList;
}
```

The method for linking to a Direct to Web page must return a component (that is, a WOComponent object) that implements the interface appropriate to the required type of page. For example, if you want to link to a dynamically generated list page, the component returned must implement the ListPageInterface interface. Fortunately, the D2W class provides methods that create such components:

```
public WOComponent d2wList() {
        ListPageInterface
lpi=D2W.factory().listPageForEntityNamed("Movie",session());
        lpi.setDataSource(movieDisplayGroup.dataSource());
        lpi.setNextPage(this);
        return (WOComponent)lpi;
    }
```

Notice that before you return the component, you must set things such as the data source for the component and the page to go to when users click the Return button (**setNextPage**).

Setting Up a Next-Page Callback

For query pages, you must create a component implementing the QueryPageInterface, and this component must create a callback object (an object that implements the NextPageCallback interface) that is pushed back into the page with the component is returned. When the submit button is clicked for the query (Query DB), the callback method is invoked.Here is an example of how to provide a callback:

```
public WOComponent d2wList() {
  QueryPageInterface qpi=D2W.factory().queryPageForEntityNamed(“Movie”,
session());
  qpi.setNextPageCallback(new NextPageCallback() {
      public WOComponent nextPage(WOComponent sender) {
          EODataSource=((QueryPageInterface)sender).queryDataSource();
          myDisplayGroup.setDataSource(dataSource);
          movieDisplayGroup.fetch();
          return MyComponent.this;
          }
      });
  return (WOComponent) qpi;
}
```

Deploying a Direct To Web Application

To deploy a Direct to Web application, you need to take a couple of steps in addition to the standard derployment procedure (as described in *Serving WebObjects*).

- Make sure that the `D2WLiveAssistantEnabled` command-line option is set to `NO`. The WebAssistant should not be accesible in deployment mode; it is strictly a development tool for configuring your application.

- Because the Direct to Web pages are built dynamically, they take more time to render than regular WebObjects pages. To improve performance, you should consider "freezing" some of the more sophisticated pages, especially the list pages. (See "Generating Components" (page 126) for instructions on freezing pages.) Remember, though, that after you freeze a page you cannot customize your page with WebAssistant.