

IBM Informix Web DataBlade Module

Application Developer's Guide

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Note:
Before using this information and the product it supports, read the information in the appendix entitled "Notices."

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In This Introduction

This chapter introduces the *IBM Informix Web DataBlade Module Application Developer's Guide*. Read this chapter for an overview of the information provided in this manual and for an understanding of the conventions used throughout.

About This Manual

The *IBM Informix Web DataBlade Module Application Developer's Guide* explains how to use the IBM Informix Web DataBlade module to create Web applications that dynamically retrieve data from a database managed by IBM Informix Dynamic Server.

The manual provides information about the features provided by the Web DataBlade module to assist you in developing Web-enabled database applications. These features include tags specific to the Web DataBlade module, variable-processing functions, a special HTML data type to store application pages, DataBlade module functions, and so on.

To use this manual, you or the database administrator must have previously performed certain administrative tasks, such as installing the Web DataBlade module on your database server, registering the DataBlade module in a database, and configuring Webdriver for your database. For more information on performing these administrative tasks, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

This section discusses the organization of the manual, the intended audience, and the associated software products that you must have to develop applications using the Web DataBlade module.

Organization of This Manual

This manual includes the following chapters:

- [Chapter 1, “Overview,”](#) provides an overview of the architecture and features of the Web DataBlade module.
- [Chapter 2, “Web DataBlade Module Tutorial,”](#) describes the process of creating a Web-enabled database application using the IBM Informix Web DataBlade module and AppPage Builder (APB).
- [Chapter 3, “Basics of AppPage Development,”](#) describes the basic elements of AppPages, the HTML pages that make up your Web-enabled database application. These basic elements include how to invoke an AppPage, how to link one AppPage to another, and how to retrieve large objects currently stored in a database table into an AppPage.
- [Chapter 4, “Using AppPage Builder,”](#) describes how to create and maintain Web DataBlade module applications using AppPage Builder.
- [Chapter 5, “Using Variables in AppPages,”](#) describes how to use Web DataBlade module variables to create Web-enabled applications.
- [Chapter 6, “Using Tags in AppPages,”](#) describes how to use Web DataBlade module tags to create Web-enabled applications.
- [Chapter 7, “Using Advanced AppPage Tags,”](#) describes the AppPage tags and attributes that are used for specialized processing and critical optimization features of your Web application.
- [Chapter 8, “Using Variable-Processing Functions in AppPages,”](#) describes how to use variable-processing functions to create variable expressions within AppPages.
- [Chapter 9, “Using Dynamic Tags in AppPages,”](#) describes how to use dynamic tags to share AppPage segments among multiple AppPages.
- [Chapter 10, “Using UDR Tags in AppPages,”](#) describes how to directly invoke a UDR in a AppPage without using the SQL statement EXECUTE FUNCTION.
- [Chapter 11, “Using the HTML Data Type,”](#) describes the HTML data type that you use to store the AppPages that make up your Web-enabled database application.

- [Chapter 12, “Using DataBlade Module Functions in AppPages,”](#) describes the **WebExplode()** function and additional server functions you can use to simplify AppPage design.
- [Chapter 13, “Using Other Webdriver Features,”](#) describes Webdriver features, including adding HTTP headers to your AppPages, uploading client files, and passing image map coordinates.
- [Chapter 14, “Using DataBlade Module API Functions in AppPages,”](#) describes the IBM Informix Web DataBlade module API routines.
- [Appendix A, “Debugging Web DataBlade Module Applications,”](#) describes debugging techniques for the Web DataBlade module.
- [Appendix B, “AppPage Builder Schema,”](#) describes the schema for AppPage Builder.
- [Appendix C, “Web DataBlade Module Variables,”](#) lists all Webdriver and **WebExplode()** function variables.

A Notices appendix describes IBM products, features, and services. A glossary of relevant terms follows the chapters, and an index directs you to areas of particular interest.

Types of Users

This guide is written for Web application designers who are familiar with HTML (including tables and forms), SQL, and database installation and system administration.

Software Dependencies

To use the IBM Informix Web DataBlade module, you must use IBM Informix Dynamic Server as your database server. Check the release notes for specific version compatibility. The release notes also list the Web servers that have been certified for this release of the Web DataBlade module.

Assumptions About Your Locale

IBM Informix products can support many languages, cultures, and code sets. All culture-specific information is brought together in a single environment, called a GLS (Global Language Support) locale.

The examples in this manual are written with the assumption that you are using the default locale, **en_us.8859-1**. This locale supports U.S. English format conventions for date, time, and currency. In addition, this locale supports the ISO 8859-1 code set, which includes the ASCII code set plus many 8-bit characters, such as é, è, and ñ.

If you plan to use nondefault characters in your data or your SQL identifiers, or if you want to conform to the nondefault collation rules of character data, you need to specify the appropriate nondefault locale.

Documentation Conventions

This section describes the conventions that this manual uses. These conventions make it easier to gather information from this and other volumes in the documentation set.

The following conventions are discussed:

- Typographical conventions
- Icon conventions
- Screen-illustration conventions

Typographical Conventions

This manual uses the following standard set of conventions to introduce new terms, illustrate screen displays, describe command syntax, and so forth.

Convention	Meaning
KEYWORD	All primary elements in a programming language statement (keywords) appear in uppercase letters in a serif font.
<i>italics</i> italics <i>italics</i>	Within text, new terms and emphasized words appear in italics. Within syntax and code examples, variable values that you are to specify appear in italics.
boldface boldface	Names of program entities (such as classes, events, and tables), environment variables, file and pathnames, and interface elements (such as icons, menu items, and buttons) appear in boldface.
monospace <i>monospace</i>	Information that the product displays and information that you enter appear in a monospace typeface.
KEYSTROKE	Keys that you are to press appear in uppercase letters in a sans serif font.
◆	This symbol indicates the end of product- or platform-specific information.
→	This symbol indicates a menu item. For example, “Choose Tools→Options ” means choose the Options item from the Tools menu.



Tip: When you are instructed to “enter” characters or to “execute” a command, immediately press RETURN after the entry. When you are instructed to “type” the text or to “press” other keys, no RETURN is required.

Case-Sensitive Text

Variable names used in the IBM Informix Web DataBlade module are case sensitive, are preceded by a dollar sign (\$), and consist of alphanumeric and underscore characters. Variables that begin with an underscore are reserved for system use.

Case-Insensitive Text

Tags identify the elements of an HTML page and specify the structure and formatting for that page. The IBM Informix Web DataBlade module includes a set of tags that are processed by the **WebExplode()** function.

The Web DataBlade module tags use the SGML processing instruction tag format, `<?tag_info>`, `<? /tag_info>`. An SGML processor ignores tags that it does not recognize, including Web DataBlade module tags. Like other SGML processing tags, the Web DataBlade module tags and attributes are not case sensitive. You can use uppercase letters, lowercase letters, or any combination of the two.

The text and many of the examples in this manual show function and data type names in mixed lettercasing (uppercase and lowercase). Because IBM Informix Dynamic Server is case insensitive, you do not need to enter function names exactly as shown: you can use uppercase letters, lowercase letters, or any combination of the two.

Icon Conventions

Throughout the documentation, you will find text that is identified by several different types of icons. This section describes these icons.

Comment Icons

Comment icons identify three types of information, as the following table describes. This information always appears in italics.

Icon	Label	Description
	<i>Warning:</i>	Identifies paragraphs that contain vital instructions, cautions, or critical information
	<i>Important:</i>	Identifies paragraphs that contain significant information about the feature or operation that is being described
	<i>Tip:</i>	Identifies paragraphs that offer additional details or shortcuts for the functionality that is being described

Platform Icons

Platform icons identify paragraphs that contain platform-specific information.

Icon	Description
	Identifies information that is specific to Windows operating systems
	Identifies information that is specific to UNIX operating systems

These icons can apply to a row in a table, one or more paragraphs, or an entire section. A ♦ symbol indicates the end of the platform-specific information.

Screen-Illustration Conventions

The illustrations in this manual represent a generic rendition of various windowing environments. The details of dialog boxes, controls, and windows have been deleted or redesigned to provide this generic look. Therefore, the illustrations in this manual depict Web browser output a little differently than the way it appears on your screen.

Additional Documentation

This section describes the Web DataBlade module documentation available from Informix:

- Printed documentation
- Online documentation

Printed Documentation

The following Informix manuals are part of the IBM Informix Web DataBlade module documentation set and provide more information about the DataBlade module:

- The *IBM Informix Web DataBlade Module Application Developer's Guide* describes how to develop Web-enabled database applications that dynamically retrieve data from the Informix database.
- The *IBM Informix Web DataBlade Module Administrator's Guide* describes how to administer Web applications that use the Web DataBlade module to dynamically retrieve data from an Informix database. The manual describes topics such as how to configure the Web DataBlade module for your database server, how to configure the NSAPI, Apache, CGI, and ISAPI Webdrivers, how to implement security in your Web applications, and how to increase the performance of your Web applications.

The following related IBM Informix documents complement the information in this manual:

- Data Director for Web is a set of Windows tools that allows you to develop and manage Informix-based Web sites and that provides an interface to the Web DataBlade module. For detailed information about Data Director for Web, refer to the *IBM Informix Data Director for Web User's Guide*.
- Before you can use the IBM Informix Web DataBlade module, you must install and configure IBM Informix Dynamic Server. The administrator's guide for your database server provides information about how to configure the server and also contains information about how it interacts with DataBlade modules.
- Once you have installed the Web DataBlade module, you must use BladeManager to register it into the database where the DataBlade module will be used. See the *DataBlade Module Installation and Registration Guide* for details on registering DataBlade modules.
- If you have never used Structured Query Language (SQL), read the *IBM Informix Guide to SQL: Tutorial*. It provides a tutorial on SQL as it is implemented by IBM Informix products. It also describes the fundamental ideas and terminology for planning and implementing an object-relational database.
- A companion volume to the *Tutorial*, the *IBM Informix Guide to SQL: Reference*, includes details of the IBM Informix system catalog tables, describes IBM Informix and common environment variables that you should set, and describes the column data types that IBM Informix database servers support.
- An additional companion volume to the *Reference*, the *IBM Informix Guide to SQL: Syntax*, provides a detailed description of all the SQL statements supported by Informix products. This guide also provides a detailed description of Stored Procedure Language (SPL) statements.
- The *DB-Access User's Manual* describes how to invoke the DB-Access utility to access, modify, and retrieve information from IBM Informix database servers.
- The performance guide for your database server provides information on how to improve the performance of your SQL queries.

- If you plan to develop your own DataBlade modules using the Web DataBlade module as a foundation, read the *DataBlade Developers Kit User's Guide*. This manual describes how to develop DataBlade modules using BladeSmith, BladePack, and BladeManager.
- When errors occur, you can look them up by number and learn their cause and solution in the *IBM Informix Error Messages* manual. If you prefer, you can look up the error messages in the online message file described in the introduction to the *IBM Informix Error Messages* manual.

Online Documentation

The online documentation for the Web DataBlade module includes release notes and documentation notes.

Release Notes and Documentation Notes

In addition to printed documentation, the following sections describe the online files that supplement the information in this manual. Examine these files before you begin using the IBM Informix Web DataBlade module. They contain vital information about application and performance issues.

On UNIX platforms, the following online files appear in the **\$INFORMIXDIR/extend/web.version** directory, where *version* refers to the current version of the IBM Informix Web DataBlade module.

UNIX

Online File	Purpose
WEBDOC.TXT	Describes features that are not covered in the manual or that have been modified since publication
WEBREL.TXT	Describes any special actions that are required to configure and use the Web DataBlade module on your computer This file also describes new features and feature differences from earlier versions of the Web DataBlade module and how these differences might affect current products. Additionally, this file contains information about any bugs and their workarounds.

◆

Windows

The following items appear in the **Informix** folder. To display this folder, choose **Start→Programs→Informix** from the task bar.

Program Group Item	Description
Documentation Notes	This item includes additions or corrections to manuals, along with information about features that might not be covered in the manuals or that have been modified since publication.
Release Notes	This item describes feature differences from earlier versions of IBM Informix products and how these differences might affect current products. This file also contains information about any known problems and their workarounds.



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To help us with future versions of our manuals, we want to know about any corrections or clarifications that you would find useful. Include the following information:

- The name and version of your manual
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- Your name, address, and phone number

Send electronic mail, to our address:

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We appreciate your suggestions.

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In This Chapter

This chapter provides an overview of the IBM Informix Web DataBlade module. It includes the following topics:

- [“What Is the Web DataBlade Module?”](#) following
- [“Product Architecture”](#) on page 1-4
- [“Product Features”](#) on page 1-9

What Is the Web DataBlade Module?

The Web DataBlade module is a collection of SQL functions, data types, tags, and client applications that enables you to create Web applications that dynamically retrieve data from an Informix database.

In typical Web database applications, most of the logic is in gateway application code written in Perl, Tcl, or C. This *Common Gateway Interface (CGI)* application connects to a database, builds and executes SQL statements, and formats the results.

Using the Web DataBlade module, you need not develop a CGI application to dynamically access database data. Instead, you create HTML pages that include Web DataBlade module specific tags (also called AppPage tags) and functions that dynamically execute the SQL statements you specify and format the results. These pages are called *Application Pages (AppPages)*. The types of data you retrieve can include traditional data types, as well as HTML, image, audio, and video data.

AppPages are themselves stored in the database. A Web application that uses the Web DataBlade module, therefore, first retrieves the AppPage from the database, then passes the AppPage through an SQL function that interprets the special AppPage tags and functions, typically to retrieve or update data from database tables and to format the results.

Product Architecture

The Web DataBlade module consists of three main components:

- Webdriver
- The **WebExplode()** function
- Tags and attributes

These components are described in the following sections. The section [“Architecture Diagram” on page 1-6](#) provides an illustration of the architecture of the Web DataBlade module and how the main components work together.

Webdriver

Webdriver is a database client application that builds the SQL queries that execute the **WebExplode()** function to retrieve AppPages from your database. Webdriver returns the HTML that results from calls to the **WebExplode()** function to the Web server.

The Web DataBlade module includes four implementations of Webdriver:

- **NSAPI Webdriver.** This implementation of Webdriver is written with the Netscape Server API and is used only with Netscape Web servers.
- **Apache Webdriver.** This implementation of Webdriver is written with the Apache API and is used only with Apache Web servers.
- **ISAPI Webdriver.** This implementation of Webdriver is written with the Microsoft Internet Information Server API and is used only with Microsoft Internet Information Web servers.
- **CGI Webdriver.** This implementation of Webdriver is a standard CGI program that can be executed by all Web servers.



For optimal performance, you should use the implementation of Webdriver written for your specific Web server. You should only use the CGI Webdriver for Web servers that do not have their own implementation of Webdriver.

***Tip:** This guide uses the term “Webdriver,” without a preceding qualifier, to refer to Webdriver functionality that is present in all implementations of Webdriver. The guide uses a qualified term, such as “NSAPI Webdriver,” to refer to a specific implementation of Webdriver.*

The WebExplode() Function

The **WebExplode()** function is an SQL function that builds dynamic HTML pages based on data stored in your database. The **WebExplode()** function parses AppPages that contain AppPage tags within HTML and dynamically builds and executes the SQL statements and processing instructions embedded in the AppPage tags. The **WebExplode()** function formats the results of these SQL statements and processing instructions and returns the resulting HTML page to the client application, Webdriver. The SQL statements and processing instructions are specified using SGML-compliant processing tags.

Tags and Attributes

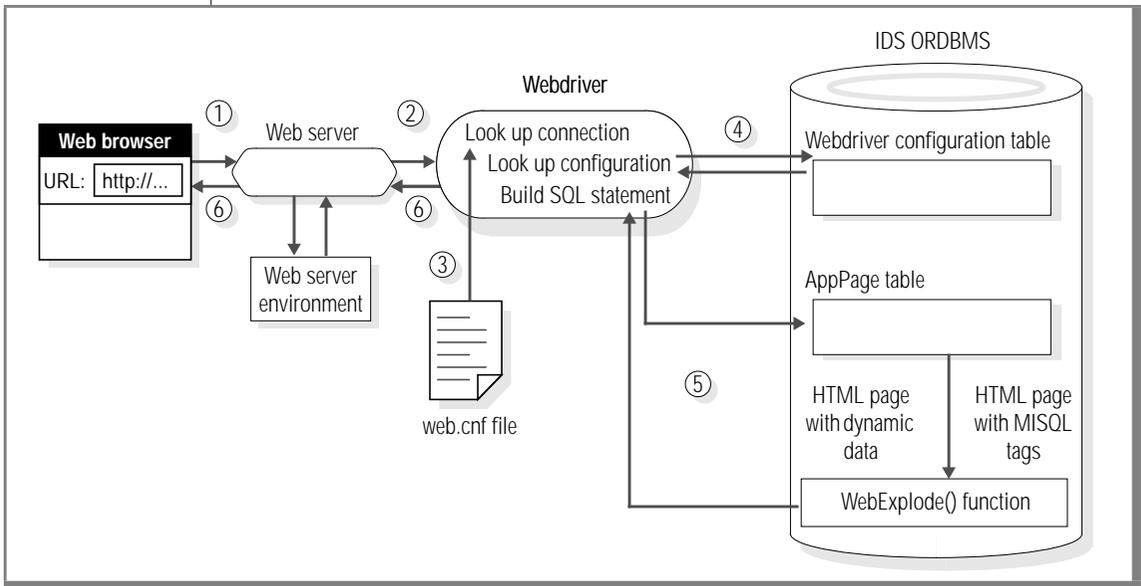
The Web DataBlade module includes a built-in set of SGML-compliant tags and attributes that enable SQL statements to be executed dynamically within AppPages. These tags are referred to as AppPage tags.

For example, the MISQL tag allows you to execute an SQL statement, such as SELECT, and format the results of the statement in your AppPage. The MISQL tag has its own attributes, such as SQL, COND, and ERR.

Architecture Diagram

The following diagram illustrates the architecture of the Web DataBlade module.

Figure 1-1
Web DataBlade Module Architecture



The sequence of events starts with a user typing a URL in a browser and ends with the AppPage rendered in the browser as follows:

1. A user enters a URL with a Webdriver request and the name of an AppPage in a browser, as shown in the following example:

```
http://ariel:8080/hr_map/?Mival=/welcome.html
```

The browser makes a request to the Web server.

2. The Web server uses its configuration files and information from its environment to determine how to invoke Webdriver. Depending on the type of Webdriver that has been configured for your Web DataBlade module installation, the Web server can execute a CGI program (CGI Webdriver), call a Netscape API shared object (NSAPI Webdriver), call an Apache API object (Apache Webdriver), and so on.

3. Webdriver refers to the **web.cnf** file on the operating system for information on how to connect to an Informix database server, the database to which to connect, the user to connect to the database as, and the Webdriver configuration to use once a connection has been made to the database. Webdriver establishes a connection to the appropriate database with this information.
4. Once Webdriver has established a connection to a database, it looks up the Webdriver configuration in the **WebConfigs** system table. The Webdriver configuration describes, among other things, the AppPage table that contains the AppPage the user requested in the URL originally entered in the browser.
5. Using this schema-related information, Webdriver builds a SELECT statement to retrieve the requested AppPage from the Web application table. The SELECT statement executes the **WebExplode()** function on the AppPage at the same time that it retrieves the AppPage. The **WebExplode()** function expands the AppPage tags within the AppPage and formats the results, resulting in a standard HTML page.
6. Finally, Webdriver returns this HTML page to the Web server, which in turn returns the HTML page to be rendered by the Web browser.

Webdriver also enables you to retrieve large objects, such as images, directly from the database when you specify a path that identifies a large object stored in the database.

Enterprise Replication

The IBM Informix Web DataBlade module contains enterprise replication (ER) support for the HTML data type. The necessary support functions are automatically created in your database when you register the Web DataBlade module on a Version 9.30, or later, server.

Please refer to the *Guide to IBM Informix Enterprise Replication* for information on how to design your replication system as well as how to administer and manage data replication throughout your enterprise.

If you are using a tool like Application Page Builder 2.0 (**APB20**), you must install the tool in each of the replicated sites and set up the tables that contain the HTML content (the `wbPages`) as well as the User Dynamic Tags and other supporting tables for replication.

If you are using the Administrator's Tool (**adminTool**), you must install the **adminTool** in each of the replicated sites and you must manually update the **webconfigs** table with the **adminTool** at each site.



Important: *It is your responsibility to maintain consistent system information throughout your enterprise. This means that you must ensure that all copies of the tables that your applications utilize are synchronized at all times.*

Converting from a 9.2x Server

If you register this version of the Web DataBlade module in a database on a Version 9.2x server and then subsequently convert your server to Version 9.30 or later and want to use ER, you must use BladeManager and repeat the registration of the Web DataBlade module in your database, in order to enable ER support. Repeat the registration procedure as follows:

```
% blademgr  
  
myserver> register web.version mydatabase
```

where *version* is the current version of the Web DataBlade module and *mydatabase* is the database in which you want to register it.

Reverting to a 9.2x Server

If you have registered the Web DataBlade module on a Version 9.30 server and you want to revert your server to Version 9.2x, you must run the **revert93to92.sql** script to drop the Web DataBlade module ER support functions, as follows:

```
cd $INFORMIXDIR/extend/web.version
dbaccess my_database revert93to92.sql
```

Run the **revert93to92.sql** script on each database in which you have registered the Web DataBlade module.

Product Features

The Web DataBlade module includes the following features:

- AppPage tags identify the elements of an HTML page and specify the structure and formatting for that page. They enable you to:
 - Embed SQL statements directly within AppPages.
 - Handle errors within AppPages.
 - Execute statements conditionally within AppPages.
 - Manipulate variables within AppPages using variable-processing functions.
 - Use other advanced query processing and formatting techniques.
- Web DataBlade module *dynamic tags* allow you to reuse existing AppPage segments to simplify the construction and maintenance of your Web applications:
 - The Web DataBlade module provides *system dynamic tags* that simplify the creation of check box lists, radio button lists, and selection lists.
 - You can also create *user dynamic tags*. A user dynamic tag is a tag that you create and register in the database.

- Webdriver allows you to customize Web applications using information from its configuration file, the Webdriver configurations stored in the database, the Web server environment, URLs, HTML forms, and your own Web application variables, without additional CGI programming. Webdriver also allows you to track persistent session variables between AppPages.
- *AppPage Builder (APB)*, a development tool that is packaged with the Web DataBlade module, provides a user interface to create and update AppPages and to manage multimedia database content. APB is itself a Web DataBlade module application made up of linked AppPages.

APB uses the same database schema as IBM Informix Data Director for Web. Data Director for Web is a set of Windows tools that allows you to develop and manage Informix-based Web sites and that provides an interface to the Web DataBlade module. For detailed information about Data Director for Web, refer to the *IBM Informix Data Director for Web User's Guide*.

- The NSAPI, ISAPI, and Apache implementations of Webdriver allow you to use the proprietary features of the Netscape Web server, Microsoft Internet Information Server, and Apache Web Server, respectively, and they eliminate CGI process overhead.
- The Web DataBlade Module Administration Tool, a Web DataBlade module application, provides a user interface to create and update Webdriver mappings and configurations.
- A subset of the examples in this guide and the *IBM Informix Web DataBlade Module Administrator's Guide* are available in the directory **INFORMIXDIR/extend/web.version/examples**, where *INFORMIXDIR* refers to the main Informix directory and *version* refers to the current version of the Web DataBlade module installed on your computer.



Important: *In some examples in this guide, long lines of code wrap to accommodate the fonts used in the guide rather than at the most logical places for the code. Therefore, it is not recommended that you follow these examples exactly when you write your code.*

Before You Begin

Before you begin developing AppPages, you or your Web DataBlade module administrator must have previously performed certain administrative tasks to set up the correct development environment.

In particular, this guide is written with the assumption that you or your Web DataBlade module administrator have:

- Installed the Web DataBlade module on your database server
- Created a database with logging enabled
- Registered the Web DataBlade module in your database
- Registered and configured the Web DataBlade Module Administration Tool in your database
- Registered AppPage Builder (APB) in the database.

Although you are not required to use APB to develop AppPages, this guide refers to it in its examples and assumes that you are using it to build AppPages

- Created the necessary Webdriver mappings and Webdriver configurations to begin development
- Invoked both APB and the Web DataBlade Module Administration Tool in your browser to ensure that the DataBlade module is correctly configured for your database

For detailed information on performing the preceding tasks, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Web DataBlade Module Tutorial

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In This Chapter

This chapter introduces you to the process of creating a Web-enabled database application using the IBM Informix Web DataBlade module and AppPage Builder (APB). This chapter assumes you can invoke APB in your browser. For instructions on how to invoke APB in your browser, see [“Invoking AppPage Builder” on page 4-5](#).

The application you create in the following tutorial consists of three linked AppPages. The application queries the database for user tables, and, for each user table, shows the columns of the selected table.

Overview of the Process

This tutorial consists of six steps:

1. Add a project.
2. Create a user dynamic tag.
3. Create the first AppPage: welcome page.
4. Create the second AppPage: shows system catalog tables.
5. Create the third AppPage: shows names of requested tables.
6. Invoke the application.

The following sections explain each step.

Creating an Application with APB

AppPage Builder (APB) is a Web DataBlade module application that enables you to create and maintain the AppPages that make up your Web applications. You can use APB to create AppPages with any Web browser that supports forms and tables, as defined in the HTML 3.0 specification. For more information on APB, refer to [“Using AppPage Builder” on page 4-1](#).

Step 1: Add a Project

If you want to create a Web-enabled application using APB, you must first add a project. A project contains all of the AppPages and other objects associated with your Web application.

When you first invoke APB, the browser displays the following AppPage.

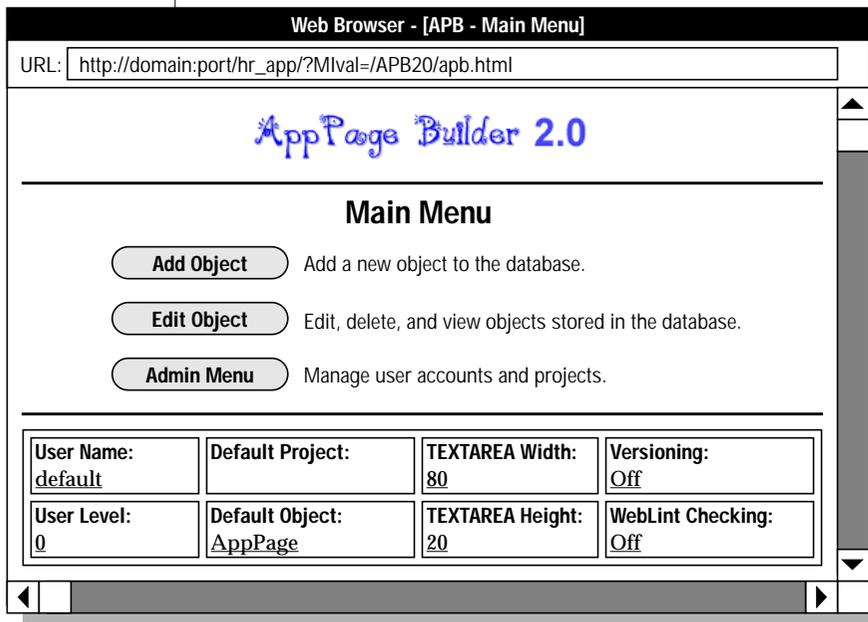


Figure 2-1
APB: Main Menu

To create a project in APB

1. From the **Main Menu**, click **Admin Menu**.
2. From the **Admin Menu**, click **Add Project**.
3. On the **Add Project** AppPage, type `getting_started` as the name of the project in the **Project** text box.
4. Type a description of the **getting_started** project in the **Description** text area.
5. Click **Save**.

The **Add Project** AppPage appears and displays a message that the **getting_started** project was created.

After **getting_started** has been successfully added as a project, use the following procedure to make **getting_started** your default project.

To make `getting_started` your default project

1. Click **Admin Menu**.
2. Click **Edit User**.
3. Select **getting_started** from the **Default Project** list box and click **Save**.

Step 2: Create User-Defined Dynamic Tags

User-defined dynamic tags allow you to specify standard components that appear on every AppPage, such as headers and footers. In this step, you create a header and footer for your application. For more information on how to use dynamic tags, refer to [“Using Dynamic Tags in AppPages” on page 9-1](#).

Create a Header

Use the following procedure to create a header tag.

To create a header tag

1. Click **Add Object**.

Step 2: Create User-Defined Dynamic Tags

2. Click **Dynamic Tag**.
The **Add Dynamic Tag** AppPage appears.

Web Browser - [APB - Add Dynamic Tag]

URL:

AppPage Builder 2.0

Add Dynamic Tag

You can base this new tag on an existing tag to copy from the list below:

Base Tag:

Tag ID: <input type="text"/>	Class: <input type="text"/>
Project: <input type="text" value="getting_started"/>	
Parameters: <input type="text"/>	
Description: <input type="text"/>	
Dynamic Tag: <input type="text"/>	

User Name: <input type="text" value="default"/>	Default Project: <input type="text" value="getting_started"/>	TEXTAREA Width: <input type="text" value="80"/>	Versioning: <input type="text" value="Off"/>
User Level: <input type="text" value="0"/>	Default Object: <input type="text" value="AppPage"/>	TEXTAREA Height: <input type="text" value="20"/>	WebLint Checking: <input type="text" value="Off"/>

Figure 2-2
APB: Add Dynamic
Tag

3. Type `my_header` in the **Tag ID** text box.
4. Type `&TITLE` in the **Parameters** text box.
5. Type a description of the dynamic tag in the **Description** text box.
6. Type the following HTML code in the **Dynamic Tag** text area:

```
<html>
<head>
<title>@TITLE@</title>
</head>
<body>
```

7. Click **Save**.

Create a Footer

Use the following procedure to create a footer tag.

To create a footer tag

1. Click **Add Object**.
2. Click **Dynamic Tag**.
3. Type `my_footer` in the **Tag ID** text box.
4. Type a description of the dynamic tag in the **Description** text box.
5. Type the following HTML code in the **Dynamic Tag** text area:

```
<br>
<br>
<br>
<br>
<HR WIDTH=90%>
<CENTER>
<FONT SIZE=-1><A HREF="http://www.informix.com">
Copyright of INFORMIX SOFTWARE, INC.</A></FONT>
</CENTER>

</body>
</html>
```

6. Click **Save**.

Step 3: Create the First AppPage of Your Application

The first AppPage of your Web-enabled application welcomes users. Follow these steps to create it.

To create the first page of the application

1. On the **Add Dynamic Tag** AppPage, click **Add Object**.
The **Add Object** AppPage appears, showing the **getting_started** project as your default project.

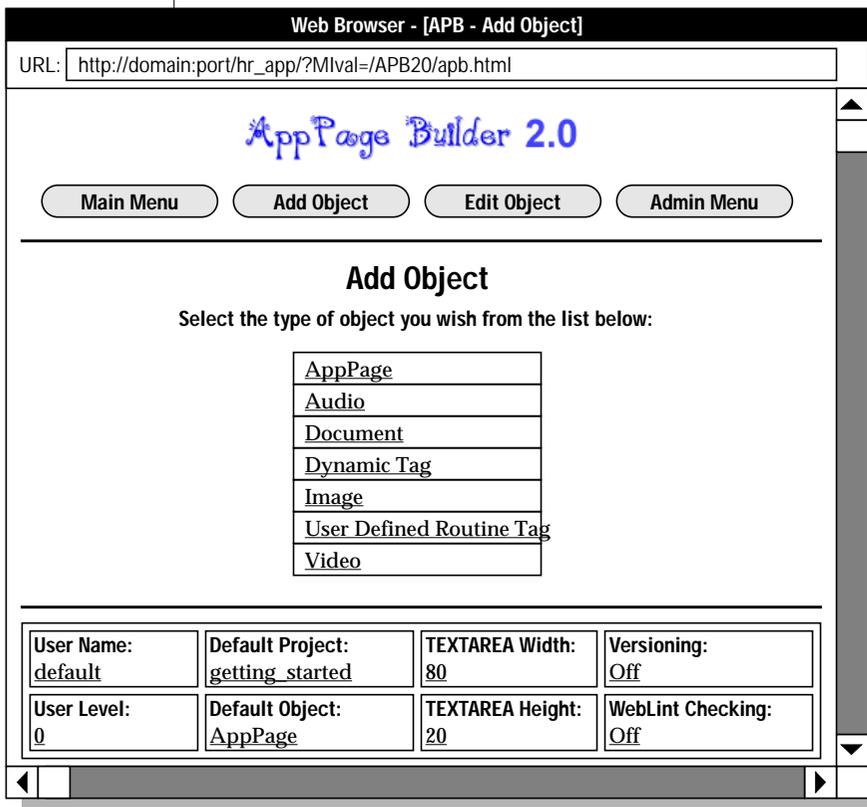


Figure 2-3
APB: Add Object

2. Click **AppPage**.
The **Add AppPage** AppPage appears.

Web Browser - [APB - Add AppPage]

URL: http://domain:port/hr_app/?Mlval=APB20/apb.html

AppPage Builder 2.0

Add AppPage

You can base this new AppPage on an existing AppPage to copy from the list below:

Project:

Path: Page ID: Extension:

Path: <input type="text" value="/"/>	Page ID: <input type="text"/>	Extension: <input type="text" value="html"/>
Project: <input type="text" value="getting_started"/>	Read Level: <input type="text" value="0"/>	
Description: <input type="text"/>		
AppPage: <input type="text"/>		

Enter filename to import AppPage from:

User Name: <input type="text" value="default"/>	Default Project: <input type="text" value="getting_started"/>	TEXTAREA Width: <input type="text" value="80"/>	Versioning: <input type="text" value="Off"/>
User Level: <input type="text" value="0"/>	Default Object: <input type="text" value="AppPage"/>	TEXTAREA Height: <input type="text" value="20"/>	WebLint Checking: <input type="text" value="Off"/>

Figure 2-4
APB-Add AppPage

- Your **getting_started** project should be selected as the default project.
3. Type the name of your AppPage, **welcome**, in the **Page ID** text box.
Be sure **Path** is set to **/** and **Extension** is set to **html**.
 4. Type the following HTML code in the **AppPage** text area:

```
<?my_header TITLE="Web Applications, Inc">

<center>
<h1>Welcome to Web Applications, Inc.</h1>
</center>
You can click
<a href=<?MIVAR>$WEB_HOME<?/MIVAR>?Mival=/page2.html>here
</a> to see a list of all the non-system tables in your database.

<hr>

Or enter the name of a table in the text box to see its columns.<br>
<FORM METHOD=post ACTION=<?MIVAR>$WEB_HOME<?/MIVAR>>
<?MIVAR NAME=table><?/MIVAR>
<?MIVAR><INPUT TYPE=INPUT SIZE=40 NAME=table VALUE=$table><?/MIVAR>
<INPUT TYPE=SUBMIT VALUE="See columns">
<INPUT TYPE=HIDDEN NAME=Mival VALUE=/page3.html>
</FORM>

<?my_footer>
```

5. Click **Save**.

Notice the syntax in the previous HTML for invoking the **my_header** and **my_footer** dynamic tags in the AppPage.

Also notice that this AppPage has two methods of linking to a subsequent AppPage: the ANCHOR tag and the FORM tag.

The ANCHOR tag method uses the following syntax:

```
You can click
<a href=<?MIVAR>$WEB_HOME<?/MIVAR>?Mival=/page2.html>here
</a> to see a list of all the non-system tables in your database.
```

The FORM tag method uses the following syntax:

```
Or enter the name of a table in the text box to see its columns.<br>
<FORM METHOD=post ACTION=<?MIVAR>$WEB_HOME<?/MIVAR>>
<?MIVAR NAME=table><?/MIVAR>
<?MIVAR><INPUT TYPE=INPUT SIZE=40 NAME=table VALUE=$table><?/MIVAR>
<INPUT TYPE=SUBMIT VALUE="See columns">
<INPUT TYPE=HIDDEN NAME=Mival VALUE=/page3.html>
</FORM>
```

For more information on linking AppPages using the ANCHOR and FORM tags, refer to [“How to Link AppPages” on page 3-11](#).

For more information on using the MIVAR tag, refer to [“MIVAR Tag” on page 6-27](#).

Step 4: Create the Second AppPage of Your Application

The second AppPage of your application is linked to the first page by the ANCHOR tag. It displays all the system catalog tables in an HTML table.

If you clicked the word **here** in the `/welcome.html` AppPage, you used the ANCHOR tag method to link to a second AppPage. If you entered a specific table name in the text box and clicked **See columns**, you used the FORM tag method to link directly from your `/welcome.html` AppPage to a third AppPage. This section describes how to create that second AppPage.

To create the second AppPage of the application

1. Click **Add Object**.
The **Add Object** AppPage appears, showing **getting_started** as your default project.
2. To add a second AppPage to your **getting_started** project, click **AppPage**.
The **Add AppPage** AppPage appears.
Your **getting_started** project should be selected as the default project.
3. Type the name of your AppPage, `page2`, in the **Page ID** text box.
Be sure **Path** is set to `/` and **Extension** is set to **html**.

4. Type the following HTML code in the AppPage text area:

```
<?my_header TITLE="Web Applications, Inc">

Here's a list of all your tables; click on the table name to see its
columns:<br><br>
<table border=1 cell_padding=0>
<tr>
<td><b>Table Name</b></td>
<td><b>Table Owner</b></td>
<td><b>Table Type</b></td>
</tr>
<?MYSQL SQL="select tabname, owner, tabtype from systables where tabname
not like 'sys%' and
tabtype IN ('T', 'V', 'P', 'S')
order by tabname;">
<tr>
<td>
<a href="$WEB_HOME?Mival=/page3.html&table=$1">$1</a></td>
<td>$2</td>
<td>
<?MIVAR COND=$(EQ,$3,T)>Table<?/MIVAR>
<?MIVAR COND=$(EQ,$3,V)>View<?/MIVAR>
<?MIVAR COND=$(EQ,$3,S)>Synonym<?/MIVAR>
<?MIVAR COND=$(EQ,$3,P)>Private Synonym<?/MIVAR>
</td>
</tr>
</table>

<?my_footer>
```

5. Click Save.

Notice the following features in the **/page2.html** AppPage:

- The **MISQL** tag “inside” a table. For every table returned by the SQL statement, an anchor tag is created:

```
<?MYSQL SQL="select tabname, owner, tabtype from systables
where tabname not like 'sys%' and
tabtype IN ('T', 'V', 'P', 'S')
order by tabname;">
```

For more information on using the **MISQL** tag, refer to **“MISQL Tag” on page 6-5**.

- The MIVAR tag with a variable-processing function to convert a returned “T” into “Table”:

```
<?MIVAR COND=$(EQ,$3,T)>Table<?/MIVAR>  
<?MIVAR COND=$(EQ,$3,V)>View<?/MIVAR>  
<?MIVAR COND=$(EQ,$3,S)>Synonym<?/MIVAR>  
<?MIVAR COND=$(EQ,$3,P)>Private Synonym<?/MIVAR>
```

For more information on using the MIVAR tag, refer to [“MIVAR Tag” on page 6-27](#).

For more information on using variable-processing functions, refer to [“Using Variable-Processing Functions in AppPages” on page 8-1](#).

- When you call the `/page3.html` AppPage, you are passing the **table** user-defined variable:

```
<td>  
<a href="$WEB_HOME?Mival=/page3.html&table=$1">$1</a></td>  
<td>$2</td>  
<td>
```

Step 5: Create the Third AppPage of Your Application

The third AppPage of your application is linked to the first page by the FORM tag and to the second page by the **table** variable. It shows the column names of the requested table.

If you click a specific table in the `/page2.html` AppPage, you link to a third AppPage that shows the column names of the requested table. If you type a specific table name in the text box and click **See columns** on the **welcome** AppPage, you use the FORM tag to link directly to your third AppPage. This section describes how to create that third AppPage.

To create the third AppPage of the application

1. Click **Add Object**.
The **Add Object** AppPage appears with **getting_started** as your default project.
2. Click **AppPage**.
The **Add AppPage** AppPage is displayed.
Your **getting_started** project should be selected as the default project.
3. Type the name of your AppPage, `page3`, in the **Page ID** text box.

4. Be sure **Path** is set to / and **Extension** to **html**.
5. Type the following HTML code in the **AppPage** text area:

```
<?my_header TITLE="Web Applications, Inc">

Here are the columns of the table
<b><?MIVAR>$table</MIVAR></b>:<br>
<br><table border=1 cell_padding=0>
<tr>
<td><b>Column Name</b></td>
</tr>

<?MYSQL SQL="select c.colname from syscolumns c, systables
t where c.tabid = t.tabid and t.tabname = '$table';">
<tr>
<td>$1</td>
</tr><?/MYSQL>
</table>
<br>

<?my_footer>
```

6. Click **Save**.

Notice that the passed user-defined variable **\$table** is used in the **MISQL** tag to retrieve the columns of the passed table name:

```
<?MYSQL SQL="select c.colname from syscolumns c, systables t where
c.tabid = t.tabid and t.tabname = '$table';">
```

Step 6: Invoke the Application

There are two ways you can invoke your Web application once you have created all the pages and saved them in the database.

The first way is to use APB by following the steps provided next.

To invoke the application from APB

1. Click **Edit Object**.
2. Click the **/welcome.html** AppPage.
3. Click **Run**.

The **/welcome.html** AppPage appears in a browser. You can now link to the rest of your application's AppPages.

The second way to invoke your Web application is to call it directly in a browser by entering a URL similar to this one:

```
http://domain:port/mapping/?Mival=/welcome.html
```

For more information on URLs, refer to [“Basics of AppPage Development”](#) on page 3-1.

For more information on Webdriver mapping, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Basics of AppPage Development

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In This Chapter

This chapter describes some basic elements of AppPages, the HTML pages that make up your Web-enabled database application. In addition, it describes how AppPages are extracted from the database and how they are connected to create a flow to your Web application. It includes the following topics:

- [“AppPage Elements” on page 3-4](#)
- [“Where AppPage Objects Are Stored” on page 3-5](#)
- [“How to Invoke AppPages” on page 3-9](#)
- [“How to Link AppPages” on page 3-11](#)
- [“How to Retrieve Large Objects” on page 3-15](#)

AppPage Elements

An AppPage is an HTML page that dynamically executes SQL statements that query the database and that formats the results. You can retrieve traditional data types into an AppPage, as well as HTML, image, audio, and video data.

An AppPage can include the following elements in addition to standard HTML tags:

- **Variables.** Variables are named storage spaces that can be used within an AppPage. Variables can also be configured using the Web DataBlade Module Administration Tool. See [“Web DataBlade Module Variables” on page 5-3](#) for more information.
- **Dynamic tags.** Dynamic tags are segments of AppPages that are stored in a database table and can be shared among multiple AppPages. Dynamic tags allow you to standardize components of multiple AppPages, such as the headers and footers that appear on multiple AppPages in your Web application. Dynamic tags reduce maintenance costs and centralize the source of updates to Web applications. See [“Using Dynamic Tags in AppPages” on page 9-1](#) for more information.
- **AppPage tags.** AppPage tags are provided with the Web DataBlade module and are processed by the **WebExplode()** function. The AppPage tags identify elements of an HTML page and specify the structure and formatting for that page. See [“AppPage Tags” on page 6-3](#) for more information.
- **Variable-processing functions.** Variable-processing functions enable calculations to be performed using variables that are passed into an AppPage, generated within the AppPage, or returned from your database. See [“Variable-Processing Functions” on page 8-3](#) for more information.
- **User-defined routine (UDR) tag.** A user-defined routine tag is a tag in an AppPage that directly executes an existing user-defined routine and places the output of the execution of the routine within the AppPage. See [“What Is a User-Defined Routine \(UDR\) Tag?” on page 10-3](#) for more information on user-defined routines.

- **Error handling.** The Web DataBlade module provides tags and variables to handle error conditions such as SQL errors, undefined variables, and incorrect constructs. See [“Error Handling with the MI_DRIVER_ERROR Variable” on page 5-17](#), [“MISQL Tag” on page 6-5](#), and [“MIERROR Tag” on page 6-40](#) for more information on error handling.

Where AppPage Objects Are Stored

AppPages are stored in a table in the database for easy retrieval. If you use AppPage Builder (APB) to create your application, an AppPage is stored in the **wbPages** table. An object like an image or an audio clip is stored as a large object in the **wbBinaries** table. A *dynamic tag* is a dynamically expanded AppPage fragment that can be easily shared among multiple AppPages. Dynamic tags are stored in the **wbTags** table.

The wbExtensions Table

The **wbExtensions** table, required by the Web DataBlade module, stores information about the tables in which you store your AppPages, images, dynamic tags, and so on. Each type of object has an extension; for example, AppPages use the **.html** extension. In the **wbExtensions** table, the row in which the **extensions** column describes the table, stores the object.

The **wbExtensions** table is composed of the following column names and data types.

Column Name	Data Type (Length)	Description
extension	VARCHAR(12)	The file extension; for example, .html or .gif
name	VARCHAR(30)	The name of the extension; for example, Application Page or GIF Image
source_table	VARCHAR(18)	The name of the table in which the resource is stored

(1 of 2)

Column Name	Data Type (Length)	Description
super_type	VARCHAR(18)	The MIME supertype of the extension; for example, text or image
sub_type	VARCHAR(18)	The MIME subtype of the extension; for example, HTML or GIF
ID_column	VARCHAR(18)	The name of the column containing the resource identifier; for example, ID
content_column	VARCHAR(18)	The name of the column containing the resource content; for example, object
retrieval_method	INTEGER	The retrieval method used by Webdriver when retrieving the type: 1=Retrieve with WebExplode() 2=Retrieve as text 3=Retrieve as large object
path_column	VARCHAR(18)	The name of the column containing the resource path information

(2 of 2)

The following table shows the default extensions and the columns used by the **wbExtensions** table. These extensions are added to the **wbExtensions** table when you install APB into your database.

extension	name	source_table	super_type	sub_type	id_column	content_column	retrieval_method	path_column
html	Application page	wbPages	text	html	ID	object	1	path
htm	Application page	wbPages	text	html	ID	object	1	path
txt	Text document	wbPages	text	plain	ID	object	2	path

(1 of 2)

extension	name	source_table	super_type	sub_type	id_column	content_column	retrieval_method	path_column
gif	GIF image	wbBinaries	image	gif	ID	object	3	path
jpg	JPEG image	wbBinaries	image	jpeg	ID	object	3	path
jpeg	JPEG image	wbBinaries	image	jpeg	ID	object	3	path
bmp	Bitmap image	wbBinaries	image	bmp	ID	object	3	path
doc	Microsoft Word document	wbBinaries	application	ms-word	ID	object	3	path
ppt	Microsoft PowerPoint presentation	wbBinaries	application	ms-ppt	ID	object	3	path
xls	Microsoft Excel worksheet	wbBinaries	application	ms-excel	ID	object	3	path
pdf	Adobe Acrobat document	wbBinaries	application	pdf	ID	object	3	path
wav	WAV sound	wbBinaries	audio	x-wav	ID	object	3	path
qt	QuickTime movie	wbBinaries	video	quicktime	ID	object	3	path
mov	QuickTime movie	wbBinaries	video	quicktime	ID	object	3	path
avi	Microsoft video	wbBinaries	video	x-msvideo	ID	object	3	path
vrml	VRML model	wbPages	x-world	vrml	ID	object	2	path

(2 of 2)

For example, this table shows that an object with the extension **.doc** is stored in **wbBinaries**, the ID of the document is stored in the **id** column, and the path of the document is stored in the **path** column.

Adding a New Extension to the *wbBinaries* Table

If you have other resources that your AppPage uses such as plug-ins or applications that are not stored in your database, you can create a table and map to these resources using the ID, path, and extension associated with the resource. Use DB-Access or any client tool to create the table. Use APB to add a new extension that maps to your new table. The extension links to the **wbExtensions** table, where you find the corresponding object and MIME type. If you do create a new extension for a new resource, the extension must be unique.

For more information on how to add a new extension using APB, see [“Creating Web Applications in AppPage Builder” on page 4-7](#).

As described in the previous section, the **wbExtensions** table contains default extensions that correspond to standard objects that can be included in an AppPage: HTML, GIFs, Microsoft Word documents, and so on. These default extensions probably cover most of the types of objects you might want to include in an AppPage.

If, however, you want to include an object in your AppPage that is not described by a row in the **wbExtensions** table, you can add a new extension to the table that describes the object. For example, you might have a new video object that is stored in a format not described by any row in the **wbExtensions** table.

Use APB to add a new extension to the **wbExtensions** table. For the procedure on adding an extension, see [“Adding an Extension” on page 4-10](#). When you create a new extension, you specify the source table that stores the objects, the MIME supertype and subtype, and so on.

When you specify the source table, you can specify one of the existing APB tables such as **wbPages** or **wbBinaries**. Store text type objects (like HTML) in the **wbPages** table and binary objects (such as video) in the **wbBinaries** table.

You can also specify that the source table be a completely new table that you have previously created with DB-Access or SQL editor. Be sure that your table has the following two columns to identify your object:

- ID: the name of the object
- Path: the path of the object

If you store objects in a new table, only objects of the associated extension can be stored in the new table. In other words, you cannot store more than one extension type in a new table. You can, however, store more than one extension type in the **wbPages** and **wbBinaries** table.

Refer to the **wbBinaries** table definition in “AppPage Builder Schema” on [page B-1](#) for a sample schema of a table that stores AppPage objects.

How to Invoke AppPages

When you invoke an AppPage, you retrieve it from a table in the database into your browser. You can invoke an AppPage by typing a URL in a browser or specifying a URL in an AppPage to show a subsequent AppPage in your browser.

A URL provides a general-purpose naming scheme for specifying Internet resources using a string of printable ASCII characters. The following syntax shows a generic URL used to invoke an AppPage if you use NSAPI or Apache Webdriver:

```
http://domain:port/webdriver_mapping?MIval=/path/appage_id.extension
```

The following syntax shows a generic URL used to invoke an AppPage if you use ISAPI Webdriver:

```
http://domain:port/webdriver_mapping/drvisapi.dll?MIval=/path/  
appage_id.extension
```

The following syntax shows a generic URL used to invoke an AppPage if you use the CGI Webdriver:

```
http://domain:port/webdriver_mapping/webdriver?MIval=/path/  
appage_id.extension
```

The following table describes the elements of the previous URL example.

URL Element	Description
http	Which Internet protocol the browser should use when accessing a resource on a server
<i>domain</i>	The domain name for the Web server
<i>:port</i>	The port number of the Web server process A colon (:) is used as a separator between the domain and the port. Defaults to port 80 if blank
<i>webdriver_mapping</i>	The name of the Webdriver mapping you are using to connect to the database
?Mival=	The Webdriver variable that is used to specify the AppPage
<i>path</i>	The value in the path column of the table that stores your AppPages For the APB schema, this column is called path .
<i>appage_id</i>	The actual name of the AppPage stored in the ID column of your AppPage table
<i>extension</i>	The value in the extension column of the wbPages table

To invoke an AppPage called **/welcome.html**, you type the following URL into your browser:

```
http://ariel:8080/hr_app/?Mival=/pages/welcome.html
```

In the previous example, the Webdriver mapping is `/hr_app`, the path is `/pages`, the *appage_id* is `welcome`, and the extension is `html`.

Using Mlpath and Mlextension

You can set the **Mlpath** and **Mlextension** Webdriver variables to default paths and extensions. For example, use the Web DataBlade Module Administration Tool to set **Mlpath** to / and **Mlextension** to `html`.

If you set these, you do not have to specify a path or extension in the URL. For example, you can enter the following URL in your browser to invoke the `/welcome.html` AppPage:

```
http://domain:port/hr_app?MIval=welcome
```

This technique is useful if you have a pre-4.0 version application that you do not want to rewrite by adding explicit paths and extensions.

How to Link AppPages

Web applications typically have more information than can fit on one AppPage. Your Web application should provide you the ability to navigate from one page to another. Linking AppPages requires placement of an identifier in one AppPage that permits a connection with another AppPage.

There are two methods for linking AppPages within an IBM Informix Web DataBlade module application. You can:

- Link AppPages with the ANCHOR tag.
- Link AppPages with the FORM tag.

Each method is described next.

Linking AppPages with the ANCHOR Tag

The anchor variable in an AppPage is a variable whose value is generated by Webdriver based on the URL prefix used to invoke the AppPage. Anchor variables are used to link together one or more AppPages in the same Web application.

Use the HREF attribute of the ANCHOR tag to link AppPages in your Web application to each other. Use the **WEB_HOME** anchor variable and the MIVAR AppPage tag to dynamically generate these links.

The following example shows a generic method to link to an AppPage using the ANCHOR tag:

```
<a href=<?MIVAR>$WEB_HOME<?/MIVAR>?Mival=/path/id.ext
```

Linking AppPages with the FORM Tag

Another way to link the AppPages in your Web application is to create a hidden INPUT button in an HTML form. The FORM tag for the button must specify **WEB_HOME** as the action. For example:

```
<FORM METHOD=POST ACTION=<?MIVAR>$WEB_HOME<?/MIVAR>>
```

When you submit the form, the following INPUT tag causes the **/display_table.html** AppPage to be invoked:

```
<INPUT TYPE=HIDDEN NAME=Mival VALUE=/display_table.html>
```

Example of Using FORM Tag Links

The following `/select_table.html` AppPage allows you to type a table name into the `table_name` text field and then submit the form. When you submit the form, Webdriver invokes the `/display_table.html` AppPage and performs a SELECT statement from the specified table; the browser then displays the output. The following example shows the `/select_table.html` AppPage:

```
<HTML>
<HEAD><TITLE>Select from Table</TITLE></HEAD>
<BODY>
<FORM METHOD=POST ACTION=<?MIVAR>$WEB_HOME<?/MIVAR>>
<?MIVAR NAME=$table_name><?/MIVAR>
Select from table: <HR>
<?MIVAR>
<INPUT TYPE=INPUT SIZE=40 NAME=table_name VALUE=$table_name>
<?/MIVAR>
<INPUT TYPE=SUBMIT VALUE=Select>
<INPUT TYPE=HIDDEN NAME=Mival VALUE=/display_table.html>
</FORM>
</BODY>
</HTML>
```

For information on the MIVAR tag used in this example, see [“MIVAR Tag” on page 6-27](#).

The following illustration shows sample Web browser output for the `/select_table.html` AppPage. The value `departments` has been entered in the text box.

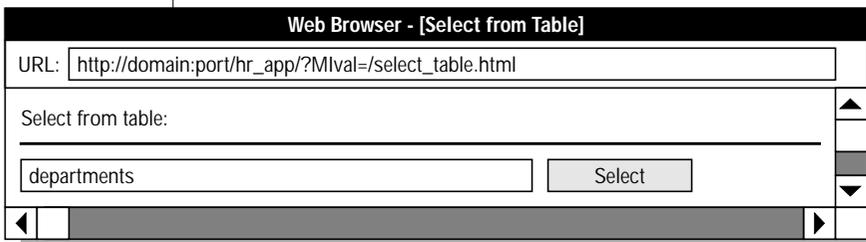


Figure 3-1
Select from Table

The `/display_table.html` AppPage is invoked when you submit the form displayed by `select_table`. The `/display_table.html` AppPage retrieves the column headers for the specified table in the submitted `table_name` field from the `syscolumns` and `systables` system catalog tables and displays the column headers and the rows of the specified table within an HTML table. The following example is the `/display_table.html` AppPage:

```
<HTML>
<HEAD><TITLE>Display Table Data</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<TR>
<?MISQL SQL="select a.colname, colno from syscolumns
      a, systables b where a.tabid = b.tabid and
      b.tabname = trim('$table_name')
      order by colno;"><TH>$1</TH>
<?/MISQL>
</TR>
<?MISQL SQL="select * from $table_name;">
<TR> { <TD>$*</TD> } </TR><?/MISQL>
</TABLE>
</BODY>
</HTML>
```

For more information on the MISQL tag used in this example, see [“MISQL Tag” on page 6-5](#).

The following illustration shows sample Web browser output for the `/display_table.html` AppPage.

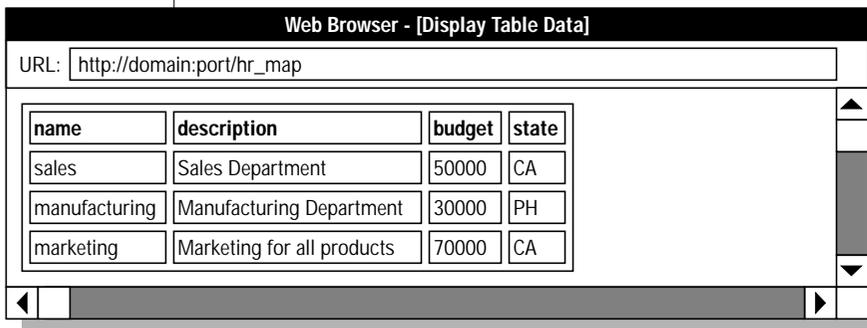


Figure 3-2
Display Table Data

How to Retrieve Large Objects

The Web DataBlade module provides built-in support for objects typically found in Web applications, such as images, audio, and video. These objects are called *large objects*. As with AppPages, you store large objects in a table in the database. Similarly to invoking AppPages, you can also invoke or retrieve large objects from the table where they are stored. APB provides a table to store large objects in, called **wbBinaries**.

You can either retrieve large objects by specifying the names by which they are stored in the **wbBinaries** table or by using their large object handles (unique identifiers within the database in which they are stored.)

Retrieving Large Objects By Name

The following syntax shows how a large object is retrieved within an AppPage by specifying its name:

```
<IMG SRC=<?MIVAR>$WEB_HOME</?MIVAR>?Mival=/path/id.extension
```

For example, to retrieve a large object called **flower** with an extension type of **.gif**, you include the following code in your AppPage:

```
<IMG SRC=<?MIVAR>$WEB_HOME</?MIVAR>?Mival=/images/flower.gif
```

Retrieving Large Objects By Large Object Handles

This section describes how you can retrieve a large object into your AppPage based on its large object handle. This method is particularly useful when retrieving large objects that are not stored in the **wbBinaries** table.

You can retrieve large objects by their large object handles when you dynamically retrieve the results of a SELECT statement:

1. Use the Web DataBlade Module Administration Tool to set the following Webdriver variable in your Webdriver configuration.

Webdriver Variable	Mandatory?	Description
MltypeObj	Yes	MIME type and subtype used to export the large object, such as image/gif Be sure to check the Overwrite checkbox when you add this variable to your Webdriver configuration.

2. Use the MISQL AppPage tag in your AppPage to select the large object from the table.
3. Use the **LO** Webdriver variable combined with WEB_HOME to specify the selected large object handle and retrieve the large object into your AppPage.



Important: Do not set the **LO** Webdriver variable in your Webdriver configuration, because this forces Webdriver to ignore the **Mlval** Webdriver variable. Only specify the **LO** Webdriver variable in the URL you use to retrieve the large object.

For example, assume you have stored images in the **object** column of a table called **webImages**. The following AppPage retrieves one of the images using its large object handle:

```
<HTML>
<HEAD><TITLE>Retrieving Large Objects</TITLE></HEAD>
<BODY>
<H3>Display the image</H3>
<HR>
<?MISQL SQL="select object from webImages where ID = 'flower';">
<IMG SRC=$WEB_HOME?LO=$1><BR>
<?/MISQL>
</BODY>
</HTML>
```

For instructions on changing the query string if you want to add security to large objects, see the *IBM Informix Web DataBlade Module Administrator's Guide*.

For more information about large objects, see the *IBM Informix Guide to SQL: Reference*.

Using AppPage Builder

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In This Chapter

This chapter includes the following topics about AppPage Builder:

- [“Overview of AppPage Builder,”](#) following
- [“Registering AppPage Builder in Your Database”](#) on page 4-4
- [“Invoking AppPage Builder”](#) on page 4-5
- [“Creating Web Applications in AppPage Builder”](#) on page 4-7

Overview of AppPage Builder

AppPage Builder (APB) is a Web DataBlade module application that enables you to create and maintain the AppPages that make up your Web applications. You can use APB to create AppPages with any Web browser that supports forms and tables, as defined in the HTML 3.0 specification. If you use a Web browser that supports client file upload, you can also use APB to manage multimedia content in the database.

Registering AppPage Builder in Your Database

This section describes how to register APB in your database, if it has not already been registered as part of the initial Web DataBlade module setup for your database with the **websetup** utility.

To find out whether APB is currently registered in your database, execute the following SQL statement:

```
SELECT * FROM wbpages WHERE id = 'apb' and path = '/APB20' and extension=
'html';
```

If the SELECT statement returns a value, APB is registered in your database.

Typically, the owner of a database registers APB in the database.

To register APB in your database

1. Create an sbspace in your database to store the AppPages that make up the APB application.

Be sure to enable logging for the sbspace.

You may use an existing sbspace, such as the default sbspace pointed to by the **SBSPACENAME** parameter in the **ONCONFIG** file.

To create a new sbspace, use the **onspaces** utility. For detailed information on using the **onspaces** utility, refer to the *Administrator's Guide* for your database server.

2. At the operating system prompt, change to the directory that contains the APB utilities and data.

This directory is ***SINFORMIXDIR*/extend/web.version/apb2**, where ***SINFORMIXDIR*** refers to the main Informix directory and ***version*** refers to the current version of the Web DataBlade module installed on your computer.

For example, if ***SINFORMIXDIR*** is set to `/local/informix` for your database server and the current Web DataBlade module version is `web.4.13.UC1`, the UNIX command to change to the correct directory is:

```
cd /local/informix/extend/web.4.13.UC1/apb2
```

3. Create the APB schema by executing the **schema_create** utility, passing it the name of your database and the name of the sbspace in which the APB AppPage are stored.

For example, to create the APB schema in a database called **web40** and store the AppPages in the **sbsp1** sbspace, execute the following command at the operating system prompt:

```
createAPB20_DDW20schema web40 sbsp1
```

4. Load the APB data, which includes AppPages and GIF, into the database by executing the **loadAPB20application** utility.

For example, to load the APB data into the **web40** database, execute the following command at the operating system prompt:

```
loadAPB20application web40
```

For detailed information on these utilities, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Invoking AppPage Builder

There are two ways to invoke APB in your browser:

- Specify the URL prefix specially created to invoke APB in your URL. This URL prefix maps to a Webdriver mapping that specifies the **apb** Webdriver configuration.
- Use any URL prefix that maps to any Webdriver mapping (other than the Webdriver mapping used to invoke the Web DataBlade Module Administration Tool) and specify the text `?MIval=/APB20/apb.html` in the URL.

Both methods are described in the following sections.

Using the URL Prefix Specially Created to Invoke APB

Typically, when the Web DataBlade module is initially configured for your database with the **websetup** utility, the Web DataBlade module administrator creates a special URL prefix that maps to the Webdriver mapping that specifies the **apb2** Webdriver configuration. The **apb2** Webdriver configuration is automatically registered in your database as part of the registration of the Web DataBlade Module Administration Tool. The special URL prefix to invoke APB is typically `/apb2`.

If the Web DataBlade module administrator has set up this special URL prefix, specify it in your URL to invoke the main APB AppPage.

For example, assume the name of your Web server computer is **ariel**, the port number of the Web process is **8080**, and the URL prefix to invoke APB is `/apb2`. Use the following URL to invoke APB in your browser:

```
http://ariel:8080/apb2/
```

Tip: Many Web servers require you add the “extra” slash at the end of the URL.

For detailed information on URL prefixes, Webdriver mappings, and Webdriver configurations, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Using Any URL Prefix

If the Web DataBlade module administrator has not created a special URL prefix to invoke APB directly, you can use any URL prefix that maps to a Webdriver mapping to invoke APB. Specify `?MIval=/APB20/apb.html` after the URL prefix.

For example, assume the name of your Web server computer is **ariel** and the port number of the Web process is **8080**. Further assume that the URL prefix `/hr_map` maps to a Webdriver mapping that specifies a Webdriver configuration in the **web40** database. The following URL invokes APB for the **web40** database:

```
http://ariel:8080/hr_map/?MIval=/APB20/apb.html
```

Tip: You cannot use the URL prefix that invokes the Web DataBlade Module Administration Tool to invoke APB. You can only use this URL prefix to invoke the Web DataBlade Module Administration Tool.



For detailed information on URL prefixes, Webdriver mappings, and Webdriver configurations, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Creating Web Applications in AppPage Builder

When you invoke APB, the browser displays the following AppPage. Use APB to create and maintain AppPages and other multimedia objects that make up your Web applications.

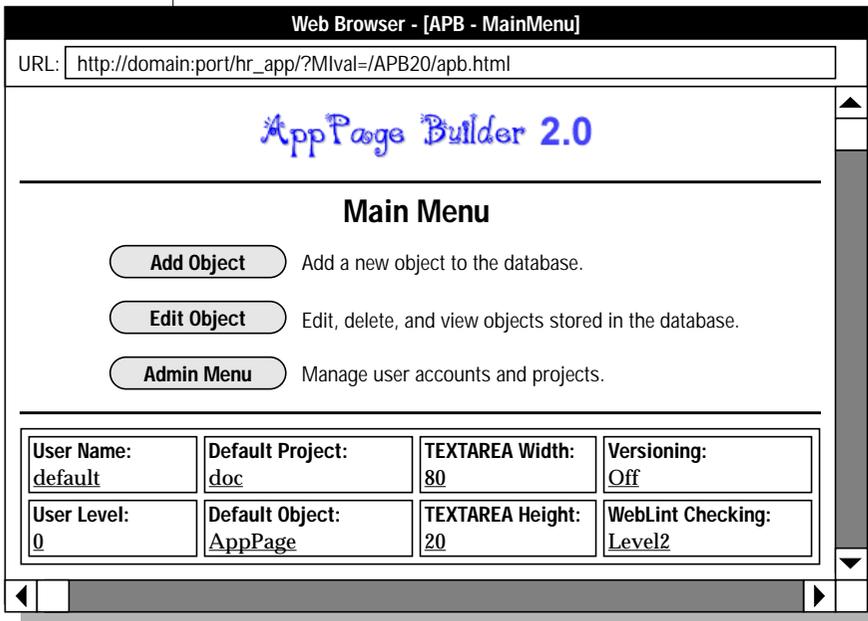


Figure 4-1
APB-Main Menu

The following table describes the APB options displayed in Figure 4-1.

Option	Action
Add Object	Add a new AppPage, dynamic tag, audio, document, image, video, or other Web application object.
Edit Object	Edit, delete, or view a Web application object.
Admin Menu	Edit or delete a user account, project, extension type, or object type.

You can add or edit AppPages by typing or pasting into the text area or by uploading a client file. You can add and edit multimedia objects by uploading a client file.

The **Admin Menu** option is described in more detail in [“Administration Features” on page 4-9](#).

Multimedia Content

The following table lists the multimedia object types that you can use with APB. The **Table** column indicates the table where the objects are stored in the database.

Object Type	Supported Formats	Table
AppPage	HTML	wbPages
Dynamic tag	HTML	wbTags
Audio	AU, WAV, and AIFF	wbBinaries
Document	MS Word, MS PowerPoint, and Adobe PDF	wbBinaries
Image	GIF and JPEG	wbBinaries
Video	Quicktime, MPEG, and AVI	wbBinaries

[Appendix B, “AppPage Builder Schema,”](#) describes the complete APB schema and information on adding new object types and MIME types.

Administration Features

When you invoke the **Admin Menu** option of APB, the browser displays the following AppPage.

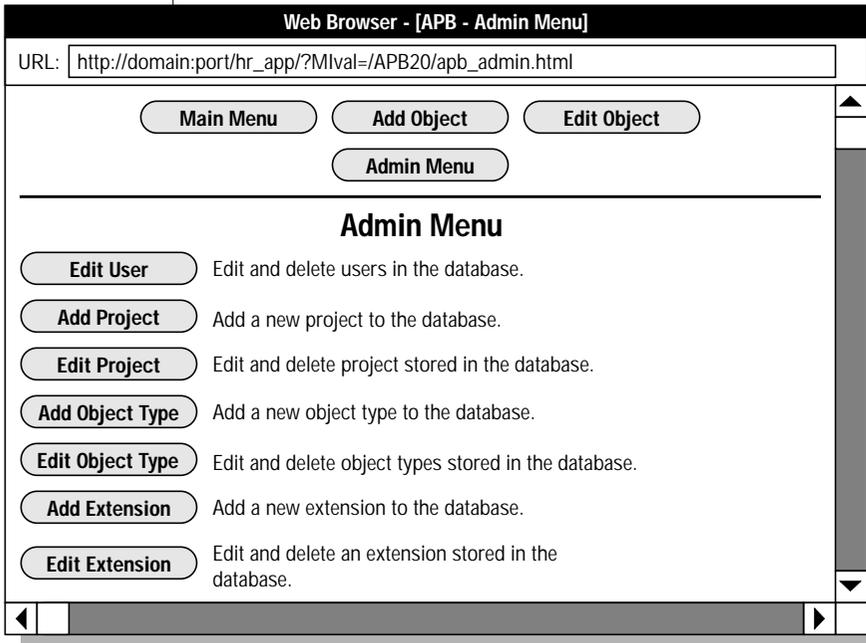


Figure 4-2
APB: Admin Menu

The following table describes APB administrative features.

Option	Action
Edit User	Modify user preferences, including changing the user password, changing the default project or object type, changing the TEXTAREA height or width, turning AppPage versioning on or off, and changing the level of WebLint checking for syntax errors.
Add Project	Add a new project. A project contains all of the AppPages and other objects associated with a particular Web application.
Edit Project	Change the owner or the description of a project.

(1 of 2)

Option	Action
Add Object Type	Add a new multimedia object type to APB.
Edit Object Type	Modify the page suffix for an object type.
Add Extension	Add a new extension.
Edit Extension	Edit an existing extension.

(2 of 2)

Adding an Extension

When you initially install AppPage Builder in your database, the **wbExtensions** table contains a default set of extensions for most object types you need to invoke in an AppPage. Use the following procedure to add a new extension to the **wbExtensions** table.

To add a new extension to the wbExtensions table using APB

1. Click **Admin Menu**.
2. Click **Add Extension**.
3. On the **Add Extension** AppPage, fill in the following text boxes with the appropriate information for your new extension.

Text Box	Description
Extension	The file extension
Name	The name of the extension
Source Table	The name of the table that stores objects of this type
Super Type	The MIME supertype of the extension
Sub Type	The MIME subtype of the extension
ID Column	The column in the storage table that identifies the object
Content Column	The column in the storage table that contains the object
Path Column	The column that contains the object's path information

4. Click the **WebExplode**, **Text**, or **Blob** button to indicate the retrieval method you prefer for your new object.
5. Click **Save**.

Using Variables in AppPages

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In This Chapter

This chapter describes how to use Web DataBlade module variables within AppPage tags to customize your Web application.

The following topics are covered in this chapter:

- [“Web DataBlade Module Variables,”](#) following
- [“Error Handling with the MI_DRIVER_ERROR Variable”](#) on page 5-17

Web DataBlade Module Variables

The following list describes Web DataBlade module variables:

- Variables are case sensitive.
- A variable must be preceded by a \$ when used in a variable expression.
- Variables preceded by \$MI_ are reserved for the portion of the Web DataBlade module that runs within the database. The portion that does not run within the database is Webdriver.
- A variable starts with an alpha character (a-z or A-Z). Subsequent characters include alphanumeric characters (a-z, A-Z, or 0-9), dots (.), and underscores (_).

Variables are global in scope within an AppPage and can be called recursively from an AppPage using the **WebExplode()** function. To pass variable values between AppPages that are not called recursively with the **WebExplode()** function, you must explicitly pass the variables in a URL or an HTML form. For information on calling the **WebExplode()** function, see [“WebExplode\(\)”](#) on page 12-4.



Important: Variables are only interpreted within MISQL, MIVAR, and MIERROR tags, as well as within the COND attribute of the MIBLOCK tag.

There are five different kinds of variables in AppPages, described in the following subsections:

- “User-Defined Variables,” following
- “Vector Variables” on page 5-4
- “Web DataBlade Module System Variables” on page 5-8
- “Web Server and Web Browser Variables” on page 5-8
- “Session Variables” on page 5-11

User-Defined Variables

You can create user-defined variables and assign default values to them by using the Web DataBlade Module Administration Tool or by setting them using the NAME attribute of the MIVAR tag within an AppPage. You can override default values for existing user-defined variables in an MIVAR tag, an HTML form, or a URL that invokes an AppPage. For more information on how to assign and display variables using the MIVAR tag, see [“MIVAR Tag” on page 6-27](#).

For more information on setting user-defined variables with the Web DataBlade Module Administration Tool, refer to the *IBM Informix Web DataBlade Module Administrator’s Guide*.

Vector Variables

A vector variable is a list of values with the same variable name. Vector variables are similar to arrays. You reference each element in the vector variable by specifying the name of the vector variable and an index number within brackets. The first element in the vector variable has an index of 1.

You create and display vector variables with the MIVAR tag, just as you create and display simple user-defined variables. A simple user-defined variable is a vector variable with a single value rather than a list of values. This means that the following two variable specifications are equivalent:

```
<?MIVAR>$myvar<?/MIVAR> and <?MIVAR>$myvar[ 1 ]<?/MIVAR>.
```

The following sections describe how to create and manipulate vector variables.

Creating and Assigning Values to Vector Variables

Use the MIVAR AppPage tag to create a vector variable. Use the SETVAR variable-processing function to assign values to the vector variable. Finally, use the MIVAR AppPage tag to display an element of the vector variable.

The following example creates a vector variable called **\$flowers**, assigns it four values, and displays the second value:

```
<?MIVAR NAME=flowers><?/MIVAR>

<?MIVAR>$(SETVAR,$flowers[1],rose)<?/MIVAR>
<?MIVAR>$(SETVAR,$flowers[2],hyacinth)<?/MIVAR>
<?MIVAR>$(SETVAR,$flowers[3],marigold)<?/MIVAR>
<?MIVAR>$(SETVAR,$flowers[4],)<?/MIVAR>

<?MIVAR>This is the second element in the array: $flowers[2]<?/MIVAR>
```

The value of the fourth element is a 0-length string.

Use the DEFAULT attribute to set a default value for a particular element in the vector array.

Use the UNSETVAR variable-processing function to remove a vector variable, as shown in the following example:

```
<?MIVAR>$(UNSETVAR,$flowers)<?/MIVAR>
```

An AppPage that tries to access a vector variable that has been unset returns an error.

Looping Through a Vector Variable

The example in the previous section shows how to use the MIVAR AppPage tag to display a single element in a vector variable by specifying the appropriate index number within brackets.

If you want to display each element in a vector variable, use the MIBLOCK AppPage tag with the FOREACH attribute in combination with the MIVAR AppPage tag, as shown in the following example:

```
<?MIVAR NAME=vec[1]>hard<?/MIVAR>
<?MIVAR NAME=vec[2]>green<?/MIVAR>
<?MIVAR NAME=vec[3]>expensive<?/MIVAR>
<?MIBLOCK INDEX=$fred FOREACH=$vec >
  <?MIVAR> Characteristics of product:$fred <?/MIVAR>
<?/MIBLOCK>
```

In this example, the **\$vec** vector variable has three elements. The MIBLOCK AppPage tag loops through the vector variable three times and displays each corresponding value.

Manipulating a Vector Variable

You can use the following four variable-processing functions to manipulate a vector variable:

- VECAPPEND
- VECSIZE
- REPLACE
- SEPARATE

Use the VECAPPEND variable-processing function to add a new value to the end of the vector variable. Use the VECSIZE variable-processing function to determine the size of a vector variable.

The following example shows how to use the VECAPPEND and VECSIZE variable-processing functions:

```
<?MIVAR NAME=flowers><?/MIVAR>

<?MIVAR>$(SETVAR,$flowers[1],rose)<?/MIVAR>
<?MIVAR>$(SETVAR,$flowers[2],hyacinth)<?/MIVAR>
<?MIVAR>$(SETVAR,$flowers[3],marigold)<?/MIVAR>

<?MIVAR>$(VECAPPEND,$flowers,daisy)<?/MIVAR>
The vector has <?MIVAR>$(VECSIZE,$flowers)<?/MIVAR> elements. <p>
The last element is <?MIVAR>$flowers[$(VECSIZE,$flowers)]<?/MIVAR>
```

Use the SEPARATE and REPLACE variable-processing functions to separate the elements in a vector variable and replace the values with something else. For detailed examples of using these two variable-processing functions, refer to [“Using SEPARATE and REPLACE in Variable Expressions” on page 8-11.](#)

Forms and Variable Vectors

If you use a form on your AppPage that uses the TYPE=CHECKBOX attribute of the INPUT tag to create a check box for users to make multiple selections, you can specify that the form variables be stored in a vector variable. Do this by making sure that each NAME attribute specifies the same variable name.

Then, in the AppPage that is invoked when the user clicks the **Submit** button, use the MIBLOCK AppPage tag with the FOREACH attribute to loop through the passed vector variable, as shown in [“Looping Through a Vector Variable” on page 5-6.](#)

The following example shows how to store check box form variables in a vector variable called **\$mycheckbox**:

```
<form method=post>
<input type=hidden name=Mival value=myform>
<input type=hidden name=process value=true>
<br>
Please check one or more options:
<br>
<input type=checkbox name=mycheckbox value=option1 checked>Option 1
<input type=checkbox name=mycheckbox value=option2>Option 2
<input type=checkbox name=mycheckbox value=option3 checked>Option 3
<hr>
<input type=submit>
</form>
```

If you use the SELECT tag with the MULTIPLE attribute to specify a selectable list of options in your form, the selected options are also passed to the called AppPage as a vector variable.

Vector variables are automatically used if you use the CHECKBOXLIST system dynamic tag and the SELECTLIST system dynamic tag with the MULTIPLE attribute. Refer to [“Using System Dynamic Tags” on page 9-8](#) for detailed information on using the CHECKBOXLIST and SELECTLIST system dynamic tags.



Important: You can only use the POST method to pass vector variables from a form to an AppPage. Using the GET method with vector variables is not supported.

Web DataBlade Module System Variables

Web DataBlade module system variables are set by the database server when an SQL statement is executed within the MISQL tag.

For more information on using these variables, see [“Using System Variables to Format the SQL Results” on page 6-7](#).

Web Server and Web Browser Variables

By default, the following Web server and Web browser variables are available to the **WebExplode()** function when you use Webdriver:

- AUTH_TYPE
- HTTP_USER_AGENT
- HTTP_REFERER
- HTTP_HOST
- HTTP_URI
- REMOTE_ADDR
- REQUEST_METHOD
- SERVER_PROTOCOL
- QUERY_STRING
- REMOTE_USER
- MI_WEBACCESSLEVEL
- MI_WEBGROUPELVEL

To access these Web browser and Web server variables in an AppPage, you must explicitly add them as user variables in the Webdriver configuration you use to access your Web application. This procedure is described later in this section.

When you add a Web browser or Web server variable to your Webdriver configuration, you can set the variable to one of the following two possible values:

- + Indicates that you are *not* going to enable AppPage caching for the AppPages that access the Web browser or Web server variable.
- +**defer** Indicates that you *are* going to enable AppPage caching for the AppPages that access the Web browser or Web server variable, and you must always access the variable as a deferred variable.

If you set the Web browser or Web server variable for your Webdriver configuration to **+defer**, you must refer to the variable in your AppPage by prepending it with the **defer** keyword and enclosing it in the `<?MIDEFERRED>` `<?/MIDEFERRED>` tags.

For example, to refer to the `HTTP_USER_AGENT` Web browser variable in your AppPage, you must use the following syntax:

```
<?MIDEFERRED>
<?MIVAR>The value of HTTP_USER_AGENT is $defer.HTTP_USER_AGENT<?/MIVAR>
<?/MIDEFERRED>
```

For more information about the `MIDEFERRED` tag using the **defer** keyword, refer to [“MIDEFERRED Tag” on page 7-7](#).

The following `env_var` AppPage displays the value for the `HTTP_USER_AGENT` Web browser variable:

```
<HTML>
<HEAD><TITLE>Display a Variable</TITLE></HEAD>
<BODY>
<HR>The value of the HTTP_USER_AGENT environment variable is
  <?MIVAR>$HTTP_USER_AGENT<?/MIVAR><HR>
</BODY>
</HTML>
```

The following sample output is returned to the client:

```
<HTML>
<HEAD><TITLE>Display a Variable</TITLE></HEAD>
<BODY>
<HR>The value of the HTTP_USER_AGENT environment variable is
      Mozilla/3.0 (WinNT;I)<HR>
</BODY>
</HTML>
```

The following is sample Web browser output.

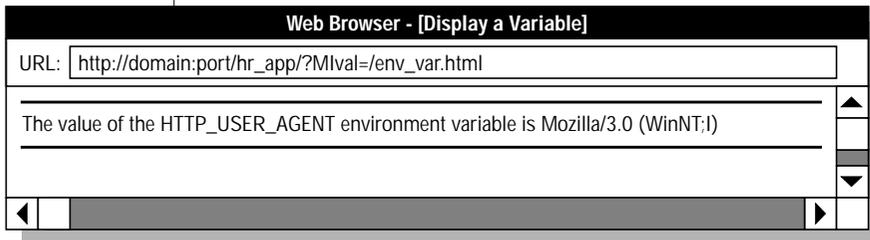


Figure 5-1
Display a Variable

To add a Web browser or Web server variable to your Webdriver configuration

1. Invoke the Web DataBlade Module Administration Tool in your browser.
For detailed information on this step, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.
2. Display the details of your Webdriver configuration.
For detailed information on this step, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.
3. Go to the **Add User Variable** AppPage.
For detailed information on this step, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.
4. Type the name of the Web browser or Web server variable in the **Variable Name** text box.

5. Enter one of the following two values in the **Value** text box, depending on how you are going to use the variable:
 - If you are *not* going to use AppPage caching, enter +.
 - If you *are* going to use AppPage caching, enter **+defer**.
6. Finish adding the user variable as described in the *IBM Informix Web DataBlade Module Administrator's Guide*.

Session Variables

A typical Web application needs a location to place search results, user preferences, shopping cart, and other data generated by users in the course of their interactions with the application. The maintenance of user-private spaces for the duration of a user's interaction with a Web-based system is often called *session management*.

Typically, each user's session is distinguished by a unique session ID, generated at the beginning of the session and embedded into the forms (or URLs) in all of the subsequent HTML pages returned to the client. Whenever the user submits a form or clicks a button, the session ID is passed in as part of the request so users can continue where they previously stopped. Webdriver uses information returned by the **WebExplode()** function to record the current values of session variables and reload them on each subsequent request from the same browser.

Session management allows a Web DataBlade application to assign a unique ID to a browser instance. This allows Webdriver to identify that particular browser instance on subsequent requests.

Currently, session management gives you persistent variables. A variable can be set on one page and retrieved on another. These variables are available as long as the session remains active and does not time out.

How Session Management Assigns an ID to a Browser Instance

There are three methods of assigning a unique ID to a browser:

- Cookies
- URL
- Auto

The first method is through the use of cookies. On the first request from a browser, Webdriver sends a cookie called **session.ID** to the browser. This ID has been given a unique value by Webdriver. When the browser makes another request, it sends with it that cookie, enabling Webdriver to re-establish the session.

Cookies are the best approach to maintaining a session between browser interaction with the Web server and Webdriver.

The second method requires anchoring the session ID within the page itself so that any URLs pointing to subsequent pages that the user may select contain the ID within their path. This method requires more configuration by the user and has implications when using the AppPage cache mechanism. For more information on AppPage caching, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

The second method also requires that the browser always hit up an anchor string that contains the **session.ID**. As soon as a URL is selected that does not contain this ID, the session information is lost.

The third method provides a way that always chooses cookies but can revert to URL-based capture if the browser is ignoring cookies. This way combines the two methods on first invocation. When the browser receives a subsequent request with the ID in both the cookie and the URL, it abandons the URL and continues processing as if just cookie had been set. If it sees only a URL ID, it continues as if URL session management had been selected. This method is known as *auto*.

Setting Session Variables

To enable the use of session variables in your AppPages, use the Web DataBlade Module Administration Tool to set the following Webdriver variables.

Variable	Mandatory?	Description
session	Yes	This variable allows you to select the method for binding a session ID to the browser. This variable can have values of <code>url</code> , <code>cookie</code> , or <code>auto</code> . If set to <code>url</code> , then the session ID is bound to any dynamic anchor variable contained within the page. Typically, this variable would be <code>\$WEB_HOME</code> . If set to <code>cookie</code> , the session ID is tracked with a variable sent back to the browser as a cookie. If you select <code>auto</code> , Webdriver automatically determines which method is best to use.
session_home	Yes, if using <code>auto</code> or <code>url</code>	This variable identifies which configuration file variable is used by your application to anchor HREF tags. For example, if your application uses <code>WEB_HOME</code> as its anchor, <code>WEB_HOME</code> is the value set for this variable. If multiple values are required for this variable, they should be separated by commas.
session_location	Yes	This variable describes how the persistent state is handled. If the session code is going to run within the same process, this variable needs to refer to the full path of the directory to create session state files. This directory must be created and owned by the same user that owns the Web server. If the code is going to run as a separate process, the variable needs to refer to a port and IP address in the form <code>port@ip-address</code> .
session_buckets	No	This variable is used to define the number of subdirectories that are available to hash the session data if the site is exceptionally large. It is only required if session management is being controlled within the same process. The default is 100.
session_life	No	This variable is used to define the amount of time a session is allowed to continue. It measures time from the last update to the session stack (if a session stack exists) or time from session creation. Granularity is in seconds (default), hours (h) or days (d) and uses the same syntax as <code>cache_page_life</code> . For more information about AppPage caching, refer to the <i>IBM Informix Web DataBlade Module Administrator's Guide</i> .



Important: If you are using the ISAPI Webdriver in conjunction with session variables and have set the session Webdriver variable to `url`, you must attach the ISAPI filter library to the Microsoft Internet Information server service. For detailed information, refer to the chapter on the ISAPI Webdriver in the “Informix Web DataBlade Module Administrator’s Guide.”

Examples of Using Session Variables

To specify a session variable in an AppPage, you add the prefix **session.** to the front of the variable.

In the following example, an AppPage contains a reference to a session variable **session.test**. The first time this AppPage is invoked, the URL does not contain a session ID. The following example shows the syntax for setting the **session.test** variable:

```
<?MIVAR NAME=session.test>xyz<?/MIVAR><br>
```

Webdriver generates a new session ID, which is passed through to the **WebExplode()** function as two variables. The first is a dynamically allocated variable **session.ID**, and the second is a modified anchor variable **WEB_HOME**.

Since **WEB_HOME** is used in subsequent pages to anchor other pages to the same application as the user hits these references, the session ID continues to be available to Webdriver. On future pages, this **session.ID** is used to access session variables created or modified in previous pages.

The following AppPage gets the value of the session variable **session.test**. The URL used to call this AppPage uses a session ID, which Webdriver interprets to produce the variable value:

```
<?MIVAR>${session.test}<?/MIVAR>. <br>
```

To unset the **session.test** session variable, use the following syntax:

```
Unsetting $session.test session variable:  
<?MIVAR>$(UNSETVAR,$session.test<?/MIVAR>
```

The following example shows an AppPage that uses three different session variables: **session.item**, **session.description**, and **session.count**. The session variables are populated by a SELECT statement. Since these session variables survive for the duration of the session, subsequent AppPages do not need to keep selecting from a table; they can simply refer to the existing variables. Using session variables can thereby notably increase performance:

```
<?MIBLOCK COND=$(NXST,$driver.session)>
<PRE>Hummm, No driver.session indicates that you have not got
session management configured correctly, or you did not hit up
this page with
a session_home anchor variable.
<?/MIBLOCK>

<?MIVAR>
$(SETVAR,myindex,0)
<?/MIVAR>
<?MISQL SQL="select item_code, description, count from
sestesttab;">
$<?MIVAR>
$(SETVAR,myindex,$(+,$myindex,1))
$(SETVAR,session.item_code[$myindex],$1)
$(SETVAR,session.description[$myindex],$(URLENCODE,$2))
$(SETVAR,session.count[$myindex],$3)
<?/MIVAR>
<?/MISQL>

<?MIVAR>$myindex rows inserted into session array<?/MIVAR>
<PRE><?MIVAR>
<BR><A HREF=$WEB_HOME?Mival=/example_menu.html>Return to
example_menu</A>
<?/MIVAR>
```

The following example shows the browser output:

```
<4 rows inserted into session array
```

The output shows that the table contained four rows.

The following AppPage example shows how to print the value of the session variables:

```
<?MIBLOCK COND=$(NXST,$session.item_code[1])>
Don't detect expected variable... need to run read_table first!
<?MIELSE>
<?MIVAR>$(SETVAR,myindex,1)<?/MIVAR>
<PRE><?MIBLOCK INDEX=item_code FOREACH=$session.item_code>
<?MIVAR>$session.item_code[$myindex],
$session.description[$myindex], $session.count[$myindex]
$(SETVAR,myindex,$(+,$myindex,1))<?/MIVAR><?/MIBLOCK>
<?/MIBLOCK>

<PRE><?MIVAR>
<BR><A HREF=$WEB_HOME?Mival=/example_menu.html>Return to
example_menu</A>
<?/MIVAR>
```

The following example shows the browser output:

```
100025, Linux Getting Started, 4
100039, History of the World, part I, 1
100042, 100 ways to avoid paying tax & duty, 3
100099, Informix Universal Server Guide, 10
```

The output is the contents of the **sestesttab** table.

For detailed information on how to configure variables or how to change the configuration of variables using the Web DataBlade Module Administration Tool, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Error Handling with the MI_DRIVER_ERROR Variable

You can handle Webdriver error conditions with error messages that are more descriptive than the standard browser error messages by selecting a page in the database to be the error-catching page. Set the following Webdriver variables with the Web DataBlade Module Administration Tool to modify the error messages seen by the browser as different types of errors are encountered.

Variable	Mandatory?	Content
show_exceptions	No	Set to <code>on</code> or <code>off</code> . When <code>on</code> , Webdriver displays the database exception returned by the WebExplode() function. When <code>off</code> , Webdriver displays the HTTP/1.0 500 Server error message. Default is <code>off</code> .
redirect_url	No	Set to the URL to redirect users to if they do not have access to the AppPage they attempt to retrieve.
error_page	No	Set to the value of the AppPage that contains error handling routines.

If **error_page** is set, Webdriver calls this page, and all error handling is processed on that page.

The following table lists the errors provided for post-AppPage execution.

Error Condition	Error Message
QRYTIMEOUT	Query exceeded the query_timeout value
NOTFOUND	No page exists in the database (404 Not Found)
NOACCESS	No access permissions
TRUNCATED	Results exceeded max_html_size

The following table lists the errors provided for pre-AppPage execution.

Error Condition	Error Message
SESSION TIMEOUT	Session exceeded session_life
SESSION INVALID	Bogus session ID passed to session manager
SESSION MANAGER	Session manager not running (external process)
SESSION ERROR	General failure in session code

For error handling, the variables **show_exceptions**, **redirect_url**, and **error_page** may be set or not set in various combinations. This affects what is received by the browser and what is executed by the **WebExplode()** function. The following sections discuss the post-AppPage errors when the variables **show_exceptions**, **redirect_url**, and **error_page** are set or not set in various combinations.

If the Webdriver variable **error_page** is set to an AppPage that might be called `myerror_page`, the following error handling occurs:

- **NOTFOUND** goes to `myerror_page`, and **MI_DRIVER_ERROR** is set to **NOTFOUND**.
- **NOACCESS** goes to `myerror_page`, and **MI_DRIVER_ERROR** is set to **NOACCESS**.
- **TRUNCATED** goes to `myerror_page`, and **MI_DRIVER_ERROR** is set to **TRUNCATED**.
- **QRYTIMEOUT** goes to `myerror_page`, and **MI_DRIVER_ERROR** is set to **QRYTIMEOUT**.

If **show_exceptions**, **redirect_url**, and **error_page** Webdriver variables have not been configured, the following error messages are returned to the browser:

- **NOTFOUND** returns `404 Asset not found.`
- **NOACCESS** returns `403 Access not allowed.`
- **TRUNCATED** returns `500 Server Error.`
- **QRYTIMEOUT** returns `500 Server Error.`

If the Webdriver variable **show_exceptions** is set to `on`, and **redirect_url** and **error_page** are not, the following error messages are returned to the browser:

- `NOTFOUND` returns `404 Asset not found.`
- `NOACCESS` returns `403 Access not allowed.`
- `TRUNCATED` returns an HTML error message explaining that the output has exceeded the value specified by the **max_html_size** variable.
- `QRYTIMEOUT` returns an HTML error message explaining that the query had exceeded the time limit specified by the **query_timeout** variable.

If the Webdriver variable **show_exceptions** is set to `on`, **redirect_url** is set to `http://www.yoursite.com`, and **error_page** is not set, the following error messages are returned to the browser:

- `NOTFOUND` goes to `http://www.yoursite.com.`
- `NOACCESS` goes to `http://www.yoursite.com.`
- `TRUNCATED` returns an HTML error message explaining that the output has exceeded the value specified by the **max_html_size** variable.
- `QRYTIMEOUT` returns an HTML error message explaining that the query has exceeded the time limit specified by the **query_timeout** variable.

If the Webdriver variable **redirect_url** is set to `http://www.yoursite.com`, and **show_exceptions** and **error_page** are not set, the following actions take place:

- `NOTFOUND` goes to `http://www.yoursite.com.`
- `NOACCESS` goes to `http://www.yoursite.com.`
- `TRUNCATED` returns `500 Server Error.`
- `QRYTIMEOUT` returns `500 Server Error.`

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In This Chapter

This chapter discusses the AppPage tags and attributes that are included with the Web DataBlade module and used to create AppPages.

The following tags are covered in this chapter:

- “MISQL Tag” on page 6-5
- “MIVAR Tag” on page 6-27
- “MIBLOCK Tag” on page 6-29
- “MIELSE Tag” on page 6-38
- “MIERROR Tag” on page 6-40
- “MICOMMENT Tag” on page 6-49

AppPage Tags

AppPage tags identify the elements of an HTML page and specify the structure and formatting for that page. The Web DataBlade module includes a set of tags that are processed by the **WebExplode()** function. Use the tags and tag attributes described in this chapter to create AppPages stored in the database.



Tip: The AppPage tags use the SGML processing instruction tag format, `<?tag_info>`, `<?/tag_info>`. An SGML processor ignores tags that it does not recognize, including AppPage tags.

The following table lists the AppPage tags.

Tag	Description
<?MISQL><?/MISQL>	Contains SQL statements and formatting specifications for the data retrieved
<?MIVAR><?/MIVAR>	Creates, assigns, and displays variables
<?MIBLOCK><?/MIBLOCK>	Delimits logical blocks of HTML
<?MIELSE>	Works in conjunction with an MIBLOCK tag that has a COND attribute
<?MIERROR><?/MIERROR>	Manages error processing
<?MIFUNC><?/MIFUNC>	Allows the execution of user-written HTTP server modules invoked by the NSAPI or ISAPI Webdriver from an AppPage
<?MIDEFERRED><?/MIDEFERRED>	Enables partial page caching
<?MIEXEC><?/MIEXEC>	Enables you to execute a Perl program in your AppPage



Important: You can nest all AppPage tags within the MIBLOCK tag. You can also nest an MISQL tag within another MISQL tag.

MISQL Tag

Use the MISQL tag to execute SQL statements and to format the results of those statements in AppPages. The expansion of SQL takes place in the database server before the resulting HTML is returned to the client.

The MISQL tag has the following tag attributes.

Attribute	Mandatory?	Description
SQL	Yes	Specifies a single SQL statement The statement must be executable inside a transaction block.
NAME	No	Specifies the name of the variable to which the formatted results of the MISQL tag are assigned If NAME is not specified, the results are output.
COND	No	Specifies if the tag is executed only if this condition evaluates to <code>TRUE</code> (nonzero) If the COND attribute is not present, the tag is executed.
ERR	No	Specifies how an error should be processed Because multiple errors can occur on an AppPage, use the ERR attribute to link the error processing to a particular MIERROR tag.
WINSTART	No	Specifies the first row in the current data set to process See “WINSTART Attribute” on page 6-14.
WINSIZE	No	Specifies the maximum number of rows to be processed See “WINSIZE Attribute” on page 6-15.
RESULTS	No	Specifies the name used in accessing the set of rows returned from a SELECT statement The scope of the RESULT attribute does not extend beyond the MISQL tag. See “RESULTS Attribute” on page 6-15.

Attribute	Mandatory?	Description
DATASET	No	Specifies how many rows can be fetched per iteration through the MISQL tag
DEFAULT	No	Default value for any unassigned variables between the start and end MISQL tags This value can be another variable.
CACHE RESULTS	No	Allows you to cache the results of a call to a SQL statement within an MISQL AppPage tag
PREPARE	No	Sets up an SQL statement for dynamic execution; the variables are substituted with real values at runtime See “PREPARE Attribute” on page 6-21.

For more information on the ERR attribute, see [“MIERROR Tag” on page 6-40.](#) For more information on the COND attribute, see [“MIBLOCK Tag” on page 6-29.](#)

Specify the SQL statement to retrieve or modify database data in the SQL attribute of the MISQL tag. Specify formatting information, which indicates how to display the results of the SQL statement, between the start and end MISQL tags. In the following example of an MISQL tag, \$1 refers to the first column returned by the SELECT statement (in this case, name), and \$2 refers to the second column (in this case, company):

```
<?MISQL SQL="select name, company from customers;">$1 $2</MISQL>
```

The following section describes how to format the results of the SQL statement executed in the MISQL tag.

Using System Variables to Format the SQL Results

For each row the SQL statement returns, the output is formatted according to the specifications between the start and end MISQL tags. The following sections describe the system variables you can use to format SQL output:

- “[Specifying Column and Row Formatting Information](#),” following
- “[Displaying Processing Information](#)” on page 6-11
- “[Specifying Replacement Values for NULL or No-Value Columns](#)” on page 6-13

Specifying Column and Row Formatting Information

To specify a column variable, use the format \$#, where # is a column number from 1 up to the maximum number of columns in the row, column variables are \$1 for the first column, \$2 for the second column, and so on. To specify all the columns, use an asterisk (\$*), as described later in this section.



Important: *If you execute the XST and NXST variable-processing functions on column variables, the functions return 0 and 1, respectively. Although these values seem to indicate that the column variables do not exist, they do in fact exist. This behavior of the XST and NXST variable-processing functions is only true for column variables; when used on all other types of Web DataBlade module variables the functions behave as expected.*

The following `/select1.html` AppPage illustrates the use of column variables:

```
<HTML>
<HEAD><TITLE>Simple Select 1</TITLE></HEAD>
<BODY>
<?MISQL SQL="select first_name, last_name, title
      from staff;">
<B>$1 $2</B>, $3<BR><?/MISQL>
</BODY>
</HTML>
```

The **WebExplode()** function returns the following sample output to the client:

```
<HTML>
<HEAD><TITLE>Simple Select 1</TITLE></HEAD>
<BODY>
<B>John Somebody</B>, Senior Consultant<BR>
<B>Joe Average</B>, Consultant<BR>
<B>Mark Markup</B>, Software Development Engineer<BR>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

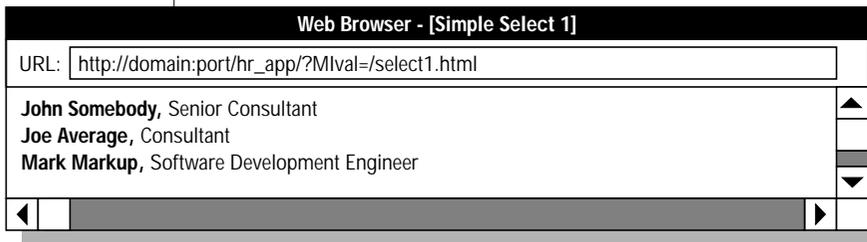


Figure 6-1
Simple Select 1

Specifying a Row Index

To specify a row index, use the format `[#]`, where `#` is a number from 1 to the maximum number of rows in the result set. If you do not specify a row index, `[1]` is assumed. The highest row index dictates the size of the *data window* that is displayed. The following `/select2.html` AppPage illustrates column and row formatting specifications and the corresponding output:

```
<HTML>
<HEAD><TITLE>Simple Select 2</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<?MISQL SQL="select first_name, last_name from staff;">
<TR> <TD> $1 $2 </TD><TD> $1[2] $2[2] </TD> </TR>
<?/MISQL>
</TABLE>
</BODY>
</HTML>
```

The **WebExplode()** function returns the following sample output to the client:

```
<HTML>
<HEAD><TITLE>Simple Select 2</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<TR> <TD> John Somebody </TD><TD> Joe Average</TD> </TR>
<TR> <TD> Mark Markup </TD><TD> NOVALUE NOVALUE</TD> </TR>
</TABLE>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

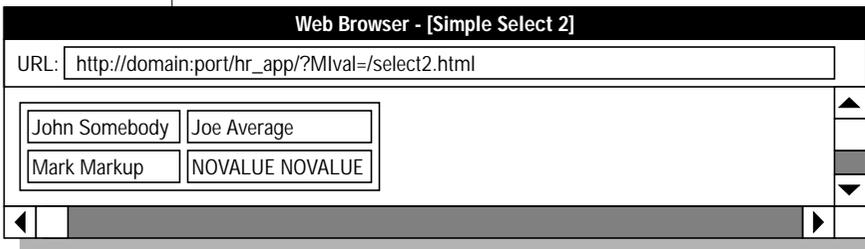


Figure 6-2
Simple Select 2

The **WebExplode()** function processes the preceding data set two rows at a time because [2] is the highest row index specified. If [3] was the highest row index specified, the data would be processed three rows at a time, and so on.

Displaying Rows with No Value

When you process multiple rows at a time, you might need to display rows with no value for the columns. See [“Specifying Replacement Values for NULL or No-Value Columns”](#) on page 6-13 for more information.

Display Repeated Items

To display items that are repeated with every column, use \$* within curly braces ({ }). This formatting technique is useful when you do not know the number of rows or columns to be retrieved for display. The `/select3.html` AppPage displays each column in a separate table cell:

```
<HTML>
<HEAD><TITLE>Simple Select 3</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<?MISQL SQL="select * from staff;">
<TR> {<TD> $* </TD>} </TR>
<?/MISQL>
</TABLE>
</BODY>
</HTML>
```

The `WebExplode()` function returns the following sample output to the client:

```
<HTML>
<HEAD><TITLE>Simple Select 3</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<TR> <TD> John </TD><TD> Somebody </TD><TD> Senior Consultant </TD> </TR>
<TR> <TD> Joe </TD><TD> Average </TD><TD> Consultant </TD> </TR>
<TR> <TD> Mark </TD><TD> Markup </TD><TD> Software Development Engineer
</TD> </TR>
</TABLE>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

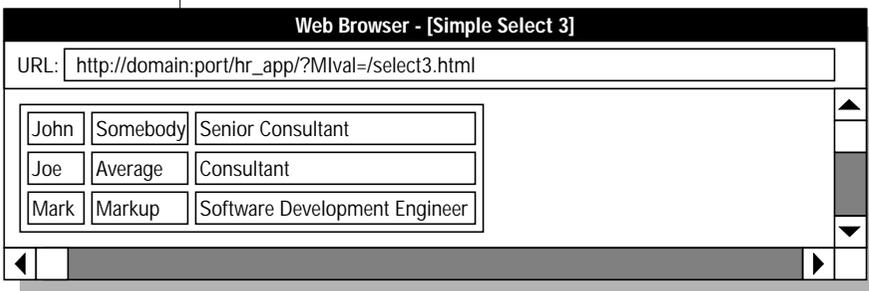


Figure 6-3
Simple Select 3

Displaying Processing Information

The following table lists additional system variables set by the database server when The **WebExplode()** function executes an SQL statement within the MISQL tag. You can use these processing variables to display more information about the results of the SQL statement.

Variable	When Set?	Description
MI_COLUMNCOUNT	On execution	Number of columns retrieved in the SQL statement
MI_CURRENTROW	On current row	Current formatted row being displayed during execution of the SQL statement Set to the number of formatted rows displayed after the MISQL tag has been executed.
MI_ERRORCODE	On error	Error code returned from the SQL statement All WebExplode() errors return an error code of -937. For explanations of error codes, see <i>IBM Informix Error Messages</i> . For more information on handling errors, see “MIERROR Tag” on page 6-40 .
MI_ERRORSTATE	On error	SQLSTATE returned from the SQL statement when an error occurs For more information on handling errors, see “MIERROR Tag” on page 6-40 .
MI_ERRORMSG	On error	Error message returned from the SQL statement For more information on handling errors, see “MIERROR Tag” on page 6-40 .
MI_ROWCOUNT	After execution	Number of rows retrieved in the SQL statement Updated after processing is complete.
MI_SQL	On execution	SQL statement executed

The following `/select4.html` AppPage displays the number of rows returned by the last query executed:

```
<HTML>
<HEAD><TITLE>Simple Select 4</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<?MISQL SQL="select * from staff;">
<TR> {<TD> $* </TD>} </TR>
</MISQL>
</TABLE>
<HR>
<B>This query retrieved:</B>
<?MIVAR> $MI_ROWCOUNT </MIVAR> <B> rows </B>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

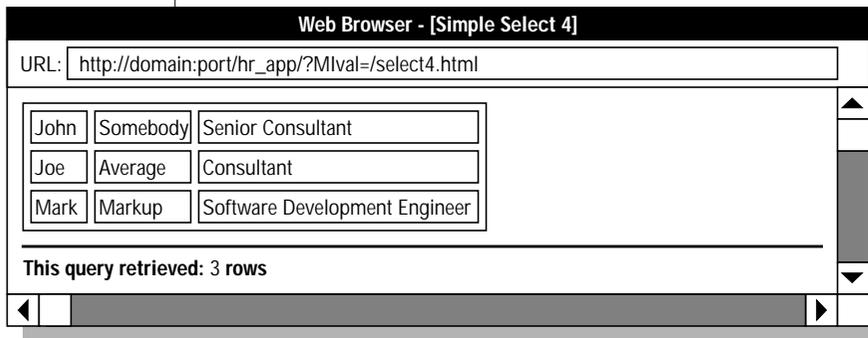


Figure 6-4
Simple Select 4



Tip: System variables maintain their values and can be redisplayed until the next MISQL tag is executed.

Specifying Replacement Values for NULL or No-Value Columns

When you format your SQL output, `NULL` is displayed by default if a column has a `null` value. `NOVALUE` is displayed by default if you specify a column variable greater than the number of columns in the row or if there is no value for a column when the output is formatted to display multiple rows on the same line.

- Use the `MI_NULL` variable to specify the text to be displayed when a `null` value is retrieved.
- Use the `MI_NOVALUE` variable to specify the text to be displayed when no value is retrieved.

In the following `/select5.html` AppPage, the `MI_NULL` and `MI_NOVALUE` variables are assigned to a blank space:

```
<HTML>
<HEAD><TITLE>Simple Select 5</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<?MIVAR NAME=$MI_NOVALUE> <?/MIVAR>
<?MIVAR NAME=$MI_NULL> <?/MIVAR>
<?MISQL SQL="select first_name, last_name from celebrities;">
<TR> <TD> $1 $2 </TD><TD> $1[2] $2[2] </TD> </TR> <?/MISQL>
</TABLE>
</BODY>
</HTML>
```

The `WebExplode()` function returns the following sample output to the client:

```
<HTML>
<HEAD><TITLE>Simple Select 5</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<TR> <TD> Jerry Lewis </TD><TD> Frank Sinatra </TD> </TR>
<TR> <TD> Dean Martin </TD><TD> Cher </TD> </TR>
<TR> <TD> Madonna </TD><TD> </TD> </TR>
</TABLE>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

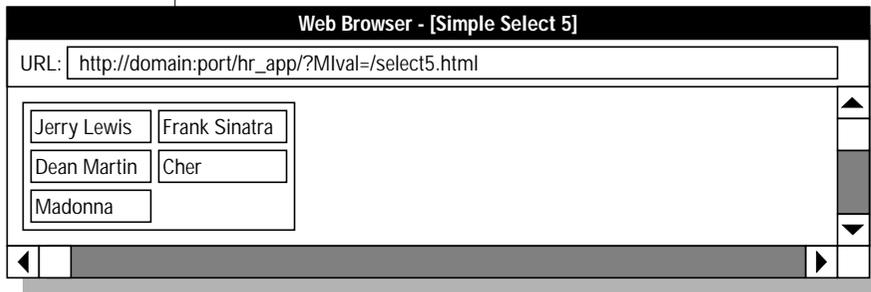


Figure 6-5
Simple Select 5

A blank space replaces the null values of **last_name** for Cher and Madonna. Because the query retrieves an odd number of rows, a blank space also replaces the columns that have no value in the last table cell.

WINSTART Attribute

The WINSTART attribute of the MISQL tag indicates the first row in the current result set to process. WINSTART can be assigned a value or can be designated a value by a variable. The value of WINSTART increments to begin with the next consecutive row number following the last row number that was retrieved. If you have set the WINSIZE attribute to 20, the WINSTART value is 0 for the first iteration through the relevant portion of the AppPage. The second iteration through the AppPage sets the WINSTART value to 20. The third iteration through the AppPage sets the WINSTART value to 40. This continues until the **WebExplode()** function retrieves all rows. For an example of how to use WINSTART and WINSIZE to create a “walking window,” see [“Example of a Walking Window” on page 8-15.](#)

WINSIZE Attribute

The WINSIZE attribute limits the maximum number of rows that are displayed in the output of the MISQL tag. Use WINSIZE to limit the size of the result set being returned across the network if the queries you are executing might return a very large number of rows. Setting this attribute limits the system resources required to execute the query and return the results to the client. The following example limits the result set to 20 formatted rows:

```
<?MISQL WINSIZE=20 SQL="select * from staff;"> { $* } <BR>
<?/MISQL>
```



Important: If WINSIZE prevents all of the rows in the result set from being retrieved, *MI_ROWCOUNT* is not updated.

For an example of how to use the WINSTART and WINSIZE attributes in an AppPage, refer to [“Example of a Walking Window” on page 8-15](#).

RESULTS Attribute

MISQL statements can be nested within one another when the RESULTS attribute is included in an MISQL statement. The RESULTS attribute defines a location where the SQL result set for a variable is bound. This location is also known as a *namespace*. To access the results value, use the column number with the RESULTS attribute, separated by a dot (.).

If you set RESULTS to `myoutput`, then the following example shows how to access the second column of the resulting set of rows:

```
$myoutput.2
```

If a namespace is declared, the data is accessible only through that namespace. If you have declared a namespace with the RESULTS attribute, you should not write into that namespace. The following table lists the variables that should not be used with the RESULTS attribute within an MISQL statement.

Variable	When Set?	Description
MI_COLUMNCOUNT	On execution	Number of columns retrieved in the SQL statement
MI_CURRENTROW	On current row	Current formatted row being displayed during execution of the SQL statement Set to the number of formatted rows displayed after the MISQL tag has been executed.
MI_ROWCOUNT	After execution	Number of rows retrieved in the SQL statement Updated after processing is complete.
MI_SQL	On execution	SQL statement executed

If, for example, you used the RESULTS attribute and the **MI_CURRENTROW** variable within a single MISQL statement, an undefined variable error is returned or the **MI_CURRENTROW** is returned from a previous MISQL tag without the RESULTS attribute.

For an example of a nested MISQL statement, consider the following two tables.

Name	Money
Joe	10
Mary	11

Item	Cost
Food	4
Art	5

The nested MISQL statement might look like this:

```
<?MISQL SQL="select item, cost from TABLE2;" RESULTS=tab2>
  <?MISQL SQL="select name, money from TABLE1;"RESULTS=tab1>
    $tab2.1 $tab2.2 $tab1.1 $tab1.2
  <?/MISQL>
  **** next iteration ****
</MISQL>
```

The results of this MISQL statement are as follows:

```
Food 4 Joe 10
Food 4 Mary 11
**** next iteration ****
Art 5 Joe 10
Art 5 Mary 11
**** next iteration ****
```

DATASET Attribute

The DATASET attribute indicates how many rows can be retrieved per iteration through the body of an MISQL tag. The following example shows the DATASET attribute, indicating that two rows are fetched:

```
<HTML>
<HEAD><TITLE>Simple Select 2</TITLE></HEAD>
<BODY>
<TABLE BORDER>
<?MISQL SQL="select first_name, last_name from staff;" DATASET=2>
<TR> <TD> $1 $2 </TD><TD> $1[2] $2[2] </TD> </TR>
</MISQL>
</TABLE>
</BODY>
</HTML>
```

CACHERESULTS Attribute

You use the CACHERESULTS attribute to cache the results of a call to an SQL statement within an MISQL AppPage tag. For example, assume that your Web DataBlade module application executes a query against a small static database table many times. The results from this query never change, thus caching by using the CACHERESULTS attribute would improve the performance of your application.

The following example shows how to use the CACHERESULTS attribute:

```
<?MISQL SQL="SELECT captionText FROM mc_Caption
          WHERE captionID = 42 AND locale = 'fr_fr'"
          CACHERESULTS>
$1
<?/MISQL>
```

Whenever the **WebExplode()** function encounters an MISQL AppPage tag with a CACHERESULTS attribute, the function searches the results cache for an entry with the same SQL statement, and if it is a prepared statement, it also searches for the same statement input parameters. If the **WebExplode()** function finds a matching entry, then the function returns the contents of the cache to the AppPage. Otherwise, the function executes the SQL statement as usual and saves the results in the cache.

The **WebExplode()** function replaces all variables and parameters in an SQL statement before it searches the results cache for a match. For example, the following MISQL call contains both a parameter and a variable:

```
<?MISQL SQL="SELECT captionText FROM mc_Caption
          WHERE captionID = @ID@ AND locale = '$LOCALE'"
          CACHERESULTS>
$1
<?/MISQL>
```

The **WebExplode()** function replaces both the parameter *@ID@* and the variable *\$LOCALE* before searching or creating a cache. The DataBlade module maintains a separate cache for each combination of *@ID@* and *\$LOCALE*.

The CACHERESULTS attribute is designed to work with queries that return a small number of small rows. As the result sets get larger, the caching mechanism works more slowly and uses more memory. Therefore, it is recommended that you not use this attribute with queries that return large amounts of data.

Clearing the Cache

The **WebExplode()** function does not automatically update the results cache when the underlying table is updated. You must explicitly clear the cache if you change the underlying table in any way.

To clear the results cache, execute the **WebClearResultsCache()** routine, as shown in the following example:

```
execute function WebClearResultsCache('mc_caption');
```

In this case, the routine deletes all entries in the cache whose SQL string contain the string *mc_caption*.

You can execute the **WebClearResultsCache()** routine with no arguments, in which case, all entries in the cache are deleted.

It is recommended that you not use the CACHERESULTS attribute on tables that are frequently updated. This is because you must clear the results cache each time the table is updated, which could result in poorer overall performance than if you did not use results caching at all.

ISTAR and Caching Results

A results cache is attached to the database that executes the MISQL AppPage tag that has a CACHERESULTS attribute. In an ISTAR query, the data in the cache might come from many different databases. This means that if the underlying table in one database changes, the cache must be cleared in all other databases that reference the changed table, or the returned data might be out of date. Due to the probability of error in such maintenance, it is recommended that you do not use the CACHERESULTS attribute with ISTAR queries.

Maximum Size of a Results Cache

Each results cache has a maximum size. If the total size of all entries in a cache has reached the maximum, then the least recently used entry is thrown out until there is room for a new entry. The default maximum size of a cache is 32 KB.

To change the maximum size, insert a new row in the **wbInfo** table, setting the **name** column to `WebResultsCacheSize` and the **value** column to the desired maximum size.

If the database does not have a **wbInfo** table or the **wbInfo** table does not have a `WebResultsCacheSize` row, then the **WebExplode()** function uses the default 32 KB maximum size.

Disabling the Cache While Updating Tables

It is not possible to implement all the standard isolation levels with the results cache. For this reason it is recommended that you disable the results cache feature while a table is being updated. Do this by changing the maximum cache size to 0 in the **wbInfo** table, then setting it back after the update is finished.

SERIAL and SERIAL8 Attributes

You use the SERIAL and SERIAL8 attributes to return the value that the database server automatically inserts into a SERIAL or SERIAL8 column after you execute an appropriate INSERT statement with the MISQL AppPage tag.

Within the MISQL AppPage tag, set the SERIAL or SERIAL8 attribute to the name of a variable that you can subsequently query to find out what serial number was inserted into the column.

For example, assume you have previously created a table with the following SQL statement:

```
CREATE TABLE serialtest (  
    id      SERIAL,  
    id8     SERIAL8,  
    name    VARCHAR(20)  
);
```

The following sample HTML shows how to use the MISQL AppPage tag to insert a row into the **serialtest** table and then use the MIVAR AppPage tag to return the values that the database server automatically inserted into the two serial columns:

```
<?MISQL SERIAL8=serial8var SERIAL=serialvar
    SQL="insert into serialtest (name) values ('whatever');">
</MISQL>
<?MIVAR> Value of serial column was $serialvar</MIVAR><p>
<?MIVAR> Value of the serial8 column was $serial8var </MIVAR>
```

PREPARE Attribute

You use the PREPARE attribute to set up an SQL statement for dynamic execution. You embed variables in your query, designated by question marks, which are substituted by real values at runtime.

There are many reasons why you might want to prepare an SQL statement first and substitute actual values when you run the statement. This section illustrates how to use the PREPARE attribute by describing two situations; the first example reduces errors, and the second enhances security.

Your web site may use HTML <FORM> tags to receive user input. Typically, the page takes the <INPUT> of the form, assembles an SQL statement string, and executes it to select or update data. If a text entry in a form contains any single quotes, the resulting SQL query can result in a syntax error. For example:

Original form:

```
<INPUT TYPE="text" NAME="name">
```

Receiving (target) page:

```
<?MISQL SQL="
    INSERT into person (name)
    VALUES ('$name')
    ;">Person inserted.
</MISQL>
```

The user types the following text into the **name** field: O'Brien

This results in an incorrect SQL VALUES clause, that raises error: -16306: "Found a quote for which there is no matching quote."

```
VALUES ('O'Brien')
```

Consider another situation; a hacker who knows that <INPUT> fields become part of a SQL string could enter data into any field (text or otherwise) to change the syntax and function of an SQL statement. For example:

Original form:

```
<INPUT TYPE="text" NAME="custid">
```

Receiving (target) page:

```
<?MISQL SQL="
  SELECT date, amount, payee
  FROM transactions
  WHERE custid = $custid
  ORDER BY 1
  ;">$1 $2 $3
><?/MISQL>
```

The hacker enters into **custid** field: 12345 OR 1=1

The resulting SQL WHERE clause is WHERE custid = 12345 OR 1=1, which allows the hacker to see all customer transactions.

To prevent these problems, you can use either of the following methods:

- Validate non-text fields and escape quotation marks for all variables coming from text form fields in your SQL statement:

```
<?MISQL SQL="INSERT INTO FOO VALUES (
  '$(REPLACE,$name',' ','...)'
  '$(REPLACE,$address',' ','...)'
  ;">
```

- Use the PREPARE attribute to put the users input into placeholders for literals in the query. For example:

```
<?MIVAR>
  $(SETVAR,val[1],$name)
  $(SETVAR,val[2],$address)
  ...
<?/MIVAR>
<?MISQL SQL="INSERT INTO FOO
  VALUES (?, ?, ...);" PREPARE="$val">
```

Generating XML-Formatted Data

You can use the MISQL AppPage tag to generate XML-formatted data based on rows in a table. You can do this in two ways:

- Use the MISQL AppPage tag to retrieve only data from the table and specify your own XML tags.
- Use XML-specific attributes of the MISQL AppPage tag to generate default XML tags as well as retrieve data from the table.

Both methods are discussed in the following sections.

AppPages that create XML-formatted data must use the extension **xml** in their names; you must have an **xml** extension in the **wbExtensions** table in your database. You can check whether this exists by invoking AppPage Builder (APB) and clicking Admin Menu and Edit Extension. Look for the **xml** extension in the list box.

If there is no **xml** extension in the list, then you must add one to the **wbExtensions** table.

To add an xml extension to the wbExtensions table

1. In APB, click Add Extension from the admin menu AppPage and type the values for the text boxes shown in the following table.

TextBox	Value
Extension	XML
Name	XML Page
Source Table	wbPages
Super Type	text
Sub Type	xml
ID Column	ID
Content Column	object
Path Column	path
Retrieval Method	WebExplode



2. Click Save.

APB adds the **xml** extension to the **wbExtensions** table and you are ready to create an AppPage that generates XML-formatted data.

Important: *Currently, the only browser that can use XML data is Microsoft Internet Explorer, Version 5.*

The examples in the following sections use this table and data:

```
CREATE TABLE people
(
    id          INTEGER,
    name        VARCHAR(30)
);

INSERT INTO people VALUES (1, 'Mary Smith');
INSERT INTO people VALUES (2, 'John Grant');
```

Using Your Own XML Tags

The following AppPage shows how you can generate XML-formatted data from the data in the **people** table:

```
<?xml version="1.0" ?>
<TABLE_DATA>
<?MISQL SQL="select id, name from people;">
    <ROW_DATA ID="$MI_CURRENTROW">
        <ID_DATA>$1</ID_DATA>
        <NAME_DATA>$2</NAME_DATA>
    </ROW_DATA>
<?/MISQL>
</TABLE_DATA>
```

When you invoke this AppPage, the **WebExplode()** function generates the following XML:

```
<?xml version="1.0" ?>
<TABLE_DATA>

    <ROW_DATA ID="1">
        <ID_DATA>1</ID_DATA>
        <NAME_DATA>Mary Smith</NAME_DATA>
    </ROW_DATA>

    <ROW_DATA ID="2">
        <ID_DATA>2</ID_DATA>
        <NAME_DATA>John Grant</NAME_DATA>
    </ROW_DATA>

</TABLE_DATA>
```

In this example, you specify all the XML tags, such as <ROW_DATA> and <TABLE_DATA>, in the standard way of using the MISQL AppPage tag.

Using Attributes of the MISQL AppPage Tag

Starting with Version 4.00.UC2 of the Web DataBlade module, you can use XML-specific attributes of the MISQL AppPage tag to automatically generate an XML stream with default XML tags. The following table describes these XML-specific attributes.

MISQL Attribute	Description
XMLDOC	Specifies the DOC type of the generated XML stream You must specify this attribute for the WebExplode() function to generate an XML stream.
XMLROW	Specifies the name of the XML tag that delineates rows If you do not specify this attribute, the WebExplode() function generates the default <ROW> and </ROW> tags.
XMLVERSION	Specifies the version of XML If you do not specify this attribute, the default is 1.0.

The following AppPage snippet shows how to use these attributes to generate an XML stream similar to that in the previous section:

```
<?MISQL SQL="select id, name from people;"
      XMLDOC=TABLE_DATA XMLROW=ROW_DATA><?/MISQL>
```

When you invoke this AppPage, the **WebExplode()** function generates the following XML:

```
<?xml version="1.0" ?>
<TABLE_DATA>
  <ROW_DATA ID="1">
    <id>1</id>
    <name>Mary Smith</name>
  </ROW_DATA>
  <ROW_DATA ID="2">
    <id>2</id>
    <name>John Grant</name>
  </ROW_DATA>
</TABLE_DATA>
```

Note that in the preceding XML, the XML tags that delineate the columns have the same name as the columns themselves. If you want to change the name of the tags that delineate the columns, use the AS keyword in your SELECT statement, as in:

```
<?MISQL SQL="select id as ID_DATA, name AS NAME_DATA from people;"
XMLDOC=TABLE_DATA XMLROW=ROW_DATA><?/MISQL>
```

When you invoke this AppPage, the **WebExplode()** function generates the following XML:

```
<?xml version="1.0" ?>
<TABLE_DATA>
  <ROW_DATA>
    <id_data>1</id_data>
    <name_data>Mary Smith</name_data>
  </ROW_DATA>
  <ROW_DATA>
    <id_data>2</id_data>
    <name_data>John Grant</name_data>
  </ROW_DATA>
</TABLE_DATA>
```

MIVAR Tag

The MIVAR tag enables you to assign and display variables. Use variables with AppPage tags to dynamically generate and format the results of SQL statements and to process errors.

The following table lists the MIVAR tag attributes.

Attribute	Mandatory?	Description
NAME	No	Specifies the name of the variable specified by the text between the start and end MIVAR tags. If NAME is not specified, the text between the start and end MIVAR tags is output. Variables within the text are expanded.
DEFAULT	No	Specifies the default value for any unassigned variables between the start and end MIVAR tags. This value can be another variable.
COND	No	Tag is enabled only if this condition evaluates to TRUE (nonzero). If the COND attribute is not present, it is executed.
ERR	No	Specifies how an error should be processed. Because multiple errors can occur on an AppPage, use the ERR attribute to link the error processing to a particular MIERROR tag.

For more information on the ERR attribute, see [“ERR Attribute” on page 6-29](#). For more information on the COND attribute see, [“COND Attribute” on page 6-31](#).

NAME Attribute

Use the NAME attribute to assign the value of the text between the start and end MIVAR tags to that variable name. The following `/var1.html` AppPage demonstrates how to assign variables:

```
<HTML>
<HEAD><TITLE>Variable Assignment 1</TITLE></HEAD>
<BODY>
<?MIVAR NAME=$TITLE>Entrepreneur<?/MIVAR>
<?MIVAR NAME=$SALUTATION> Dear $TITLE: <?/MIVAR>
<?MIVAR=$SALUTATION <BR> You are a sweepstakes winner!<?/MIVAR>
</BODY>
</HTML>
```

When you do not specify the NAME attribute, the text between the tags is output. Variables between the tags are expanded. As a result of the preceding AppPage, the `WebExplode()` function returns the following output to the client:

```
<HTML>
<HEAD><TITLE>Variable Assignment 1</TITLE></HEAD>
<BODY>
Dear Entrepreneur: <BR> You are a sweepstakes winner!
</BODY>
</HTML>
```



Important: Within the NAME attribute assignment (`NAME=$varname`), the `$` in front of the variable name is optional. In all other occurrences, you must precede the variable name with a `$`.

DEFAULT Attribute

Use the DEFAULT attribute to specify a default value for any unassigned variables between the start and end MIVAR tags. In the following `/var2.html` AppPage, the DEFAULT attribute is used to replace any unassigned variables between the start and end MIVAR tags with the value specified in the DEFAULT attribute:

```
<HTML>
<HEAD><TITLE>Variable Assignment 2</TITLE></HEAD>
<BODY>
<?MIVAR NAME=$TITLE DEFAULT="Sir or Madam"> $INPUT_TITLE <?/MIVAR>
<?MIVAR> Dear $TITLE: <BR> You are a sweepstakes winner! <?/MIVAR>
</BODY>
</HTML>
```

If the `INPUT_TITLE` variable is unassigned, the preceding `AppPage` returns the following output to the client:

```
<HTML>
<HEAD><TITLE>Variable Assignment 2</TITLE></HEAD>
<BODY>
Dear Sir or Madam: <BR> You are a sweepstakes winner!
</BODY>
</HTML>
```

If the `INPUT_TITLE` variable is assigned elsewhere—for example, in the calling URL or in an HTML form—that value overrides the default value.

COND Attribute

The `COND` attribute specifies a condition that is evaluated before the tag is processed. If the condition is true, the tag is processed. Conditions are variables or variable expressions that are false if 0 and true if nonzero.

ERR Attribute

The `ERR` attribute links an `MISQL`, `MIVAR`, `MIBLOCK`, or dynamic tag with an `MIERROR` tag to be invoked if an error occurs in the processing of that tag. Specify an `ERR` attribute in an `MISQL`, `MIVAR`, or `MIBLOCK` tag to invoke an `MIERROR` tag with a matching `ERR` attribute when an error occurs.

MIBLOCK Tag

The `MIBLOCK` tag enables you to delimit logical blocks of HTML to be executed in a variety of conditions. Extensions to the `MIBLOCK` tag, for example, determine how many times a statement between `<?MIBLOCK>` and `</?MIBLOCK>` can be iterated. The `MIBLOCK` tag can also be used for loop processing. Later sections within this `MIBLOCK` explanation describe how to use loop processing with the `MIBLOCK` tag.

Important: You can nest `MIBLOCK` tags within `MIBLOCK` tags and `MISQL` tags within `MISQL` tags. Variables are interpreted only within `MISQL`, `MIVAR`, `MIELSE`, and `MIERROR` tags and within the `COND` attribute of the `MIELSE` or `MIBLOCK` tag.



The following table lists the MIBLOCK tag attributes.

Attribute	Dependency	Description
COND	None	The MIBLOCK tag is enabled only if this condition is true (nonzero)
ERR	None	Specifies how an error should be processed Because multiple errors can occur on an AppPage, use the ERR attribute to link the error processing to a particular MIERROR tag.
INDEX	FROM and FOREACH	Used as a loop counter Required if either the FROM or the FOREACH attribute is specified.
FROM	FOR	Specifies the initial value of the INDEX attribute in a FOR loop
TO	FOR	Specifies the maximum value of the INDEX attribute value
STEP	None	Specifies the increment or decrement of the INDEX attribute The default is 1.
FOREACH	None	Used in the FOREACH loop to specify that a variable that can be, but is not necessarily, a vector variable A vector variable consists of multiple variables with the same name, passed into the AppPage using check boxes or the MULTIPLE attribute of selection lists. If the variable is not a vector variable, the loop is processed one time; if it is a vector variable, the body is processed the vector variable length number of times.
WHILE	None	Used in the WHILE loop to determine if the body is processed If this attribute is not equal to 0, the body is processed.

ERR Attribute

A vector variable consists of multiple variables with the same name, passed into the AppPage using check boxes or the MULTIPLE attribute of selection lists. The ERR attribute of the MIBLOCK tag is invoked only if an error occurs when the **WebExplode()** function evaluates the condition specified by the COND attribute. For more information on the ERR attribute, see [“MIERROR Tag” on page 6-40](#).

COND Attribute

The COND attribute specifies a condition that is evaluated before the tag is processed. If the condition is true, the tag is processed. Conditions are variables or variable expressions that are false if 0 and true if nonzero.

The following `/cond_display.html` AppPage uses the COND attribute within an MIBLOCK tag to conditionally display text according to the value of a variable:

```
<HTML>
<HEAD><TITLE>Conditional Display</TITLE></HEAD>
<BODY>
<?MIVAR COND=$(NXST,$VAR1) NAME=$VAR1>0<?/MIVAR>
This is always displayed.<BR>
<?MIBLOCK COND=$VAR1>
  This is conditionally displayed if VAR1 is nonzero.<BR>
  <B>The value of VAR1 is: <?MIVAR>$VAR1<?/MIVAR></B><BR>
<?/MIBLOCK>
This is always displayed.
</BODY>
</HTML>
```

If the condition in the MIBLOCK tag evaluates to true—that is, if the **VAR1** variable has been assigned a value other than 0 in the URL that calls it or in an HTML form—the value of the variable is displayed. The AppPage might be called with the following URL:

```
http://myhost/hr-map/?Mival=/cond_display.html&VAR1=1,
```

The preceding AppPage returns the following output to the client:

```
<HTML>
<HEAD><TITLE>Conditional Display</TITLE></HEAD>
<BODY>
This is always displayed.<BR>
  This is conditionally displayed if VAR1 is nonzero.<BR>
  <B>The value of VAR1 is: 1</B><BR>
This is always displayed.
</BODY>
</HTML>
```

If the **VAR1** variable is undefined, the preceding AppPage returns the following output to the client:

```
<HTML>
<HEAD><TITLE>Conditional Display</TITLE></HEAD>
<BODY>
This is always displayed.<BR>
This is always displayed.
</BODY>
</HTML>
```

NXST and other variable-processing functions you can use to create variable expressions are described in [Chapter 8, “Using Variable-Processing Functions in AppPages.”](#)

Loop Processing

This section describes the three classes of loop processing you can use with the MIBLOCK tag:

- **FOR**—Loop over a sequence of numbers.
- **FOREACH**—Loop over the values in a vector variable.
- **WHILE**—Loop until the evaluation of COND results in a value of 0.

FOR Loop Processing

The FOR loop uses the following attributes of the MIBLOCK tag.

Attribute	Description
INDEX	Variable used as a loop counter
FROM	Initial value of INDEX
TO	Final value of INDEX
STEP (optional)	Amount INDEX is changed each time through the loop If not specified, STEP defaults to 1. This value can be either a positive or negative integer.

The value of the STEP attribute determines loop processing, as follows.

Value	Descriptions
Positive or 0	INDEX is less than or equal to TO.
Negative	INDEX is greater than or equal to TO.

Once the loop starts, all statements within the body of the MIBLOCK tag are executed and the INDEX attribute value is added to the TO attribute. Either the statements in the loop execute again (based on the same test that caused the loop to execute initially) or the loop is exited and processing continues at the end tag.

This is an example of a FOR loop that starts at 10 and counts down to 0:

```
<?MIBLOCK INDEX=idx TO=0 FROM=10 STEP=-1>
<?MIVAR> $idx iterations left<?/MIVAR>
<?/MIBLOCK>
```



Important: Changing the value of the INDEX, TO, or STEP attributes does not affect loop processing after it has commenced.

The following flowchart illustrates the program logic for the FOR loop.

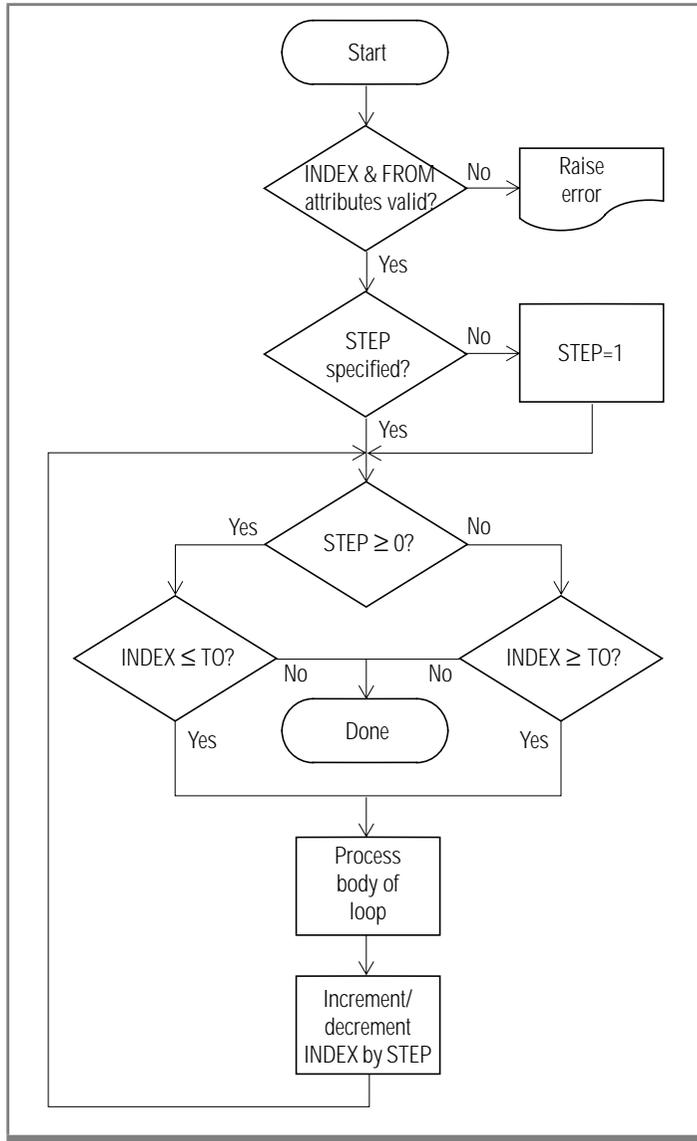


Figure 6-6
FOR Loop
Processing

FOREACH Loop Processing

The FOREACH loop uses the following two attributes of the MIBLOCK tag.

Attribute	Description
INDEX	Variable used to iterate through the elements of the vector variable.
FOREACH	Name of vector variable If it is a normal variable, then it is treated as a vector variable with one element.

The FOREACH loop is entered if the attribute is present. Once the loop is entered, the entire body of the MIBLOCK tag is processed for the first element in the vector variable. Then, as long as there are more elements in the variable, the body of the MIBLOCK tag is processed. When there are no more elements in the variable, the loop is exited and execution continues at the terminating tag.

The following example uses the MIVAR tag to first create a vector variable called `vec` that has three elements: `hard green expensive`. The example then loops through the body of the MIBLOCK tag three times, once for each element in the vector variable.

```
<?MIVAR NAME=vec[1]>hard</MIVAR>
<?MIVAR NAME=vec[2]>green</MIVAR>
<?MIVAR NAME=vec[3]>expensive</MIVAR>
<?MIBLOCK INDEX=$fred FOREACH=$vec >
  <?MIVAR> Characteristics of product:$fred </MIVAR>
</MIBLOCK>
```

The result of executing this AppPage is as follows:

```
Characteristics of product: hard
Characteristics of product: green
Characteristics of product: expensive
```

The following flowchart illustrates the program logic for the FOREACH loop.

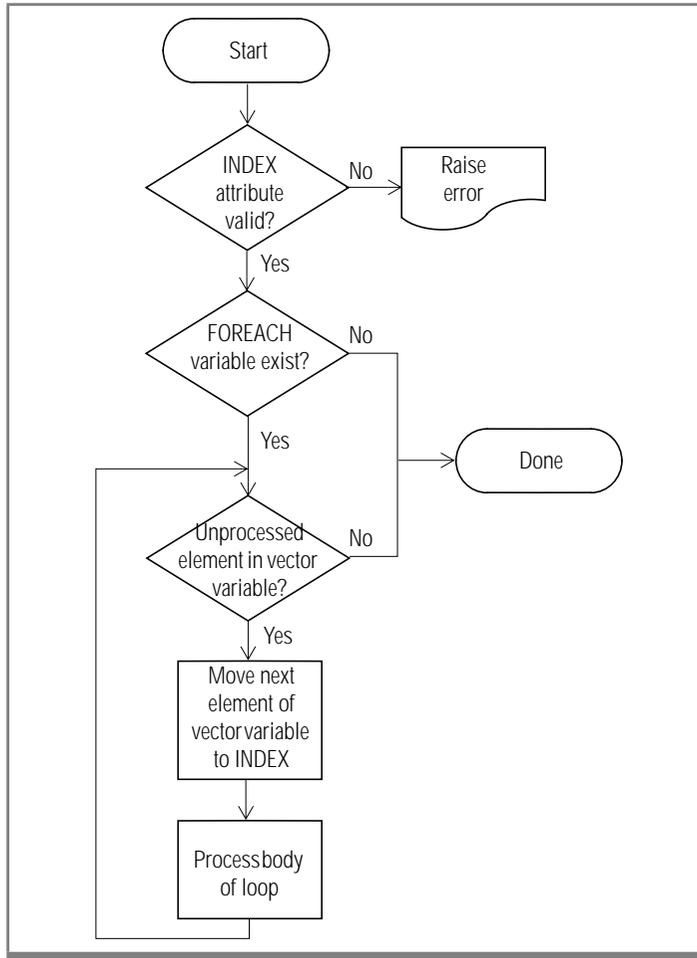


Figure 6-7
FOREACH Loop
Processing

WHILE Loop Processing

The WHILE loop uses the following attribute of the MIBLOCK tag.

Attribute	Description
WHILE	Variable expression that evaluates to a numeric value

The WHILE variable expression evaluates to a numeric value. If the variable expression is nonzero, all statements are executed within the body of the MIBLOCK tag. Control then returns to the WHILE attribute, and the variable expression is checked again. If the variable expression evaluates to nonzero, the process is repeated. If the variable is 0, processing resumes with the end tag.

The following example writes out 10 messages with the **test** variable descending toward 0:

```
<?MIVAR NAME=test>10<?/MIVAR>
<?MIBLOCK WHILE=$test>
This will iterate<?MIVAR>$test<?/MIVAR> more times.
  <?MIVAR NAME=test>$(-,$test,1)<?/MIVAR>
<?/MIBLOCK>
```

The following flowchart illustrates the program logic for the WHILE loop.

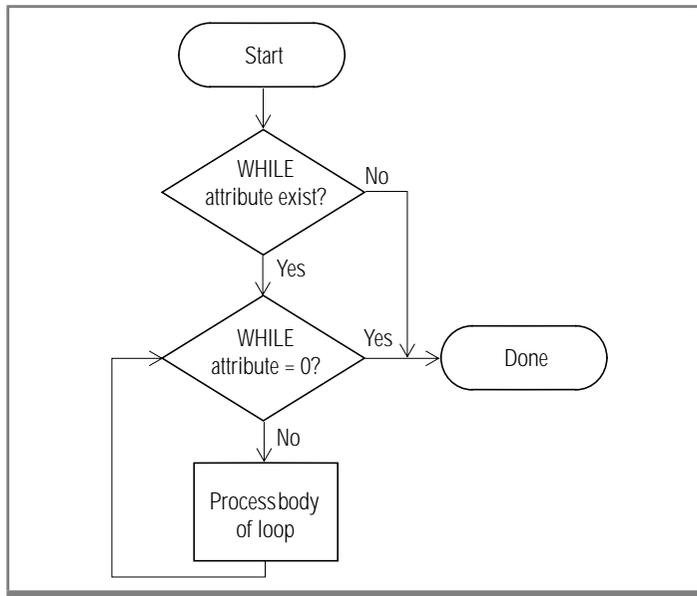


Figure 6-8
WHILE Loop
Processing

MIELSE Tag

The MIELSE tag works in conjunction with the MIBLOCK tag. MIELSE has the following optional attribute.

Attribute	Description
COND	If the value of COND is true, the body of the MIELSE is processed to the next MIBLOCK or MIELSE.

The MIELSE tag is used within the body of an MIBLOCK tag. Statements within an MIBLOCK body that contain an MIELSE tag are executed if the most recently unmatched COND attribute of MIBLOCK is 0. The body of the MIBLOCK is skipped to the MIELSE. The contents of the MIELSE is processed to the close of the most recent unclosed MIBLOCK or the next MIELSE. This is similar to Visual Basic “if then else” processing.

The following example shows a simple application of an MIELSE tag used within an MIBLOCK tag:

```
<?MISQL SQL="select foreign_language from languages where name =
'John Doe';">$1<?/MISQL>
<?MIBLOCK COND=$MI_ROWCOUNT>
You are an american
<?MIELSE>
You are multilingual
<?/MIBLOCK>
```

MIBLOCK tags can be embedded within one another. The following example shows how the MIELSE tag with a COND attribute might be used within embedded MIBLOCK tags:

```
<?MISQL SQL="select foreign_language from languages where name =
'John Doe';">
$1<?/MISQL>
<?MIBLOCK COND=$MI_ROWCOUNT>
  american
  <?MIELSE>
    <?MIBLOCK COND="$ (=, $MI_ROWCOUNT, 1) ">
      bilingual
    <?MIELSE COND="$ (=, $MI_ROWCOUNT, 2) ">
      multilingual
    <?MIELSE>
      polyglot
    <?/MIBLOCK>
  <?/MIBLOCK>
```

MIERROR Tag

Use the MIERROR tag to specify the processing that takes place when the **WebExplode()** function encounters an error within other AppPage tags. Errors can occur if the database server cannot successfully process an SQL statement, if you try to access an unassigned variable, or if you use an incorrect tag construct.



Important: The placement of MIERROR tags is significant. You must specify MIERROR tags within an AppPage prior to invoking them.

The following table lists the MIERROR tag attributes.

Attribute	Mandatory?	Description
TAG	No	Specifies the type of processing when an error occurs. This attribute must be assigned to an MISQL, MIVAR, or dynamic tag. If you make the TAG=MISQL attribute assignment, the SQL attribute must also be specified. If you make the TAG=MIVAR attribute assignment, the tag is equivalent to an MIVAR tag with no NAME attribute, and the text between start and end tags is output. Default is TAG=MIVAR.
COND	No	Tag is enabled only if this condition evaluates to true (nonzero)
ERR	No	Specifies how an error should be processed. Because multiple errors can occur on an AppPage, use the ERR attribute to link the error processing to a particular MIERROR tag.

For more information on the COND attribute, see [“MIBLOCK Tag” on page 6-29](#).

The following table lists the variables that become active when the body of the MIERROR tag is executed.

Variable	When Set	Description
MI_ERRORCODE	On error	Error code returned from the SQL statement All WebExplode() errors return an error code of -937. For explanations of error codes, see <i>IBM Informix Error Messages</i> .
MI_ERRORSTATE	On error	SQLSTATE returned from the SQL statement when an error occurs
MI_ERRORMSG	On error	Error message returned from the SQL statement

TAG Attribute

When an error occurs and the **WebExplode()** function invokes an MIERROR tag, the tag behaves like an MISQL, MIVAR, or dynamic tag, depending on the TAG attribute. Use the TAG=MISQL attribute assignment to execute the SQL statement specified in the SQL attribute.

The following example shows how to use the TAG attribute. The SELECT statement specified in the SQL attribute is performed when the MIERROR tag is invoked. This error handler retrieves an error message from the **my_weberr_catalog** table. The error handler assumes that the table already exists.

```
<?MIERROR TAG=MISQL SQL="select error_msg from my_weberr_catalog
  where error_id='$MI_ERRORCODE';">$1<?/MIERROR>
```

This is equivalent to executing the following MISQL tag:

```
<?MISQL SQL="select error_msg from my_weberr_catalog
  where error_id='$MI_ERRORCODE';">$1<?/MISQL>
```



Important: When an error occurs during the processing of an AppPage, the entire transaction is rolled back. Therefore an INSERT, UPDATE, or any other update performed by the SQL statement in the MIERROR tag is also rolled back.

An MIERROR tag with the TAG=MIVAR attribute assignment behaves like an MIVAR tag with no NAME attribute. Use the TAG=MIVAR attribute assignment to output an error message. For example, when the following MIERROR tag is invoked, the text between the start and end tags is output:

```
<?MIERROR TAG=MIVAR>
<B>Please contact your Web Administrator.</B><BR><?/MIERROR>
```

This is equivalent to executing the following MIVAR tag:

```
<?MIVAR><B>Please contact your Web Administrator.</B><BR><?/MIVAR>
```

ERR Attribute

The ERR attribute links an MISQL, MIVAR, MIBLOCK, or dynamic tag with an MIERROR tag to be invoked if an error occurs in the processing of that tag. Specify an ERR attribute in an MISQL, MIVAR, or MIBLOCK tag to invoke an MIERROR tag with a matching ERR attribute when an error occurs. For example, define an MIERROR tag as follows:

```
<?MIERROR ERR=BADTABLENAME TAG=MISQL SQL="select error_msg
from my_weberr_catalog where error_id='BADTABLENAME';">$1<?/MIERROR>
```

The **WebExplode()** function invokes this error handler if an error occurs during the processing of an MISQL or MIVAR tag, the COND attribute of an MIBLOCK tag, or dynamic tag with the same ERR attribute assignment (ERR=BADTABLENAME). If the following MISQL tag generates an error when it is executed, the preceding MIERROR tag, with the matching ERR attribute, is invoked:

```
<?MISQL ERR=BADTABLENAME SQL="select count(*) from
$TABLE_NAME">$1<BR><?/MISQL>
```

If no MIERROR tag with a matching ERR attribute precedes the MISQL, MIVAR, MIBLOCK, or dynamic tag that generates an error in the AppPage, the **WebExplode()** function invokes the generic error handler, described in the following section.

Creating a Generic Error Handler

A generic error handler is an MIERROR tag without an ERR attribute. Create a generic error handler to be invoked if an error occurs during the processing of a tag that has no ERR attribute or an invalid ERR attribute. The following example of a generic error handler logs an error message to the trace file:

```
<?MIERROR TAG=MIVAR>$(TRACEMSG,An error occurred on page:
  $Mival.)<?/MIERROR>
```

A single MIERROR AppPage tag in an AppPage acts as a generic error handler, even if it has an ERR attribute to link it to specific AppPage tag execution.

For more information on the TRACEMSG variable processing function, see [“Enabling WebExplode\(\) Tracing” on page A-6](#).

Creating a Specific Error Handler

The following example shows how to use the ERR attribute of the MIERROR tag to link an MIERROR tag to an error produced by a specific AppPage tag:

```
<?MIERROR ERR=CM_ERROR_HANDLER>
  An error has occurred while serving your request. Please contact
  system administrator and pass on the following details:<BR>
  Error Code: $MI_ERRORCODE<BR>
  Error State: $MI_ERRORSTATE<BR>
  Error Message: $MI_ERRORMSG<BR>
  SQL Statement: $MI_SQL<BR>
<?/MIERROR>
<?MISQL ERR=CM_ERROR_HANDLER SQL="select id from
your_table;">$1<?/MISQL>
```

In the example, the **your_table** table does not exist. The ERR attribute of the MISQL tag specifies the exact MIERROR tag that should be called, in this case, labeled with the **CM_ERROR_HANDLER** label.

Handling Error Conditions

When the **WebExplode()** function first encounters an MIERROR tag on an AppPage, only the COND and ERR attributes are evaluated. Variables between the start and end tags are not evaluated until the error condition is encountered. Since the condition is evaluated only the first time the **WebExplode()** function encounters the MIERROR tag, you must call the **WebExplode()** function recursively to handle specific error conditions that must be evaluated after an error occurs. The **/enter_table.html** AppPage allows you to type a table name into the **TABLE** text-entry field in the following HTML form:

```
<HTML>
<HEAD><TITLE>Enter Table Name</TITLE></HEAD>
<BODY>
<H2>Enter table name:<H2>
<?MIVAR NAME=$TABLE><?/MIVAR>
<?MIVAR>
<FORM METHOD=POST ACTION="$WEB_HOME">
<INPUT TYPE=TEXT NAME=TABLE VALUE=$TABLE>
<INPUT TYPE=HIDDEN NAME=Mival VALUE="/count_rows.html">
<INPUT TYPE=SUBMIT VALUE="Count Rows"><HR>
<?/MIVAR>
</BODY>
</HTML>
```

The following illustration shows sample Web browser output.

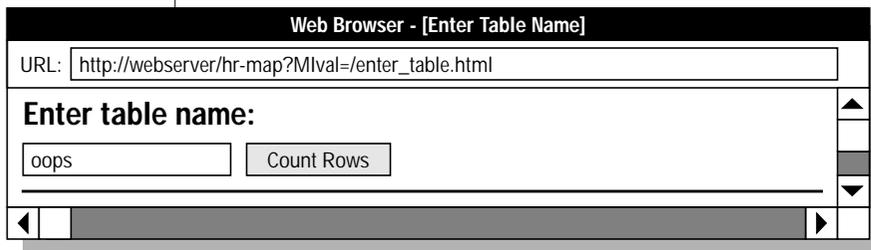


Figure 6-9
Enter Table Name

The following `/count_rows.html` AppPage processes the preceding form. This processing AppPage contains a generic error handler that uses the `WebExplode()` function to call the `/error_handler.html` AppPage if an error occurs:

```
<HTML>
<HEAD><TITLE>Count Rows</TITLE></HEAD>
<BODY>
<!-- count the number of rows in the table -->
<!-- specified, call the error_handler page -->
<!-- if an error occurs on this page. -->
<?MIERROR TAG=MISQL SQL="select WebExplode(object, ''
    from wbPages where ID='error_handler' and path='/'
    and extension='html';">$1<?/MIERROR>
<?MISQL SQL="select count(*) from $TABLE;">
<BR><B>Number of rows in table $TABLE:
</B>$(FIX,$1)<BR><?/MISQL>
</BODY>
</HTML>
```

If an error occurs in the `/count_rows.html` AppPage, the `WebExplode()` function invokes the preceding `MIERROR` tag, and the `error_handler` AppPage is executed. The `/error_handler.html` AppPage evaluates the error code:

```
<HTML>
<HEAD><TITLE>Error Processing Page</TITLE></HEAD>
<BODY>
<?MIVAR NAME=$done>NO<?/MIVAR>
<?MIBLOCK COND=$(EQ,$MI_ERRORCODE,-206)>
    We regret to inform you that table:
    <?MIVAR>$TABLE<?/MIVAR> does not exist.
    <?MIVAR NAME=done>YES<?/MIVAR>
<?/MIBLOCK>
<?MIBLOCK COND=$(EQ,$MI_ERRORCODE,-201)>
    You entered one or more blank spaces as a table name. Please go
    back and enter a table name.
    <?MIVAR NAME=done>YES<?/MIVAR>
<?/MIBLOCK>
<?MIBLOCK COND=$(AND,$(EQ,$MI_ERRORCODE,-937),$(EQ,$MI_ERRORSTATE,UWEB1))>
    You have not specified a table. Please go back and enter
    a table name.
    <?MIVAR NAME=done>YES<?/MIVAR>
<?/MIBLOCK>
<?MIBLOCK COND=$(EQ,$done,NO)>
    You received an unexpected error:
    <?MIVAR>$MI_ERRORMSG<?/MIVAR> <BR>
    Please contact your administrator.
<?/MIBLOCK>
<HR>
</BODY>
</HTML>
```

The following sample Web browser output shows what happens when the user specifies a nonexistent table.

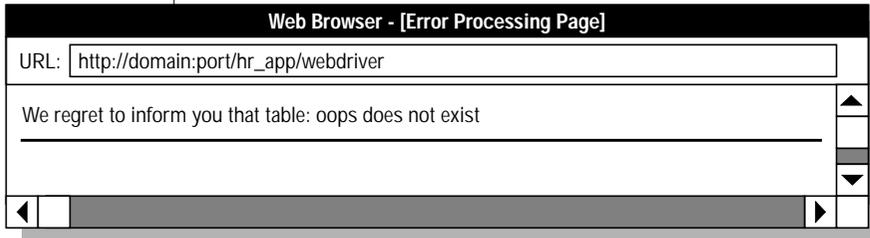


Figure 6-10
Error Processing
Page

Processing Errors with Webdriver

The database server executes each AppPage within a single transaction. When the **WebExplode()** function encounters an exception during execution of an AppPage, all of the SQL statements on that AppPage are rolled back. The **WebExplode()** function raises an exception when you execute a tag with an unassigned variable or incorrect tag construct. The database server raises an exception when an SQL error is generated.

If an MIERROR tag is invoked for the exception that occurs, the **WebExplode()** function returns a XUWEA1 error code along with the text of the MIERROR message. Webdriver displays the message text of the MIERROR tag returned by the **WebExplode()** function (up to an 8 KB buffer limit).

In the following `/catch_error.html` AppPage, a generic error handler returns a message to the user if the TEST_VAR variable is unassigned:

```
<HTML>
<HEAD><TITLE>Error Processing Page</TITLE></HEAD>
<BODY>
<?MIERROR TAG=MIVAR><HTML>
<HEAD><TITLE>Process Errors</TITLE></HEAD>
<BODY><B>Unable to proceed.</B><HR></BODY></HTML><?/MIERROR>
The value of $$TEST_VAR is <?MIVAR>$TEST_VAR<?/MIVAR>
</BODY>
</HTML>
```



Tip: Only HTML within the MIERROR tag is returned to the client.

The following illustration shows sample Web browser output.

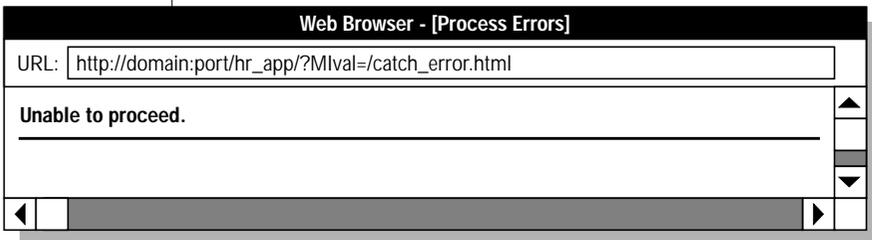


Figure 6-11
MIERROR Tag
Output

If no MIERROR tag exists to handle the error that occurs, Webdriver output depends on the setting of the **show_exceptions** variable.

Variable	Mandatory?	Content
show_exceptions	No	Use the Web DataBlade Module Administration Tool to set the show_exceptions variable to <code>on</code> or <code>off</code> . When <code>on</code> , Webdriver displays the database exception returned by WebExplode() . When <code>off</code> , Webdriver displays the HTTP/1.0 500 Server error message. Default is <code>off</code> .

If you set the **show_exceptions** variable to `on` and the **WebExplode()** function does not invoke an MIERROR tag for the exception that occurs, the database exception message returned by the **WebExplode()** function is displayed by Webdriver. If you set the **show_exceptions** variable to `off` and the **WebExplode()** function does not invoke an MIERROR tag for the exception that occurs, Webdriver displays the HTTP/1.0 500 Server error message.

The following `/process_error.html` AppPage has no MIERROR tag:

```
<HTML>
<HEAD><TITLE>Error Processing Page</TITLE></HEAD>
<BODY>
The value of $TEST_VAR is <?MIVAR>$TEST_VAR<?/MIVAR>
</BODY>
</HTML>
```

The following illustration shows sample output when the **TEST_VAR** variable has not been assigned and **show_exceptions** is set to **on**.

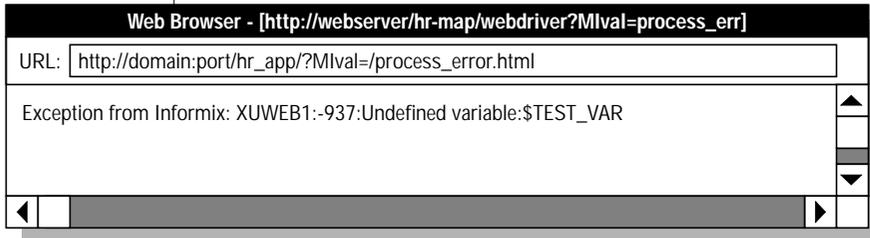


Figure 6-12
Show Exceptions On

The following illustration shows sample output when the **TEST_VAR** variable has not been assigned and **show_exceptions** is set to **off**.

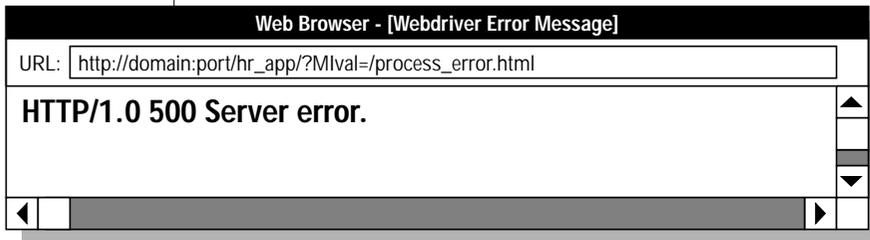


Figure 6-13
Show Exceptions Off

MICOMMENT Tag

Use the MICOMMENT AppPage tag to add comments to an AppPage. The **WebExplode()** function removes all text between the beginning and end MICOMMENT AppPage tag before it returns the resulting HTML to Webdriver. The MICOMMENT AppPage tag does not have any attributes.

The following example shows how to use the MICOMMENT AppPage tag in an AppPage:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Hello!
<?MICOMMENT>This is a comment that won't appear in the browser.
<?/MICOMMENT>
</BODY>
</HTML>
```

After exploding the AppPage, the **WebExplode()** function returns the following HTML to Webdriver:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Hello!
</BODY>
</HTML>
```

You can nest MICOMMENT AppPage tags; the **WebExplode()** function removes all the text between the outermost beginning and end AppPages tags. For example, the following AppPage uses nested MICOMMENT AppPage tags:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Welcome to my page.
<?MICOMMENT>This is the first comment.
    <?MICOMMENT> This is the second comment.
    <?/MICOMMENT>
<?/MICOMMENT>
This is the end.
</BODY>
</HTML>
```

After exploding the AppPage, the **WebExplode()** function returns the following HTML to Webdriver:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Welcome to my page.
This is the end.
</BODY>
</HTML>
```



Important: As with any AppPage tag, be sure to always specify an end tag. If an end MICOMMENT tag is missing, the **WebExplode()** function removes all text from the beginning tag to the end of the AppPage. For example, the following AppPage does not contain an end MICOMMENT AppPage tag:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Hello!
<?MICOMMENT>This is a comment.
This is supposed to be the body of the AppPage.
Unfortunately, it is going to be removed by WebExplode().
</BODY>
</HTML>
```

After exploding the AppPage, the **WebExplode()** function returns the following HTML to Webdriver:

```
<HTML>
<TITLE>Welcome Page</TITLE>
<BODY>
Hello!
```

Note that the **WebExplode()** function removed all text after the beginning MICOMMENT AppPage tag.

Special Characters in AppPage Tags

Replacement characters within your AppPages are described in the following sections:

- “[Special HTML Characters](#),” following
- “[Special Formatting Characters](#)” on page 6-52

Special HTML Characters

An *entity reference* is a way to instruct the browser to look up symbols as it renders an AppPage and replace them with equivalent characters. You must replace the double quote character with its entity reference if the character occurs within AppPage tags (between angle brackets).

Character	Entity Reference
"	"

For example, the double quotes in the following SQL statement must be replaced by their entity reference when they are included in a Web DataBlade module tag:

```
insert into staff values ('Walt "Speedy"', 'Wait', 'Engineer');
```

The syntax of the MISQL tag includes the " entity reference:

```
<?MISQL SQL="insert into staff values
('Walt &quot;Speedy&quot;', 'Wait', 'Engineer');"> 1 row inserted.
</MISQL>
```

Special Formatting Characters

You must replace characters that normally specify formatting information with the following replacements when they occur within formatting specifications (between the start and end tags).

Character	Replacement
{	{{
}	}}
\$	\$\$

For example, in the following MIVAR tag, the \$ character has been replaced:

```
<?MIVAR>You may have won $$1,000,000.00!<?/MIVAR>
```

This returns the following output to the client:

```
You may have won $1,000,000.00!
```

Using Advanced AppPage Tags

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In This Chapter

This chapter discusses AppPage tags and attributes that are used for specialized processing features of your Web application.

The following tags are covered in this chapter:

- “MIFUNC Tag,” following
- “MIDEFERRED Tag” on page 7-7
- “The MIEXEC Tag” on page 7-9

MIFUNC Tag

The MIFUNC tag allows you to execute user-written HTTP server modules invoked by the NSAPI or ISAPI Webdriver from an AppPage. Before you use the MIFUNC tag in an AppPage, you must create a shared object or DLL for a specific Webdriver implementation and register it with the Web server. You can also invoke two functions that are internal to Webdriver. These functions are used for administering session management and AppPage caching.

For details on using the MIFUNC tag within the NSAPI or ISAPI Webdriver, see the NSAPI or ISAPI chapters in the *IBM Informix Web DataBlade Module Administrator's Guide*.

When the **WebExplode()** function encounters an MIFUNC tag in an AppPage, the **WebExplode()** function passes the function name to Webdriver. Webdriver then executes the user-written function and returns the results back to the **WebExplode()** function. Within the MIFUNC tag, you must include the variables to be imported and exported (passed by reference) as name/value pairs.

Attribute	Mandatory?	Description
FUNCTION	Yes	Specifies the location of the Webdriver function in the Web server and names the routine requested
OPTIONS	No	Specifies a user-defined function that has to provide a usage description of inputs and outputs
DLL	No	Specifies the dynamically linked library (DLL) that contains the function pointed to by the FUNCTION attribute
INTERNAL	No	Specifies one of two internal Webdriver functions Can be set to <code>session_admin</code> or <code>cache_admin</code> .

FUNCTION Attribute

Use the FUNCTION attribute to locate the Webdriver function on the Web server. Assign the value of the FUNCTION attribute to the name of the Webdriver function.

When the MIFUNC tag is executed, all AppPage processing stops until the Webdriver function has completed execution. Everything between the MIFUNC tags is executed, using the variables that have been modified by reference in the Webdriver function, as well as all the variables originally supplied to the AppPage. The following AppPage example invokes the **example_onstat()** function:

```
<?MIBLOCK COND=$(NXST,$opt)><?MIVAR>$(SETVAR,$opt,"-l
/tmp")<?/MIVAR><?/MIBLOCK>
<?MIFUNC FUNCTION=example_dir OPTIONS=$opt RESULTS="">
<?MIVAR>$(HTTPHEADER,Content-type,text/plain)$RESULTS<?/MIVAR>
<?/MIFUNC>
```



Important: *If two MIFUNC tags are run in the same AppPage, be sure that the name space variables are different. MIFUNC tags can be nested, but for best performance, nesting is not recommended.*

DLL Attribute

The DLL attribute points to the dynamically-linked library (DLL) that contains the function pointed to by the FUNCTION attribute. You use the DLL attribute only in MIFUNC tags in AppPages invoked with the ISAPI Webdriver. Other implementations of Webdriver ignore this attribute.

You can either specify the full pathname of the DLL in the DLL attribute, or be sure that the directory that contains the DLL is in your Windows PATH system environment variable.

INTERNAL Attribute

You can invoke two functions that are internal to Webdriver when you use the INTERNAL attribute of the MIFUNC tag. These two functions are used for administering AppPage caching and session management and are described in the following sections.

The cache_admin Variable

The Webdriver variable **cache_admin** allows you to set the name of a page that can call the **cache_admin** function. Set the Webdriver variable **cache_admin** with the Web DataBlade Module Administration Tool to use the cache administration page provided by the Web DataBlade module. Use the **cache_admin** function to create your own cache administration page rather than use the one provided by the Web DataBlade module. The following syntax shows how to use the INTERNAL attribute with the **cache_admin** function:

```
<?MIFUNC INTERNAL=cache_admin option1=value1 [option2=value2]>
deferred html
</MIFUNC>
```

The following table shows the possible name-value pairs.

Option	Possible Values
cache_mode	enable, disable, purge, view
matchlist	name-value pairs separated by & (for example, name=Joe&id=3)
app_page	Name of an AppPage
cache_password	Password, if required, to administer caching
message	Name of variable to return result

See the *IBM Informix Web DataBlade Module Administrator's Guide* for an explanation of the cache administration AppPage and examples of AppPage caching.

The session_admin Function

The **session_admin()** function gives AppPages execution of some session management activities related to the current session. The following example shows the proper syntax to use for the INTERNAL attribute with the **session_admin()** function:

```
<MIFUNC INTERNAL=session_admin option=value>
deferred html
<?/MIFUNC>
```

The following table shows the possible name-value pair.

Option	Possible Value
session_mode	clear, end

MIDDEFERRED Tag

The MIDDEFERRED tag enables partial page caching for AppPages that contain both static and dynamic sections and that have already been configured for Webdriver AppPage caching. Use the MIDDEFERRED tag to mark the dynamic content of an AppPage, deferring its execution for each request. The MIDDEFERRED tag has no attributes.

To use the MIDDEFERRED tag in an AppPage, you must have enabled AppPage caching for the AppPage. See the *IBM Informix Web DataBlade Module Administrator's Guide* for more information on partial AppPage caching.

When Webdriver calls the **WebExplode()** function in the database and the AppPage that is being parsed contains a deferred section, Webdriver caches the AppPage, adding a **.def** extension to the file. A second call to the **WebExplode()** function is required to complete the request the first time the AppPage is called.

```
<?MIVAR>Non-deferred section<?/MIVAR>
<?MIDDEFERRED>
<?MIVAR>Deferred section<?/MIVAR>
<?/MIDDEFERRED>
```

The first time the **WebExplode()** function calls this AppPage, it writes the results to the cache directory and assigns a **.def** extension:

```
/local0/pagecache/mydb.mypage/CP232.647484-848493.def
```

The **WebExplode()** function parsing results are as follows:

```
Non-deferred section
<?MIVAR>Deferred section<?/MIVAR>
```

When the page is subsequently called (with a matching value list), the cached page is called and passed to the **WebExplode()** function, using the EXECUTE FUNCTION syntax. The parsing results are as follows:

```
Non-deferred section
Deferred section
```

Subsequent matching requests require processing of only the deferred section.

The defer. Prefix

When Webdriver caches an AppPage, it uses variables sent to the AppPage as a key to create the name of the file that is stored in the cache directory. Variables in the dynamic content of the MIDEFERRED tag, however, might change each time the AppPage is called. These types of variables, therefore, should not be part of the key used to create and find files in the AppPage cache. To specify to Webdriver that a variable should not be used in the key, prefix the variable with the **defer.** keyword.

For example, the following **/test_page.html** AppPage uses the MIDEFERRED tag:

```
<?MIVAR>Page is $Mival</MIVAR>
<?MIDEFERRED>
<?MIVAR>Total is $defer.total</MIVAR>
</MIDEFERRED>
```

Assume the page is requested in succession with the following URLs:

```
/url_mapped_path/webdriver?Mival=test_page&defer.total=100
/url_mapped_path/webdriver?Mival=test_page&defer.total=101
/url_mapped_path/webdriver?Mival=test_page&defer.total=102
```

All three URLs reference the same cached page, but each request causes the deferred section to be re-executed with a unique value of `defer.total`. The results are as follows:

```
Page is test_page
Total is 100
Page is test_page
Total is 101
Page is test_page
Total is 102
```



Important: *Nesting of the MIDEFERRED tag is not allowed.*

The MIEEXEC Tag

The MIEEXEC tag enables you to execute a Perl program in your AppPage.

You pass parameters to the Perl program by specifying user-defined attributes to the MIEEXEC tag. You pass text to the Perl program by including it between the `<?MIEEXEC>` and `<? /MIEEXEC>` tags.

If the Perl program returns information, the **WebExplode()** function replaces the full MIEEXEC tag specification in the AppPage with the returned information before the **WebExplode()** function passes the rendered AppPage to Webdriver.

Although you can write your own Perl program to use with the MIEEXEC tag, it is recommended that you start with the sample Perl program presented in [“Sample Perl Program SERVE.pl” on page 7-15](#) and modify it to fit your needs.



Important: To use the MIEEXEC tag in your AppPages, you must have previously started a WEB virtual processor. You start a virtual processor by updating the ONCONFIG file with the appropriate VPCLASS entry and restarting the database server.

For detailed information on adding the WEB virtual processor to your database server, refer to the “IBM Informix Web DataBlade Module Administrator’s Guide.”

The MIEEXEC tag has the following tag attributes.

Attribute	Mandatory?	Description
SERVICE	Yes	Specifies how to invoke the Perl program you want to execute For detailed information about using the SERVICE attribute, refer to “Using the MIEEXEC Tag in an AppPage” on page 7-11 .
NAME	No	Specifies the name of the variable to which the formatted results of the MIEEXEC tag are assigned If NAME is not specified, the results are output.

(1 of 2)

Attribute	Mandatory?	Description
COND	No	Tag is enabled only if this condition evaluates to true (nonzero)
ERR	No	Specifies how an error should be processed Because multiple errors can occur on an AppPage, use the ERR attribute to link the error processing to a particular MIERROR tag.
<i>user_attribute1</i>	No	Specifies the name of a user-defined attribute that is passed to the Perl program specified by the SERVICE attribute You can specify more than one user-defined attribute.

(2 of 2)

For more information on the NAME attribute, see [“NAME Attribute” on page 6-28](#).

For more information on the COND attribute, see [“MIBLOCK Tag” on page 6-29](#).

For more information on the ERR attribute, see [“MIERROR Tag” on page 6-40](#).



Important: All the examples in the description of the MIEEXEC tag use Perl. However, any program that can communicate via sockets can be used, including Python and Rexx.

SERVICE Attribute

The SERVICE attribute of the MIEEXEC tag specifies the Perl program you want to execute from your AppPage. In particular, the attribute specifies the commands needed to first change to the directory that contains the Perl program and then execute the program with the Perl binary.

For detailed instructions on using the SERVICE attribute of the MIEEXEC tag, refer to [“Using the MIEEXEC Tag in an AppPage,”](#) following.

The first time you specify a Perl program with the SERVICE attribute, the specified Perl program is started, and it remains available for the life of the database server. This means that subsequent uses of the MIEEXEC tag in your AppPages do not need to include the SERVICE attribute; the Web DataBlade module automatically uses the Perl program previously started.

This also means that, by default, your AppPages can only use *one* Perl program with each MIEEXEC tag: specifically, the Perl program pointed to by the first use of the MIEEXEC tag in an AppPage. If you need different MIEEXEC tags to specify different Perl programs, you must shut down the currently running Perl program so that the new Perl program is allowed to start.

To shut down the currently running Perl program in an AppPage, use the MISQL tag to execute the **WebRmtShutdown()** function. Add the MISQL tag to your AppPages before each MIEEXEC tag that uses a different Perl program from the one that is currently running. The following example shows how to execute the **WebRmtShutdown()** function with the MISQL tag:

```
<?MISQL SQL="EXECUTE FUNCTION WebRmtShutdown();">$1<?/MISQL>
```

For more information on the **WebRmtShutdown()** function, refer to [Chapter 12, “Using DataBlade Module Functions in AppPages.”](#)

Using the MIEEXEC Tag in an AppPage

This section describes the steps you must take to execute a Perl program in your AppPage with the MIEEXEC tag.

To execute a Perl program in your AppPage with the MIEEXEC tag

1. Create a Perl program that uses sockets to communicate with the Web DataBlade module.
Although you can write your own Perl program, it is highly recommended that you start with the sample Perl program called **SERVE.pl**, described in [“Sample Perl Program SERVE.pl” on page 7-15](#), and modify it to fit your needs.
2. Move the Perl program to a directory that is accessible to the user who owns the Informix database server processes. Set the permissions on the Perl program so that the same user can read it.

3. Locate the Perl binary that executes Perl programs. The Perl binary is usually called **perl**.

On UNIX, use the **which** command, as shown in the following example:

```
which perl
```

The command returns the name of a directory, such as **/usr/local/bin/perl**.

4. Be sure that you or your database administrator have previously started a WEB virtual processor.

You start a virtual processor by updating the **ONCONFIG** file with the appropriate **VPCLASS** entry and restarting the database server. For detailed information about adding and starting the WEB virtual processor, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

5. In your AppPage, add an MIEEXEC tag that sets the **SERVICE** attribute to the commands needed to find and execute the Perl program.

Specifically, set the **SERVICE** attribute to the command needed to change to the directory that contains the Perl program you want to execute, and then to the command needed to execute the Perl program. Use the full pathname of the **perl** binary.

Use user-defined attributes to the MIEEXEC tag to specify parameters to the Perl program.

The following example shows how to use the MIEEXEC tag in an AppPage:

```
<?MIVAR NAME=SRVC>cd /local/perlscripts ;  
/usr/local/bin/perl ./SERVE.pl<?/MIVAR>  
<?MIEEXEC SERVICE=$SRVC REQUEST=UPPER>  
This text, when part of the MIEEXEC tag, is in MiXeD cAsE.  
<?/MIEEXEC>
```

For a detailed explanation of this example and other examples of using the MIEEXEC tag in an AppPage, refer to the next section.

Examples of Using the MIEEXEC Tag

This section provides examples of using the MIEEXEC tag in an AppPage to execute the **SERVE.pl** sample Perl program.

The **SERVE.pl** Perl program is described in detail in [“Sample Perl Program SERVE.pl” on page 7-15](#). Familiarize yourself with the program before you continue with this section.

The **SERVE.pl** Perl program accepts the following requests, specified with the REQUEST user-defined attribute of the MIEEXEC tag:

- **RAWPERL.** Executes the text between the `<?MIEEXEC>` and `<?/MIEEXEC>` tags as Perl code
- **UPPER.** Converts the text between the `<?MIEEXEC>` and `<?/MIEEXEC>` tags to uppercase

In each example:

- The name of the directory that contains the **SERVE.pl** Perl program is **/local/perlscripts**.
- The **perl** binary that executes Perl programs is located in the directory **/usr/local/bin**.

The following example shows how to use the **SERVE.pl** Perl program to convert the text between the `<?MIEEXEC>` and `<?/MIEEXEC>` tags to uppercase:

```
<?MIVAR NAME=SRVC>cd /local/perlscripts ; /usr/local/bin/perl
./SERVE.pl<?/MIVAR>
<?MIEEXEC SERVICE=$SRVC REQUEST=UPPER>
This text, when part of the MIEEXEC tag, is in MiXeD cAsE.
<?/MIEEXEC>
```

The above sample AppPage returns the following text to the browser:

```
THIS TEXT, WHEN PART OF THE MIEEXEC TAG, IS IN MIXED CASE.
```

In this example, the SERVICE attribute specifies how to find and execute the **SERVE.pl** program. The REQUEST attribute specifies that the parameter REQUEST, with a value of UPPER, be sent to the **SERVE.pl** program. The body of the MIEEXEC tag, “This text, when part of the MIEEXEC tag, is in MiXeD cAsE” is sent to the **SERVE.pl** program and is converted to uppercase. The output of the **SERVE.pl** program is then sent to the browser via Webdriver.

The following example shows how to send Perl code embedded in the MIEEXEC tags to the **SERVE.pl** Perl program:

```
<?MIVAR NAME=SRVC>cd /local/perlscripts ; /usr/local/bin/perl
./SERVE.pl<?/MIVAR>
<?MIEEXEC SERVICE=$SRVC REQUEST=RAWPERL>
print "This is Perl output. \n";
<?/MIEEXEC>
```

The above sample AppPage returns the following text to the browser:

```
This is Perl output.
```

In this example, the REQUEST attribute of the MIEEXEC tag specifies RAWPERL. This tells the **SERVE.pl** program to take the text between the MIEEXEC tags and execute it as if it were a Perl program.

The following example also shows how to pass Perl code to the **SERVE.pl** program along with two user-defined attributes. The example also shows how the Perl program can pass variables back to the AppPage.

```
<?MIVAR NAME=SRVC>cd /local/perlscripts ; /usr/local/bin/perl
./SERVE.pl<?/MIVAR>
<?MIVAR NAME=INVAR>This was set via MIVAR<?/MIVAR>
<?MIEEXEC SERVICE=$SRVC REQUEST=RAWPERL STRONE="Hello" STRTWO=$INVAR>
    print uc($attributes{"STRONE"});
    $results{"OUTVALUE"} = length($attributes{"STRTWO"});
<?/MIEEXEC>
<?MIVAR>The length of $$INVAR is $OUTVALUE<?/MIVAR>
```

This sample AppPage returns the following text to the browser:

```
HELLO The length of $INVAR is 22
```

In the example, the two user-defined attributes are STRONE and STRTWO. The Perl program interprets these attributes with the **\$attributes** hash variable. The results of calculating the length of the STRTWO attribute, which is the value of the \$INVAR variable, are returned to the AppPage as the \$OUTVALUE variable via the **\$results** hash variable. The contents of the \$OUTVALUE variable are accessible with the MIVAR tag.

Sample Perl Program **SERVE.pl**

This section provides the sample Perl program called **SERVE.pl** that is used in all the examples of this section.

Although you can write your own Perl program to use with the **MIEXEC** tag, it is recommended that you start with the **SERVE.pl** program in this section and modify it to fit your needs.

The **SERVE.pl** program uses sockets to communicate with the Web DataBlade module, as must all programs called by the **MIEXEC** tag.

The following example shows how to specify the **SERVE.pl** program in an **MIEXEC** tag and pass it Perl code:

```
<?MIVAR NAME=SRVC>cd /local/perlscripts ; /usr/local/bin/perl
./SERVE.pl<?/MIVAR>
<?MIEXEC SERVICE=$SRVC REQUEST=RAWPERL>
print "This is Perl output. \n";
<?/MIEXEC>
```

In the example, the **SERVE.pl** Perl program is located in the directory **/local/perlscripts**, and the Perl executable is located in the directory **/user/local/bin**.

The following code makes up the **SERVE.pl** program:

```
#
# This is a SAMPLE perl program that fields requests generated
# within the Web DataBlade module using the MIEXEC tag.
# To run on NT, comment out the line: $UNIX_OS = 1;
#

require 5.002;
BEGIN { $ENV{PATH} = '/usr/ucb:/bin' };

#
# Specify modules
use Socket;
use Carp;
use FileHandle;
use English;
#
#
# Forward references
sub REAPER;
sub executeCommand;
sub processRequest;
#
# Comment out the next line to run correctly on NT
$UNIX_OS = 1;

# Setup exit handler
$SIG{CHLD} = \&REAPER;# set exit handler

#
# Declare and
my ($iaddr,$paddr,$proto,$line);
my $port = shift || @ARGV;
# note: Had one system where this value
# had to be hardwired to the node name.
my $remote = shift || 'localhost';

if ($port =~ /\D/) {
    $port = getservbyname($port,'tcp');
}

if (!$port) {
    print "NO PORT : To use as service use :\n\t\tSERVE.pl <portNum>\n";
    die "No port" ;
}

#
# Time to fork for the parent can return to database
# server and processing can continue.
#
if (defined($UNIX_OS)) {
    my $pid ;
```

```

        if (!defined($pid = fork)) {
            exit;
        } elsif ($pid) {
            exit;                # # parent must leave
        }
    }
# this is the child

    $iaddr = inet_aton($remote);
    $paddr = sockaddr_in($port, $iaddr);
    $proto = getprotobyname('name');
    socket(SOCK,PF_INET,SOCK_STREAM,$proto) or die "socket: $!";
    connect(SOCK,$paddr)                or die "connect: $!";
    SOCK->autoflush();

    print SOCK "This is the first message from the child client\n";
    SOCK->autoflush();
    $continue = 1;

#
# Main processing loop
#   Fetch Request :
#   - get length of request attributes
#   - get request attributes
#   - get length of body
#   - get body
#   Process Request :
#   - do something based upon $attributes{'REQUEST'}
#   - Put value we want to appear as variables into %results
#     a hash type.
#   - Put the value that we want in appear in the 'body'
#     in the variable ($bodyResult).
#   Generate Response :
#   - convert the %result hash to string -> $stagedResults
#     The hash is converted to name value pairs
#   - send length($stageResults) + ':' + $stagedResults
#   - send length($bodyResult) : ':' + $bodyResult
#
while ($continue) {
    undef($results);
    undef(%results);

    $attrHead=<SOCK>;        # get length of input
    defined($attrHead) || die "Connection to server dropped";

    $attrHead =~ /([0-9]*):/ ||
        print "Could not derive length from header : $attrHead\n" ;
    $attrLen = $1;          # put length in a reasonable place
    my $attr;
    while (<SOCK> ) {
        $attr .= $_;
        if (length($attr) >= $attrLen) {
            last;
        }
    }
    $attributes = $attr;
    $bodyHead=<SOCK>;
    defined($bodyHead) || die "Connection to server dropped";

```

Sample Perl Program SERVE.pl

```
$bodyHead =~ /([0-9]*):/ ||
    die "Could not derive length from header : $bodyHeader" ;
$bodyLen = $1;          # put lenght in a reasonable place

my $body;
while (<SOCK> ) {
    $body .= $_;
    if (length($body) >= $bodyLen) {
        last;
    }
}
chop($body);          # remove terminating CR sender added
$execute = $body;
%vec = split /&/, $attributes;
foreach (%vec) {
    ($name,$value) = /(.*)=(.*)/;
    $attributes{$name}=$value;
}
undef($results);      # clear out return data region

##
## got the request : execute the request
##
        processRequest();
##
## send the results : execution is finished
##
    if (defined(%results)) { # convert results vector back
        undef($stagedResults);
        while (($name, $value) = each(%results)) {
            $stagedResults .= $name . "=" . $value . "&";
        }
        chop($stagedResults);
        $results = length($stagedResults) . ":" . $stagedResults . ":";
    } else {
        $results = '0:.';
    }
    print SOCK "$results\n";

    $results = length($bodyResult) . ":" . $bodyResult;
    print SOCK "$results\n";
}
close(LOG);
close(SOCK);
# end of child code.
1;          #

#
# The support routines
#

sub executeCommand {
    my $fileName = shift;          # shift off of @_
    my $attr = shift;
    my $cmd = shift;          #
```

```

%vec = split /\&/, $attr; # variable to hash
foreach (%vec) {
    ($name,$value) = /(.*)=(.*)/;
    $attributes{$name}=$value;
}

my $fileCreate = "+>".$fileName; # create the file
open(TMPFIL,$fileCreate) || die "open failed $fileName";

my $oldHandle = select(TMPFIL);#
    $|=1;

eval " $cmd \n";# executes command use quotes # execute
    select($oldHandle);
seek(TMPFIL,0, 0) || die "seek failed";
TMPFIL;
}

sub REAPER {
    $waitedpid = wait;
    $SIG{CHLD} = \&REAPER;
}

# processRequest
# INPUT :
# %attributes : variables/attributes passed in
# $body : the body of the tag
# OUTPUT :
# %results : variables to return
# $body : bodyResult1
# NOTE : input and output are going through global name space.
sub processRequest {

    $_ = $attributes{"REQUEST"};
    undef($bodyResult);
    SWITCH: {
        /^UPPER/ && do {
            $bodyResult = uc($execute);
            last SWITCH;
        };
        /^RAWPERL/ && do {
            $fileName = '/tmp/' . $port . '.tmp';
            $execute .= "\n";
            undef(%results);# $execute string may create results
            $fileHandle = &executeCommand($fileName, $attributes,
                $execute);

            while ( <$fileHandle> ) { # # send back results
                $bodyResult .= $_;
            }
            close $fileHandle;
        }
    }
}

```

Sample Perl Program SERVE.pl

```
        last SWITCH;
    };
    $bodyResult = " REQUEST \"$_\" is unknown";
}
}
```

Using Variable-Processing Functions in AppPages

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In This Chapter

This chapter describes how variable-processing functions enable you to perform calculations using variables that are passed into an AppPage, generated within the AppPage, or returned from the database. It includes the following topics:

- “Variable-Processing Functions,” following
- “Using Variable Expressions in AppPages” on page 8-10
- “Special Characters in Variable Expressions” on page 8-17

Variable-Processing Functions

Variables are identified by a dollar sign (\$) followed by alphanumeric and underscore characters. *Variable expressions* start with a \$ character followed by the expression within parentheses, \$(*expression*). *Variable-processing functions* allow you to evaluate and manipulate variables within variable expressions. Variable expressions can contain other variable expressions.

You should always enclose variable-processing functions used in any attribute of an AppPage tag in double quotes.

For example, the following MISQL AppPage tag includes a variable-processing function enclosed in double quotes in its COND attribute:

```
<?MISQL COND="$(>,val1,val2)" SQL="select * from staff;">
```

The following example uses a table in the **superstores_demo** demonstration database provided with IBM Informix Dynamic Server (the scripts to create this database are under \$INFORMIXDIR/demo/dbaccess/demo_ud).

```
<?MISQL COND="$(XST,$rep_num)"  
SQL="select * from sales_reps where rep_num = $rep_num ;">
```



Important: Variables and variable expressions are interpreted only within *MISQL*, *MIVAR*, and *MIERROR* tags, and within the *COND* attribute of the *MIBLOCK* tag.

The following functions can be performed on Web DataBlade module variables.

Function	Returns
$\$(+, val1, val2, \dots, valn)$	Returns the sum of the numbers <i>val1</i> , <i>val2</i> , ..., <i>valn</i>
$\$(-, val1, val2, \dots, valn)$	Returns the results of subtracting the numbers <i>val2</i> through <i>valn</i> from <i>val1</i>
$\$(*, val1, val2, \dots, valn)$	Returns the result of multiplying the numbers <i>val1</i> , <i>val2</i> , ..., <i>valn</i>
$\$(/, val1, val2, \dots, valn)$	Returns the results of dividing the number <i>val1</i> by <i>val2</i> , ..., <i>valn</i>
$\$(=, val1, val2)$	If the numbers <i>val1</i> and <i>val2</i> are equal, returns 1; otherwise, returns 0.
$\$(<, val1, val2)$	If the number <i>val1</i> is less than <i>val2</i> , returns 1; otherwise, returns 0.
$\$(>, val1, val2)$	If the number <i>val1</i> is greater than <i>val2</i> , returns 1; otherwise, returns 0.
$\$(\neq, val1, val2)$	If the numbers <i>val1</i> and <i>val2</i> are not equal, returns 1; otherwise, returns 0.
$\$(\leq, val1, val2)$	If the number <i>val1</i> is less than or equal to <i>val2</i> , returns 1; otherwise, returns 0.
$\$(\geq, val1, val2)$	If the number <i>val1</i> is greater than or equal to <i>val2</i> , returns 1; otherwise, returns 0.
$\$(AND, val1, val2, \dots, valn)$	Returns the logical AND of the integers <i>val1</i> through <i>valn</i> Processing halts when a false condition is reached.
$\$(CONCAT, arg1, arg2)$	Concatenates <i>arg1</i> and <i>arg2</i>

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Function	Returns
<code>\$(DEFER,udtname,name,val,[name,val]...)</code>	When using modified URLs, a cached page must be modified before being transmitted by WebDriver. This requires that the Web DataBlade module replace a key in the output stream. The parameter <i>udtname</i> is mapped to the output stream. When Webdriver finds an AppPage in the cache, it scans and replaces keys on the AppPage and transmits the AppPage to the browser.
<code>\$(EC,string1,string2)</code>	If <i>string1</i> and <i>string2</i> are identical, regardless of lettercase, returns 1; otherwise, returns 0.
<code>\$(EQ,string1,string2)</code>	If <i>string1</i> and <i>string2</i> are identical, including lettercase, returns 1; otherwise, returns 0.
<code>\$(EVAL, \$varname)</code>	Evaluates the variable passed as the first parameter On success, outputs the resultant string. On failure, raises an exception. The name of a previously defined variable is <i>\$varname</i> .
<code>\$(EXIT,depth)</code>	Exits a control body of an MIBLOCK, MIVAR, or MISQL tag The <i>depth</i> indicates the number of levels to exit from.
<code>\$(FIX,value)</code>	Truncates the real number <i>value</i> to an integer by discarding any fractional part
<code>\$(HTTPHEADER,name,value)</code>	Adds the HTTP header <i>name</i> with the <i>value</i> to an AppPage For more information, see “Adding HTTP Headers to AppPages” on page 13-3.
<code>\$(IF,expr,dottrue)</code>	If <i>expr</i> is nonzero, evaluates and returns <i>dottrue</i>

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Function	Returns
$\$(IF,expr,dottrue,dofalse)$	If <i>expr</i> is nonzero, <i>dottrue</i> is evaluated and returned. Otherwise, evaluates and returns <i>dofalse</i> . The branch not chosen by <i>expr</i> is not evaluated.
$\$(INDEX,which,string)$	The parameter <i>string</i> is assumed to contain one or more values, delimited by a comma. The numeric value <i>which</i> selects one of these values to be extracted. Numbering of the items in <i>string</i> begins with 0.
$\$(ISNOVALUE,$num)$	Determines if column <i>\$num</i> has no value
$\$(ISNULL,$num)$	Determines if column <i>\$num</i> current value is null
$\$(ISINT,$value)$	If <i>value</i> is an integer, returns 1; otherwise, returns 0. (A number that is of equal value to an integer, such as 1.0, evaluates to 1.)
$\$(ISNUM,value)$	If <i>value</i> is numeric, returns 1; otherwise, returns 0.
$\$(LOWER,string)$	Returns <i>string</i> , converted to lowercase letters
$\$(MOD,value1,value2)$	Returns the remainder of <i>value1</i> divided by <i>value2</i> , and thus returns 0 when <i>value2</i> divides <i>value1</i> exactly
$\$(NC,string1,string2)$	If <i>string1</i> and <i>string2</i> are not identical, regardless of lettercase, returns 1; otherwise, returns 0.
$\$(NE,string1,string2)$	If <i>string1</i> and <i>string2</i> are not identical, including lettercase, returns 1; otherwise, returns 0.
$\$(NOT,value)$	Returns the logical negation of <i>value</i>

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Function	Returns
<code>\$(NTH,which,arg0,arg1,...,argN)</code>	<p>Evaluates and returns the argument selected by <i>which</i></p> <p>If <i>which</i> is 0, returns <i>arg0</i>, and so on. Note the difference between <code>\$(NTH)</code> and <code>\$(INDEX)</code>; <code>\$(NTH)</code> returns one of a series of arguments to the function while <code>\$(INDEX)</code> extracts a value from a comma-delimited string passed as a single argument</p> <p>Does not evaluate arguments not selected by <i>which</i></p>
<code>\$(NXST,varname)</code>	<p>If variable <i>varname</i> does not exist (has not been assigned a numeric or string value), returns 1; otherwise returns 0.</p>
<code>\$(OR,val1,val2,...,valn)</code>	<p>Returns the logical OR of the integers <i>val1</i> through <i>valn</i></p> <p>Processing halts when a true condition is reached.</p>
<code>\$(PARSE-HTML,string)</code>	<p>Used with server-side includes</p> <p>The parameter <i>string</i> may be either <code>DYNAMIC</code> or <code>SHARED</code>. For <code>DYNAMIC</code>, use the Web DataBlade Module Administration Tool to set the parse_html_directory variable to a path. If <i>string</i> is <code>SHARED</code>, the AppPage is used from cache. For more information on server-side includes, see the <i>IBM Informix Web DataBlade Module Administrator's Guide</i>.</p>
<code>\$(POSITION,string1,string2,valn)</code>	<p>Returns the starting position of <i>string2</i> within <i>string1</i></p> <p>If <i>string2</i> is not found, returns 0. The parameter <i>valn</i> is a numeric offset and gives the start location within the first input string. If <i>valn</i> is less than or equal to 0, returns 0.</p>

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Function	Returns
<code>\$(REPLACE, string1, string2, string3)</code>	Replaces all instances of <i>string2</i> with <i>string3</i> within <i>string1</i>
<code>\$(ROUND, value, digit)</code>	Returns the numeric <i>value</i> rounded to no more than <i>digit</i> number of digits
<code>\$(SEPARATE, varvector, string)</code>	Separates items in the vector variable <i>varvector</i> with the string value <i>string</i>
<code>\$(SETVAR, varname, value)</code>	Sets the variable <i>varname</i> to the numeric or string <i>value</i>
<code>\$(STRFILL, string, ncopies)</code>	Returns the result of concatenating <i>ncopies</i> number of copies of <i>string</i>
<code>\$(STRLEN, string)</code>	Returns the length of <i>string</i>
<code>\$(SUBSTR, string, start, length)</code>	Returns the substring of <i>string</i> starting at character <i>start</i> and extending for <i>length</i> characters Characters in the string are numbered from 1. If <i>length</i> is omitted, returns the entire remaining length of the string.
<code>\$(TRACEMSG, string)</code>	Writes the message <i>string</i> to a trace file For more information, see “Enabling WebExplode() Tracing” on page A-6.
<code>\$(TRIM, string)</code>	Removes leading and trailing blank spaces from <i>string</i>
<code>\$(TRUNC, value, digit)</code>	Returns the numeric <i>value</i> truncated to no more than <i>digit</i> number of digits
<code>\$(UNSETVAR, varname)</code>	Unsets the variable <i>varname</i> No error is generated if <i>varname</i> is not set.
<code>\$(UPPER, string)</code>	Returns <i>string</i> , converted to uppercase letters

(5 of 6)

Function	Returns
<code>\$(URLDECODE,string)</code>	Returns <i>string</i> with all hexadecimal values replaced with their nonalphanumeric ASCII characters For a description of this functionality implemented as a server function, see “WebURLDecode()” on page 12-14 .
<code>\$(URLENCODE,string)</code>	Returns <i>string</i> with all nonalphanumeric ASCII characters replaced with their hexadecimal values. For a description of this functionality implemented as a server function, see “WebURLEncode()” on page 12-15 .
<code>\$(VECSIZE,\$vec)</code>	Returns the number of elements in a vector
<code>\$(VECAPPEND,\$vec,value)</code>	Appends a value to the end of the vector
<code>\$(WEBUNHTML,string)</code>	Returns <i>string</i> with special HTML characters replaced with their entity reference for display by a Web browser. For a description of this functionality implemented as a server function, see “WebUnHTML()” on page 12-12 .
<code>\$(XOR,val1,val2,...,valn)</code>	Returns the logical XOR of the integers <i>val1</i> through <i>valn</i>
<code>\$(XST,varname)</code>	If variable <i>varname</i> exists (has been assigned a numeric or string value), returns 1; otherwise, returns 0.

(6 of 6)



Important: Arithmetic functions accept decimal or integer arguments and perform all calculations in decimal arithmetic. Arithmetic functions that allow more than two arguments allow a maximum of 10.



Tip: Spaces are significant in the evaluation of variable expressions. For example, the variable expression `$(EQ,$var1,$var2)` is not equivalent to `$(EQ, $var1,$var2)` because the latter expression has a space before the string `$var1`.

Using Variable Expressions in AppPages

A variable expression contains multiple variable-processing functions. The following sections show uses for variable-processing functions to create simple and complex variable expressions. It includes the following topics:

- “Using Arithmetic Functions in Variable Expressions,” following
- “Using SEPARATE and REPLACE in Variable Expressions” on page 8-11
- “Using Variable Expressions to Format Output Conditionally” on page 8-13

Using Arithmetic Functions in Variable Expressions

The following `/varexp1.html` AppPage uses the `+` (*plus*) function and shows an example of variable-processing within an MIVAR tag:

```
<HTML>
<HEAD><TITLE>Adding Two Variables</TITLE></HEAD>
<BODY>
<?MIVAR NAME=NUMA>10<?/MIVAR>
<?MIVAR NAME=NUMB>20<?/MIVAR>
<?MIVAR><B>The sum of $NUMA and $NUMB is</B> $(+, $NUMA, $NUMB).
<?/MIVAR>
</BODY>
</HTML>
```

The `WebExplode()` function returns the following output to the client:

```
<B>The sum of 10 and 20 is</B> 30.
```

The following figure shows sample Web browser output.

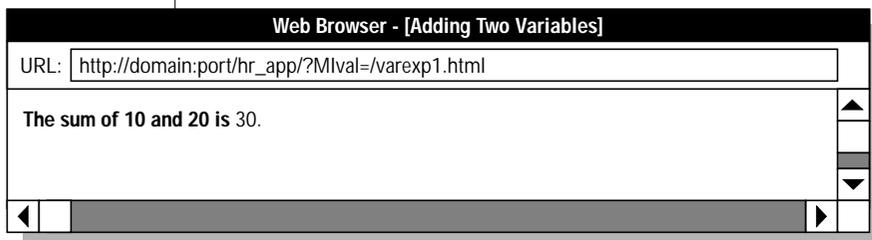


Figure 8-1
Adding Two
Variables

Using SEPARATE and REPLACE in Variable Expressions

Use the SEPARATE variable-processing function to separate elements in a vector variable. A vector variable consists of multiple variables with the same name, passed into the AppPage using check boxes or the MULTIPLE attribute of selection lists.

Use the REPLACE variable-processing function to specify a string to be replaced within text. For example, you must replace single quotes with two single quotes so that single quotes can be inserted into the database. If this replacement is not made and the text being inserted into the database contains single quotes, the INSERT statement is not built correctly.

Example of SEPARATE and REPLACE

The following `/table_prog.html` AppPage uses both the SEPARATE and REPLACE variable-processing functions:

```
<HTML>
<HEAD><TITLE> Select from Table</TITLE></HEAD>
<BODY>
<!-- Show columns of employees table in a form --->
<!-- with multi-value check box. Turn checked --->
<!-- columns into a comma-separated list. --->
<?MIVAR NAME=$column_headers> <?/MIVAR>
<HR>
<STRONG>Select Columns from Employees Table</STRONG><BR>
<?MIVAR><FORM METHOD=POST ACTION="$WEB_HOME"><?/MIVAR>
<?MYSQL SQL="select a.colname, colno from syscolumns a, systables b
  where a.tabid = b.tabid and b.tabname = 'employees' order by colno;">
<INPUT TYPE=CHECKBOX NAME=column_list VALUE="$1">$1<?/MYSQL>
<INPUT TYPE=HIDDEN NAME=Mival VALUE="/table_prog.html">
<INPUT TYPE=SUBMIT VALUE="Get Rows"><HR>
</FORM>
<!-- On the second time through the form, --->
<!-- retrieve the selected columns from the --->
<!-- database, display in table format. --->
<?MIVAR COND=$(NXST,$column_list) NAME=$column_list><?/MIVAR>
<?MIBLOCK COND=$(NOT,$(EQ,$column_list,))>
  <?MIVAR NAME=$select_list>$(SEPARATE,$column_list,",")<?/MIVAR>
  <?MIVAR
NAME=$column_headers>$(REPLACE,$select_list,",",</TH><TH>)<?/MIVAR>
  <TABLE BORDER>
    <TR><TH><?MIVAR>$column_headers<?/MIVAR></TH></TR>
    <?MYSQL SQL="select $select_list from employees order by 1;">
    <TR>{<TD>$*</TD>}</TR>
    <?/MYSQL>
  </TABLE>
<?/MIBLOCK>
</BODY>
</HTML>
```

The columns of the **employees** table are displayed as a check box list. You check one or more columns of the **employees** table to be retrieved; then submit the form to post it to the same `/table_prog.html` AppPage. On the second call to the AppPage, the SQL statement that retrieves the checked columns of the **employees** table is built by the **WebExplode()** function, using the **SEPARATE** variable-processing function to place commas between the selected columns in the **SELECT** statement. The **REPLACE** variable is then used to replace the commas separating items in the vector variable with **TH** tags to create an HTML table row. Finally, the **WebExplode()** function builds the output in an HTML table.

The following figure shows sample Web browser output.

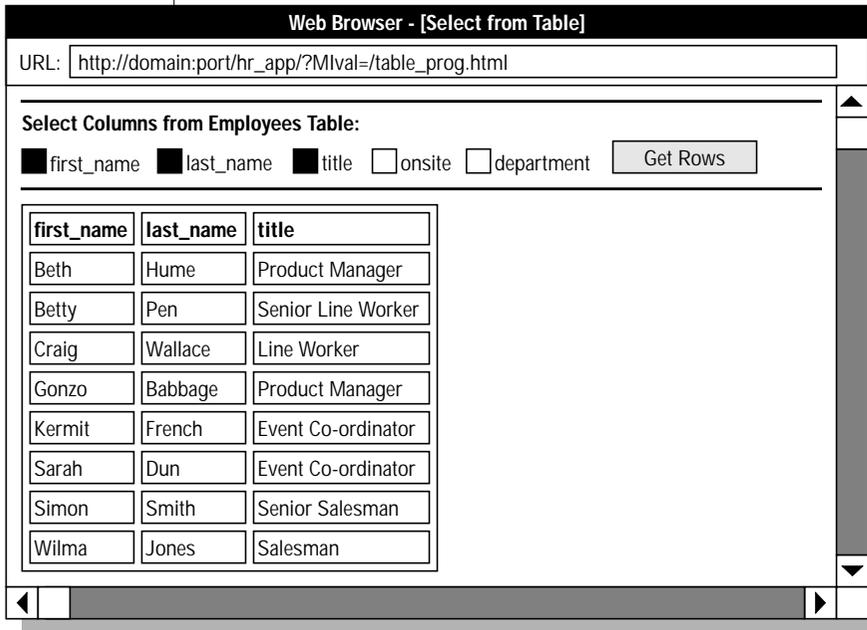


Figure 8-2
Select from Table

Using Variable Expressions to Format Output Conditionally

You can also use variable-processing functions to format output conditionally.

Example of Conditional Output

The following `/varexp2.html` AppPage illustrates how a variable expression can be used to process the results of a SELECT statement:

```
<HTML>
<HEAD><TITLE>Conditional Output</TITLE></HEAD>
<BODY>
<B>Display employee names by department: </B>
<?MIVAR NAME=LAST><?/MIVAR>
<TABLE BORDER=1>
<?MISQL SQL="select b.name, a.first_name, a.last_name from
    employees a , departments b where a.department = b.name
    order by b.name, a.last_name;">
<TR>
<TD>$( IF, $(NE, $1, $LAST) , $1)</TD>
<TD> $2 $3</TD> $(SETVAR, $LAST, $1)
</TR>
<?/MISQL>
</TABLE>
</BODY>
</HTML>
```

This AppPage queries the **employees** and **departments** tables and displays the employees by department. The department name is not output when the name has not changed from the previous row retrieved.

The following figure shows sample Web browser output.

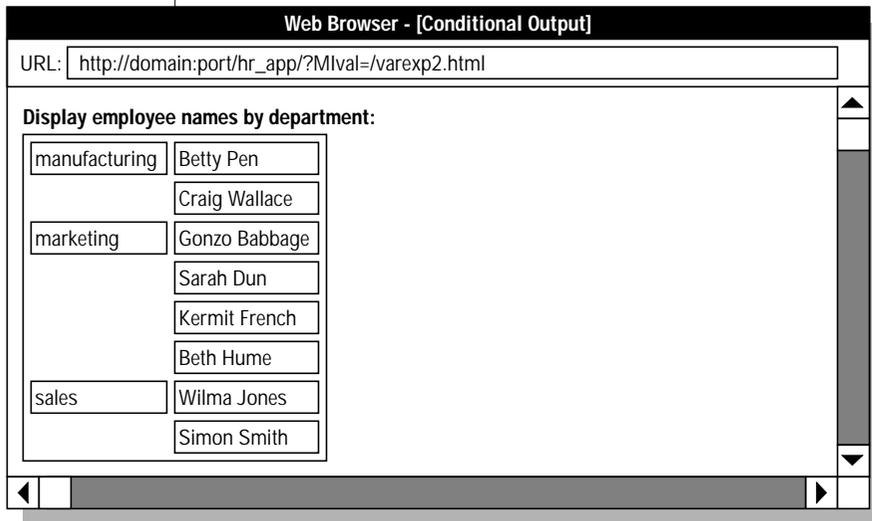


Figure 8-3
Conditional Output

Example of a Walking Window

A *walking window* shows only a portion of total responses. For example, a query might return 100 rows, but you want only 20 at a time to appear in your Web browser. In this case, you would have five windows and can *walk* forward and backwards through these five windows.

The following `/winstart.html` AppPage uses variable-processing functions to format output conditionally:

```

<HTML>
<HEAD><TITLE>WINSTART</TITLE></HEAD>
<BODY>
<!-- Initialization --->
<?MIVAR NAME=WINSIZE DEFAULT=4>$WINSIZE<?/MIVAR>
<?MIVAR NAME=BEGIN DEFAULT=1>$START<?/MIVAR>

<!-- Definition of Ranges ---->
<?MIVAR NAME=BEGIN>$(IF,$(<,$BEGIN,1),1,$BEGIN)<?/MIVAR>
<?MIVAR NAME=END>$(+,$BEGIN,$WINSIZE)<?/MIVAR>
<!-- Execution --->
<TABLE BORDER>
<?MISQL WINSTART=$BEGIN WINSIZE=$WINSIZE
  SQL="select tabname from systables where tabname like 'wb%'
      order by tabname;">
  <TR><TD>$1</TD></TR>
</MISQL>
</TABLE>
<BR>
<?MIBLOCK COND="$(>,$BEGIN,1)">
  <?MIVAR>
  <A HREF=$WEB_HOME?Mival=/walking1.html&START=$(
,$BEGIN,$WINSIZE)&WINSIZE=$WINSIZE>
  Previous $WINSIZE Rows </A> $(IF,$(<,$MI_ROWCOUNT,$WINSIZE),
  No More Rows, )
  <?/MIVAR>
</MIBLOCK>
<?MIBLOCK
COND="$(AND,$(>,$END,$WINSIZE),$(>=,$MI_ROWCOUNT,$WINSIZE))">
  <?MIVAR>
  <A
  HREF=$WEB_HOME?Mival=/walking1.html&START=$END&WINSIZE=$WINSIZE>
  Next $WINSIZE Rows </A>
  <?/MIVAR>
</MIBLOCK>
</BODY>
</HTML>

```

This example queries the **systable** table and displays only the rows that are within the current data window. The **WebExplode()** function suppresses the display of a row when the row is not within the current data window.

The following figure shows the Web browser output for the first set of rows retrieved.

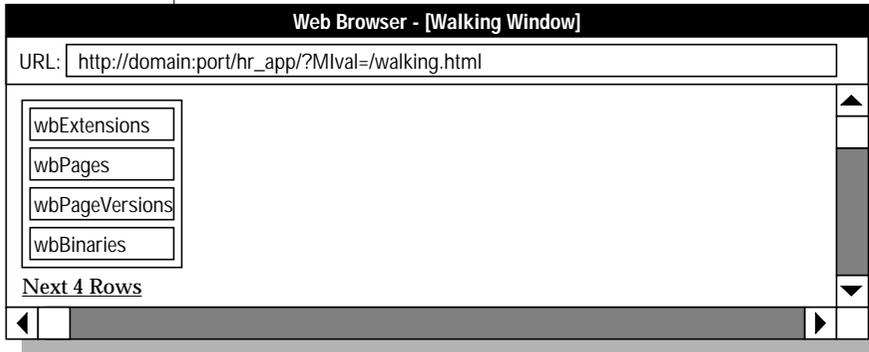


Figure 8-4
Walking Window 1

The following figure shows the Web browser output for the next set of rows retrieved.

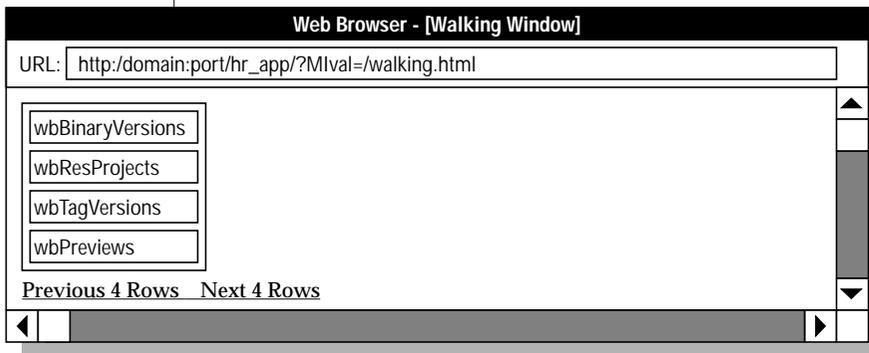


Figure 8-5
Walking Window 2

The following figure shows the Web browser output for the final set of rows retrieved.

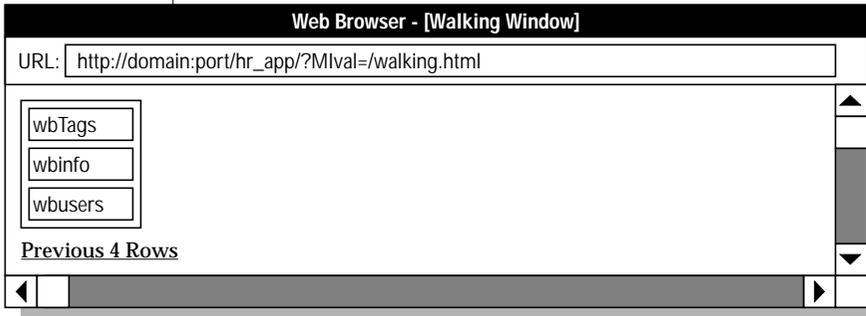


Figure 8-6
Walking Window 3

Special Characters in Variable Expressions

Quotation marks can be used to suppress evaluation of selected sequences of characters that otherwise would be interpreted as part of a variable expression. For example, in the following expression, double quotes are placed around the string `Hello, Citizen` to prevent the comma from being treated as a parameter separator:

```
<?MIVAR>$(SUBSTR,"Hello, Citizen",5)<?/MIVAR>
```

Double quotes may be included as part of a variable expression by placing them within another set of double quotes.

Additionally, since a blank space terminates an attribute assignment, you must place double quotes around any variable expression containing a space, as in the following example:

```
<?MIVAR NAME=var1>x y<?/MIVAR>
<?MIBLOCK COND="$(EQ,x y,$var1)">Values are equal.<?/MIBLOCK>
```

Since a greater-than character (>) terminates a tag, you must also place double quotes around any variable expression containing it:

```
<?MIVAR NAME=x>100<?/MIVAR>  
<?MIVAR NAME=y>50<?/MIVAR>  
<?MIBLOCK COND="$(>,$x,$y)">X is greater than Y.<?/MIBLOCK>
```

In general, it is a good idea to keep expressions within quotes, even if you are not aware of any special characters that need to be suppressed.

Using Dynamic Tags in AppPages

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In This Chapter

This chapter describes system and user-defined tags. It includes the following topics:

- “What Are Dynamic Tags?” following
- “Specifying Dynamic Tags in AppPages” on page 9-4
- “Where Dynamic Tags Are Stored” on page 9-5
- “Dynamic Tag `WebExplode()` Variables” on page 9-7
- “Using System Dynamic Tags” on page 9-8
- “Creating User-Defined Dynamic Tags” on page 9-17

What Are Dynamic Tags?

Dynamic tags are segments of AppPages that are stored in a database table and can be shared among multiple AppPages.

Dynamic tags allow you to standardize components of multiple AppPages, such as the headers and footers that appear on multiple AppPages in your Web application. Since the **WebExplode()** function expands dynamic tags, changes made to a dynamic tag are automatically applied to all AppPages that include the dynamic tag. Dynamic tags reduce maintenance costs and centralize the source of updates to Web applications.

For example, assume your Web application contains many AppPages. Each AppPage has similar footer information, such as a company logo, information about the application, and an email address. Instead of copying the common HTML into the footer of each AppPage, you can create a dynamic tag that stores the common HTML in a table, and then invoke the tag in the footer of each AppPage. Then, if you need to change any information in the footer, you need only update the dynamic tag, instead of updating every AppPage in your application. The next time you invoke an AppPage in your application, Webdriver automatically invokes the new dynamic tag in the AppPage with the updated information.

There are two types of dynamic tags: *system dynamic tags* and *user-defined dynamic tags*.

System dynamic tags are dynamic tags provided by the IBM Informix Web DataBlade module to simplify the creation of graphical objects in your AppPages, such as check box lists, radio button lists, and selection lists. The system dynamic tags are described in detail in [“Using System Dynamic Tags” on page 9-8](#).

User-defined dynamic tags are dynamic tags that you create yourself using AppPage Builder. The section [“Creating User-Defined Dynamic Tags” on page 9-17](#) describes in detail how to create a user-defined dynamic tag.

Specifying Dynamic Tags in AppPages

You specify a dynamic tag (both system and user-defined) in an AppPage using the SGML-like syntax `<?tag_name>`. Specify parameters to dynamic tags as tag attributes.

The following example contains the **display_image** user-defined dynamic tag:

```
These are the employees in department 20:<HR>
<CENTER>
<?display_image NAME=$emp_name DEPT=20>
</CENTER>
```

The **display_image** dynamic tag has two attributes, NAME and DEPT.

You must have previously created a user-defined dynamic tag before you specify it in an AppPage. For detailed instructions, refer to [“Creating User-Defined Dynamic Tags” on page 9-17](#).

Dynamic tags accept variables, variable expressions, and constants as parameter values. The COND attribute of AppPage tags, described in [“COND Attribute” on page 6-29](#), is also a valid attribute for a dynamic tag. The COND attribute specifies a condition that is evaluated before the tag is processed. If the condition is true, the **WebExplode()** function processes the tag.

Where Dynamic Tags Are Stored

When the **WebExplode()** function processes an AppPage and encounters a dynamic tag, the **WebExplode()** function substitutes the body of the dynamic tag in place of the tag identifier in the AppPage. The **WebExplode()** function searches for the body of dynamic tags in one of the following two tables, depending on the development tool you use to create your AppPages and user-defined dynamic tags:

- **webTags**

If you use the AppPage Builder application provided in Version 3.3 and earlier of the Web DataBlade module to develop your Web applications, AppPage Builder stores your user-defined dynamic tags in the **webTags** system table. The **webTags** system table is created at the time you register the Web DataBlade module in your database.

The **webTags** system table is the default table for storing dynamic tags. If you have not set any of the dynamic tag Webdriver variables (described in [“Dynamic Tag WebExplode\(\) Variables” on page 9-7](#)) in your Webdriver configuration, the **WebExplode()** function always searches the **webTags** system table for dynamic tags.

- **wbTags**

If you use the AppPage Builder application provided in Version 4.0 and later of the Web DataBlade module or IBM Informix Data Director for Web to develop your Web applications, both applications store your user-defined dynamic tags in the **wbTags** table. The **wbTags** table is created when you install the appropriate version of AppPage Builder or Data Director for Web in your database.

Since the **wbTags** table is *not* the default dynamic tag storage table, you must let the **WebExplode()** function know that your dynamic tags are stored in the **wbTags** table. You do this by setting the Webdriver variable **MI_WEBTAGSTABLE** to `wbTags` in your Webdriver configuration.

When the **WebExplode()** function is looking for a dynamic tag, it first determines whether you have set the **MI_WEBTAGSTABLE** variable in your Webdriver configuration. If you have, it searches for the dynamic tag in the specified table. Otherwise, the **WebExplode()** function searches the **webTags** table.

Both the **webTags** and **wbTags** table contain copies of all three system dynamic tags.

If you specify a dynamic tag in your AppPage that is not defined in the appropriate dynamic tags table (either **webTags** or **wbTags**), the **WebExplode()** function does not generate an error. Instead, the **WebExplode()** function returns the dynamic tag specification unaffected in the **WebExplode()** function output.

For a detailed description of the **webTags** system table, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

For more information on the **wbTags** table, refer to [Appendix B, "AppPage Builder Schema."](#)

Dynamic Tag WebExplode() Variables

The following table describes the dynamic tag **WebExplode()** variables that you can set in your Webdriver configuration. Use the Web DataBlade Module Administration Tool to set these variables.

Variable	Mandatory?	Description
MI_WEBTAGSTABLE	No	<p>Specifies the database table that the WebExplode() function searches for the body of a dynamic tag</p> <p>This variable can be set to the following two values: <code>webTags</code> or <code>wbTags</code>. The default value if this variable is not set is <code>webTags</code>.</p> <p>You <i>must</i> set the MI_WEBTAGSTABLE variable to <code>wbTags</code> in your Webdriver configuration if you developed your Web application using the APB application included in Version 4.0 or later of the Web DataBlade module or Version 2.0 of Data Director for Web.</p>
MI_WEBTAGSSQL	No	<p>Specifies a user-defined SELECT statement that the WebExplode() function runs to retrieve the body of a dynamic tag</p> <p><i>Never</i> set the MI_WEBTAGSSQL variable in your Webdriver configuration. The variable should only be set for Web applications that were developed with Version 1.1 or earlier of Data Director for Web.</p> <p>The MI_WEBTAGSTABLE variable takes precedence over the MI_WEBTAGSSQL variable. This means that if you have both variables set in your Webdriver configuration, the WebExplode() function searches for the dynamic tag in the table specified by the MI_WEBTAGSTABLE variable.</p>

(1 of 2)

Variable	Mandatory?	Description
MI_WEBTAGSCACHE	No	<p>Specifies whether the WebExplode() function should cache dynamic tags or not</p> <p>This variable should be set to <code>on</code> to turn on caching or <code>off</code> to turn off caching.</p> <p>The default value is <code>on</code>.</p> <p>Turn off dynamic tag caching when you are developing your AppPages to ensure that you always see the latest version of the dynamic tag and not the cached version. When you deploy your application to a production environment, however, you should turn on dynamic tag caching to increase the performance of your Web application.</p>

(2 of 2)

Using System Dynamic Tags

The CHECKBOXLIST, RADIOLIST, and SELECTLIST system dynamic tags simplify the creation of check box lists, radio button lists, and selection lists. You can also create your own user-defined dynamic tags, as described in [“Creating User-Defined Dynamic Tags” on page 9-17](#).

CHECKBOXLIST

The CHECKBOXLIST system dynamic tag creates an HTML list check box based on the attributes you specify. CHECKBOXLIST has the following attributes.

Attribute	Mandatory?	Description
NAME	Yes	Specifies the value of the NAME attribute of the check boxes in the check box list
SQL	Yes	Specifies the SQL statement that returns a list of items to compose the check box list

(1 of 2)

Attribute	Mandatory?	Description
CHECKED	No	Specifies the SQL statement that returns a list of items that are initially checked
CHECKONE	No	Specifies the value of a single item initially checked
PRE	No	Specifies text that precedes every check box field
POST	No	Specifies text that follows every check box field Default is .

(2 of 2)

The example of CHECKBOXLIST displays information about employees based on the following **employees** table schema:

```

create table employees
(
  first_name      varchar(40),
  last_name       varchar(40),
  title           varchar(40),
  onsite           boolean,
  department      varchar(40);

```

The following example is the `/checkboxlist.html` AppPage:

```

<HTML>
<HEAD> <TITLE> CHECKBOXLIST Example </TITLE></HEAD>
<BODY>
<?MIBLOCK COND=$(XST,$action)>
  <!-- Block to perform update when submitting form --!>
  <?MIVAR NAME=where>$(SEPARATE,$names,"', ' ")</MIVAR>
  <?MIVAR NAME=sql_statement1>update employees set onsite='t'
    where first_name in ('$where');</MIVAR>
  <?MISQL SQL="$sql_statement1"></MISQL>
  <?MIVAR NAME=sql_statement2>update employees set onsite='f'
    where first_name not in ('$where');</MIVAR>
  <?MISQL SQL="$sql_statement2"></MISQL>
</MIBLOCK>
<H3> Employees that work onsite: </H3>
<FORM METHOD=POST ACTION=<?MIVAR>$WEB_HOME</MIVAR>>
<!-- Hidden Fields --!>
<INPUT TYPE=hidden NAME=action VALUE=on>
<INPUT TYPE=hidden NAME=Mival VALUE=/checkboxlist.html>
<!-- SQL to generate check box list --!>
<?CHECKBOXLIST NAME=names SQL="select first_name from employees order by
  first_name" CHECKED="select first_name from employees where onsite='t'">
<P>
Control-click names to toggle on and off. Then choose Submit.
<P>
<INPUT TYPE=SUBMIT VALUE="Submit">
<INPUT TYPE=RESET VALUE="Reset">
</FORM>
<HR>
<?MIVAR COND=$(XST,$action)>
  SQL executed: <I>$sql_statement2</I></MIVAR>
<P>
<?MIVAR COND=$(XST,$action)>
  SQL executed: <I>$sql_statement1</I></MIVAR>
<P>
</BODY>
</HTML>

```

The following figure is sample Web browser output.

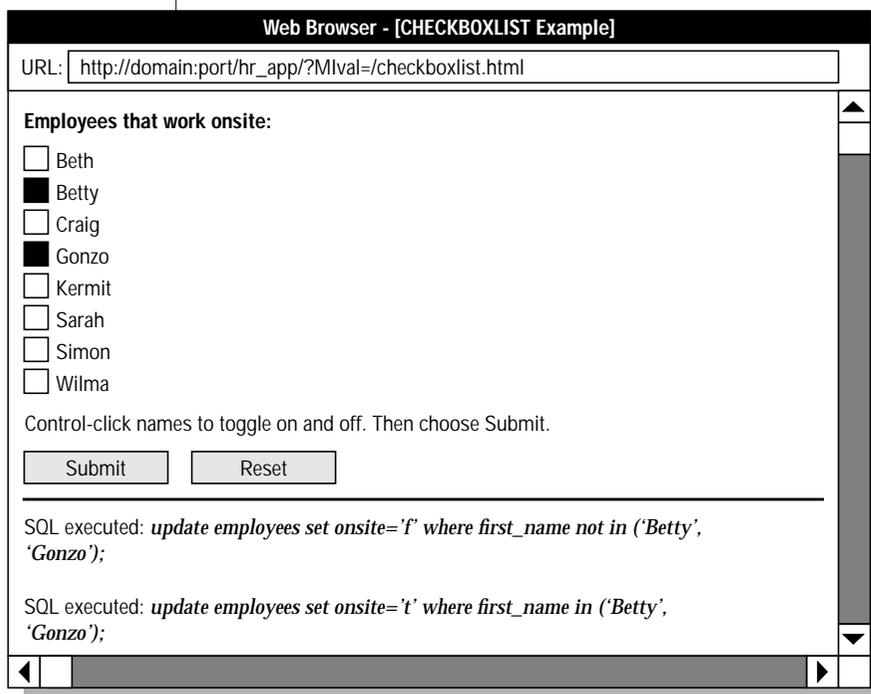


Figure 9-1
CHECKBOXLIST
Browser Output

RADIOLIST

The RADIOLIST system dynamic tag creates an HTML radio button list based on the attributes you specify. RADIOLIST has the following tag attributes.

Attribute	Mandatory?	Description
NAME	Yes	Specifies the value of the NAME attribute of the radio buttons in the radio button list
SQL	Yes	Specifies the SQL statement that returns a list of items to compose the radio button list
CHECKED	No	Specifies the SQL statement that returns a single item that is initially checked

(1 of 2)

Attribute	Mandatory?	Description
CHECKONE	No	Specifies the value of a single item initially checked
PRE	No	Specifies text that precedes every radio button field
POST	No	Specifies text that follows every radio button field Default is .

(2 of 2)



Tip: By definition, a radio button list can have only one item selected at a time.

The following example illustrates the use of RADIOLIST to display information about employees based on the following **employees** table schema:

```
create table employees
(
  first_name      varchar(40),
  last_name       varchar(40),
  title           varchar(40),
  onsite          boolean,
  department      varchar(40));
```

The following example is the `/radiolist.html` AppPage:

```

<HTML>
<HEAD> <TITLE> RADIOLIST Example </TITLE></HEAD>
<BODY>
<?MIBLOCK COND=$(XST,$action)>
  <!-- Block to perform update when submitting form --->
  <H3> Details for Employee <?Mlvar>$name</Mlvar>: </H3>
  <?Mlvar NAME=sql_statement> select * from employees
    where first_name = '$name';</Mlvar>
  <?MISQL SQL="$sql_statement">
  <B> Name: </B> $1 $2 <BR>
  <B> Title: </B> $3 <BR>
  <B> Onsite: </B> $4 <BR>
  <B> Department: </B> $5 <BR>
  </MISQL>
</MIBLOCK>
<FORM METHOD=POST ACTION=<?Mlvar>$WEB_HOME</Mlvar>>
<H3> Choose an Employee </H3>
<!-- Hidden Fields --->
<INPUT TYPE=hidden NAME=action VALUE=on>
<INPUT TYPE=hidden NAME=Mlval VALUE=/radiolist.html>
<?Mlvar NAME=name DEFAULT="">$name</Mlvar>
<!-- SQL to generate radio button list --->
<?RADIOLIST NAME=name SQL="select first_name from employees
  order by first_name" CHECKONE="Betty">
<P>
Select a name. Then choose Submit.
<P>
<INPUT TYPE=SUBMIT VALUE="Submit">
<INPUT TYPE=RESET VALUE="Reset">
</FORM>
<HR>
<?Mlvar COND=$(XST,$action)>
  SQL executed: <I>$sql_statement</I></Mlvar>
<P>
</BODY>
</HTML>

```

The following figure is sample Web browser output.

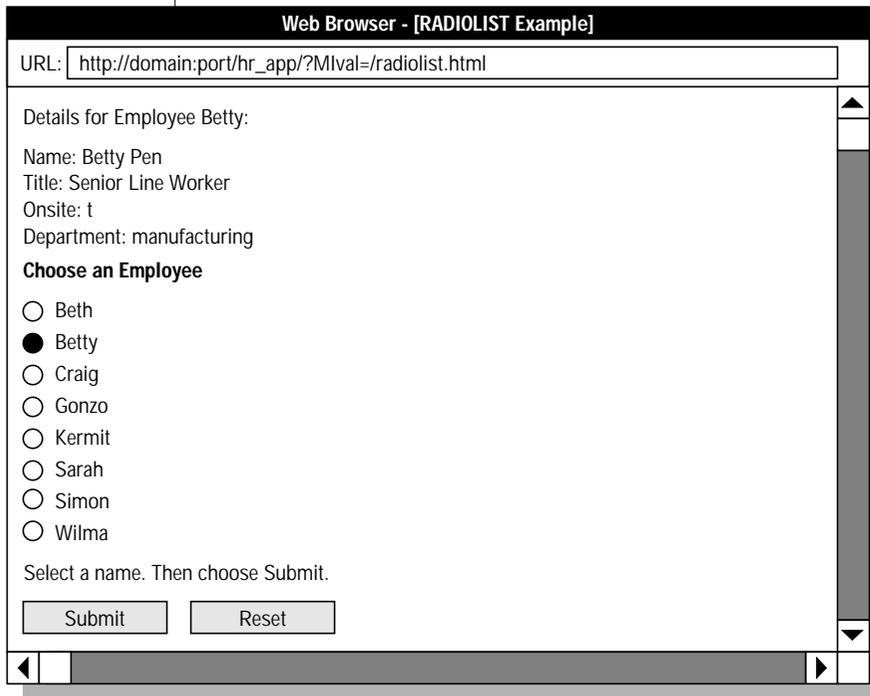


Figure 9-2
RADIOLIST Browser Output

SELECTLIST

The SELECTLIST system dynamic tag creates an HTML selection list based on the attributes you specify. SELECTLIST has the following attributes.

Attribute	Mandatory?	Description
NAME	Yes	Specifies the value of the NAME attribute of the items in the selection list
SQL	Yes	Specifies the SQL statement that returns a list of items to compose the selection list
MULTIPLE	No	If specified, users can make multiple selections
SELECTED	No	Specifies the SQL statement that returns a list of items that are initially selected
SELECTONE	No	Specifies the value of a single item initially selected
SIZE	No	Specifies the number of visible choices

The following example illustrates the use of SELECTLIST to display information about employees based on the following **employees** table schema:

```
create table employees
(
  first_name      varchar(40),
  last_name       varchar(40),
  title           varchar(40),
  onsite           boolean,
  department      varchar(40));
```

The following example is the `/selectlist.html` AppPage:

```

<HTML>
<HEAD> <TITLE> SELECTLIST Example </TITLE></HEAD>
<BODY>
<?MIBLOCK COND=$(XST,$action)>
  <!-- Block to perform update when submitting form --!>
  <?MIVAR NAME=where>$(SEPARATE,$names,"', ' ")</MIVAR>
  <?MIVAR NAME=sql_statement1>update employees set
    onsite='t' where first_name in ('$where');</MIVAR>
  <?MISQL SQL="$sql_statement1"></MISQL>
  <?MIVAR NAME=sql_statement2>update employees set
    onsite='f' where first_name not in ('$where');</MIVAR>
  <?MISQL SQL="$sql_statement2"></MISQL>
</MIBLOCK>
<H3> Employees that work onsite: </H3>
<FORM METHOD=POST ACTION=<?MIVAR>$WEB_HOME</MIVAR>>
<!-- Hidden Fields --!>
<INPUT TYPE=hidden NAME=action VALUE=on>
<INPUT TYPE=hidden NAME=Mival VALUE=/selectlist.html>
<!-- SQL to generate selection list --!>
<?SELECTLIST NAME=names SIZE=8 MULTIPLE
  SQL="select first_name from employees order by first_name"
  SELECTED="select first_name from employees where onsite='t'">
<P>
Control-click names to toggle on and off. Then choose Submit.
<P>
<INPUT TYPE=SUBMIT VALUE="Submit">
<INPUT TYPE=RESET VALUE="Reset">
</FORM>
<HR>
<?MIVAR COND=$(XST,$action)>
  SQL executed: <I>$sql_statement2</I></MIVAR>
<P>
<?MIVAR COND=$(XST,$action)>
  SQL executed: <I>$sql_statement1</I></MIVAR>
<P>
</BODY>
</HTML>

```

The following figure is sample Web browser output.

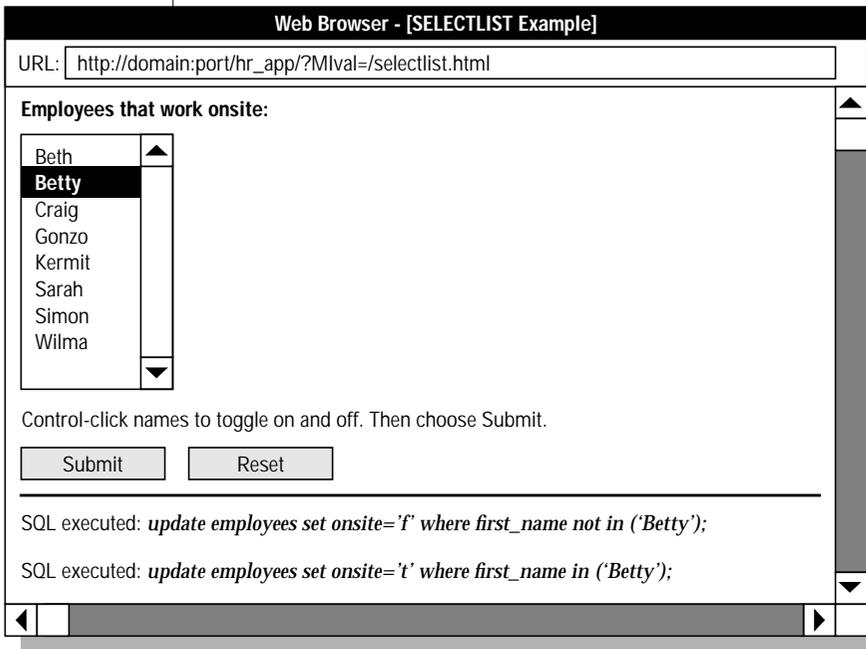


Figure 9-3
SELECTLIST
Browser Output

Creating User-Defined Dynamic Tags

Use AppPage Builder to add, edit, and delete user-defined dynamic tags. Once you have created a user-defined dynamic tag, you can specify it in any AppPage, as described in [“Specifying Dynamic Tags in AppPages” on page 9-4](#).

The AppPage Builder application provided in Version 4.0 and later of the Web DataBlade module stores dynamic tags in the **wbTags** table. The AppPage Builder application provided in Version 3.32 and earlier of the DataBlade module stores dynamic tags in the **webTags** table. This guide is written with the assumption that you are using the latest version of AppPage Builder and that you are storing your dynamic tags in the **wbTags** table.

Important: You cannot use AppPage Builder to edit or delete system dynamic tags.



Adding User-Defined Dynamic Tags with AppPage Builder

Figure 9-4 shows the Add Dynamic Tag AppPage from AppPage Builder that you use to add user-defined dynamic tags.

Web Browser - [APB - Add Dynamic Tag]

URL:

AppPage Builder 2.0

Main Menu Add Object Edit Object Admin Menu

Add Dynamic Tag

You can base this new tag on an existing tag to copy from the list below:

Base Tag:

Tag ID: <input type="text"/>	Class: <input type="text"/>
Project: <input type="text" value="getting_started"/>	
Parameters: <input type="text"/>	
Description: <input type="text"/>	
Dynamic Tag: <input type="text"/>	

User Name: default	Default Project: getting_started	TEXTAREA Width: 80	Versioning: Off
User Level: 0	Default Object: AppPage	TEXTAREA Height: 20	WebLint Checking: Off

Figure 9-4
APB-Add Dynamic
Tag

When you enter parameters in the **Parameters** text box, separate multiple parameters by specifying an ampersand (&). You can assign a default value to a parameter by specifying the parameter and its value as a name-value pair, for example, `param1=value1`. A parameter that does not need a default value is specified by the parameter followed by an equal sign (=) with no value following; for example, `param1=`.

Delimit parameters by using a “commercial at” (@) before and after the parameter name within the body of the dynamic tag.

When you insert or update a dynamic tag in the **wbTags** table, AppPage Builder verifies the tag to check that all of the parameters in the **content** column (delimited by the @ character) are also listed in the **parameters** column. When the **WebExplode()** function encounters a dynamic tag in an AppPage, the function verifies the tag to check that all parameters requiring a value are assigned a value.

Example of Creating a User-Defined Dynamic Tag

The following IMG dynamic tag, which invokes the standard HTML IMG tag based on information retrieved in a SELECT statement of the **wbBinaries** table that stores images, displays the image identified by the mandatory SRC parameter. The parameters to the IMG dynamic tag are **ID**, **path**, and **extension**. Each parameter has a default value.

Example of Creating a User-Defined Dynamic Tag

Web Browser - [APB - Add Dynamic Tag]

URL:

App Page Builder 2.0

Add Dynamic Tag

You can base this new tag on an existing tag to copy from the list below:

Base Tag:

Tag ID:	<input type="text" value="IMG"/>	Class:	<input type="text" value="beginner"/>
Project:			
<input type="text" value="getting_started"/>			
Parameters:			
<input type="text" value="ID=default_image&path=/&extension=gif"/>			
Description:			
<input type="text" value="My own image tag."/>			
Dynamic Tag:			
<pre><?MISQL SQL="select height, width, description, extension from wbBinaries where ID=@ID@ and path=@path@' and extension=@extension@;"> <?/MISQL></pre>			

User Name: <input type="text" value="default"/>	Default Project: <input type="text" value="getting_started"/>	TEXTAREA Width: <input type="text" value="80"/>	Versioning: <input type="text" value="Off"/>
User Level: <input type="text" value="0"/>	Default Object: <input type="text" value="AppPage"/>	TEXTAREA Height: <input type="text" value="20"/>	WebLint Checking: <input type="text" value="Off"/>

Figure 9-5
Example of a User-Defined Dynamic Tag

If, in your AppPage, you specify the dynamic tag `<?IMG ID=my_image>`, sample output to the client is:

```
<IMG BORDER=0 HEIGHT=40 WIDTH=332 ALT="My Image" SRC=/hr-
map/?Mival=/my_image.gif>
```

Because the IMG dynamic tag in the AppPage did not specify a value for the **path** and **extension** parameters, the **WebExplode()** function substituted the default values for the parameters in the body of the dynamic tag (the forward slash (/) and `gif`, respectively).

If, in your AppPage, you specify the dynamic tag `<?IMG ID=my_image extension=jpeg ALIGN=CENTER>`, sample output to the client is:

```
<IMG BORDER=0 HEIGHT=40 WIDTH=332 ALT="My Image" SRC=/hr-
map/?Mival=/my_image.jpeg
ALIGN=CENTER>
```

In the previous two examples, `/hr-map` is the value of **WEB_HOME** automatically generated by Webdriver.

If your AppPage contains the dynamic tag `<?IMG ID=my_image COND=$(XST,$DISPLAY)>`, the **WebExplode()** function generates the IMG tag only if the **DISPLAY** variable has been assigned a value within that AppPage.



Warning: *The body of a dynamic tag can contain another dynamic tag. However, do not call the same dynamic tag recursively, or you might consume your system resources.*

Special Characters in Dynamic Tags

An entity reference instructs the browser to look up symbols as it renders an AppPage and replace them with equivalent characters. You must replace the `@` character with its entity reference if the character occurs within your dynamic tag content.

Character	Entity Reference
@	@

Special Characters in Dynamic Tags



Using UDR Tags in AppPages

In This Chapter	10-3
What Is a User-Defined Routine (UDR) Tag?	10-3
Where Are UDR Tags Stored?	10-4
Specifying a UDR Tag in an AppPage	10-6
Creating a UDR Tag	10-8

In This Chapter

This chapter describes user-defined routine (UDR) tags. It includes the following topics:

- [“What Is a User-Defined Routine \(UDR\) Tag?”](#) following
- [“Where Are UDR Tags Stored?”](#) on page 10-4
- [“Specifying a UDR Tag in an AppPage”](#) on page 10-6
- [“Creating a UDR Tag”](#) on page 10-8

What Is a User-Defined Routine (UDR) Tag?

A user-defined routine (UDR) tag is a tag in an AppPage that directly executes an existing UDR in the database.

Directly executing UDRs in your AppPages can increase the performance of your Web application. By specifying the UDR in a UDR tag, the **WebExplode()** function bypasses the database server parser facility when it executes the UDR. If your Web application executes many UDRs, you can noticeably increase the performance of your application by executing them in UDR tags.

A UDR is a routine that you create and register in the database. UDRs can be written in C, SPL, or Java. You typically execute UDRs with an SQL statement, as shown in the following example:

```
EXECUTE FUNCTION webupper('Hello World');
```

The UDR in the example is called **webupper()** and it takes one parameter. The UDR returns the value of the parameter in uppercase: HELLO WORLD.

If you want to execute the **webupper()** UDR in an AppPage, you could use the MISQL AppPage tag, as shown in the following example:

```
<HTML>
<?MIVAR NAME=in>Hello World</MIVAR>
<?MISQL SQL="execute function webupper('$in');">$1</MISQL>
</HTML>
```

A more efficient way of executing the **webupper()** UDR in an AppPage, however, is to invoke it directly with a UDR tag, as shown in the following example:

```
<HTML>
<?MIVAR NAME=in>Hello World</MIVAR>
<?webupper NAME=out text=$in>
<?MIVAR>$out</MIVAR>
</HTML>
```

In the example, `<?webupper NAME=out text=$in>` is the UDR tag. The `NAME=out` attribute of the UDR tag specifies that the **WebExplode()** function should place the output of the UDR tag in a variable called **out**. The `text=$in` attribute specifies the single parameter to the **webupper()** UDR.

This guide does not explain how to create UDRs. For a complete discussion of creating a UDR and registering a UDR in the database, refer to *Creating User-Defined Routines and User-Defined Data Types*.

Where Are UDR Tags Stored?

UDR tags are stored in the **WebUdrs** system table.

You create UDR tags with AppPage Builder, as described in [“Creating a UDR Tag” on page 10-8](#).

The **WebUdrs** system table does *not* store the UDR itself. Instead, it stores a reference to an existing UDR in the **sysprocedures** table. This means that before you create a UDR tag, you must be sure that the corresponding UDR referenced by the UDR tag already exists.

The following table describes the columns of the **WebUdrs** system table.

Column Name	Data Type	Description
id	VARCHAR(40)	<p>Unique identifier of the routine</p> <p>Specify this identifier when you invoke the routine in an AppPage with the tag <code><?udrname...></code>.</p> <p>The value in this column does not have to match the corresponding value in the sysprocedures system table.</p>
parameters	LVARCHAR	<p>The parameters passed to the routine</p> <p>Parameters in the parameters column are separated by an ampersand (&).</p> <p>You can assign a default value to a parameter by specifying the parameter and its value as a name-value pair: for example, <code>param1=value1</code>.</p> <p>A parameter that does not need a default value is specified by the parameter followed by an equal sign (=) with no value following: for example, <code>param=</code>.</p>
procid	INTEGER	<p>Unique identifier of the routine as specified in the procid column of the sysprocedures system table</p> <p>The value in the procid column of the WebUdrs system table must exactly match the corresponding value in the procid column in the sysprocedures system table for the specified routine.</p>
procname	VARCHAR(128)	<p>Unique name of the routine as specified in the procname column of the sysprocedures system table</p> <p>The value in the procname column of the WebUdrs system table must exactly match the corresponding value in the procname column in the sysprocedures system table for the specified routine.</p>
numargs	INTEGER	<p>Number of arguments of the routine</p> <p>The value in the numargs column of the WebUdrs system table must exactly match the corresponding value in the numargs column in the sysprocedures system table for the specified routine.</p>

(1 of 2)

Column Name	Data Type	Description
paramtypes	LVARCHAR	Comma-delimited string specifying the data type of each argument The number of delimited data types must match the number of arguments specified by the numargs column. An example is <code>html,html,integer</code> .
description	VARCHAR(250)	Description of the routine
class	VARCHAR(40)	Class of the routine For example, you can specify <code>beginning</code> , <code>expert</code> , or any other class name. If you specify the class name <code>system</code> , you cannot use AppPage Builder to delete the routine from the WebUdrs system table.

(2 of 2)

Specifying a UDR Tag in an AppPage

Specifying UDR tags in an AppPage is very similar to specifying dynamic tags in an AppPage.

Use the following syntax to invoke a UDR tag that takes arguments:

```
<?udrname NAME=out COND=condition param1=value1 param2=value2...>
```

You must specify the parameters of the UDR tag in the same order as the parameters of the corresponding UDR are listed in the **sysprocedures** table. You can specify a maximum of 20 parameters.

If a UDR has no parameters, or you want to use the default value of the parameters stored in the **WebUdrs** table, use the following syntax:

```
<?udrname NAME=out COND=condition>
```

The following table describes the elements of the two previous syntax specifications.

Element	Description
udrname	Specifies the name of the UDR tag being invoked. This must match the name in the id column of the WebUdrs table
NAME	Specifies that the results of the UDR tag invocation should be stored in the <i>out</i> variable The results are stored as a string. If you do not specify an <i>out</i> variable, then the UDR tag writes the results directly to the AppPage.
COND	Specifies that the UDR tag is invoked only if <i>condition</i> evaluates to true (nonzero)
paramN	The name of the Nth parameter of the UDR Parameters are passed to the UDR in the same order in which they appear in the UDR tag invocation.
valueN	The value of the parameter <i>paramN</i> The element <i>valueN</i> is either a variable containing the value to be sent to the UDR or the value itself (with no embedded spaces).
...	Indicates more name-value pairs of the form <i>param=value</i> where <i>param</i> is the name of the parameter of the UDR and <i>value</i> is the value of the parameter.

For example, assume you have added a **webupper** UDR tag to the **WebUdrs** system table that executes the **webupper()** UDR. The **webupper()** routine takes one argument, of data type HTML, and returns an HTML data type in uppercase characters. The following example demonstrates how the **webupper** UDR tag can be invoked in an AppPage:

```
<HTML>
<?MIVAR NAME=in>Hello World</MIVAR>
<?webupper NAME=out text=$in>
<?MIVAR>$out</MIVAR>
</HTML>
```

When you invoke this AppPage in a browser, the browser displays the following text:

```
HELLO WORLD
```

Creating a UDR Tag

Once you have created the UDR and registered it in the database, you create a UDR tag that executes the UDR by inserting a reference to the UDR into the **WebUdrs** table. You use AppPage Builder to insert the reference to the UDR into the **WebUdrs** table.



Important: A routine must exist in the **sysprocedures** table before you use AppPage Builder to add a UDR tag the **WebUdrs** table.

AppPage Builder ensures that the values of the **procid**, **procname**, **param-types**, and **numargs** columns for the UDR in the **sysprocedures** table match the corresponding columns in the **WebUdrs** table.

To create a UDR tag with APB

1. Invoke APB.

For detailed information on this step, refer to [“Using AppPage Builder” on page 4-1](#).

2. Click **Add Object** from **Main Menu**.
3. Click **User Defined Routine Tag**.

The **Add Dynamic Routine** AppPage appears, as shown in [Figure 10-1](#).

Select a UDR from the **Routine/Signature** list box.

AppPage Builder uses the **sysprocedures** table to create this list box. The items in the list box are all the UDRs that have been created in the database.

Web Browser - [APB - Add a User Defined Routine Tag]

URL:

AppPage Builder 2.0

Add a User Defined Routine Tag

Choose a Routine you wish to register in webudrs:

Routine/Signature: ▼

Tag ID:	<input type="text" value="webupper"/>	Class:	<input type="text"/>
Parameters:			
<input type="text" value="p1"/>			
Description:			
<input type="text"/>			
ParamTypes:	<input type="text" value="html"/>		
Routine type:	<input type="text" value="Function"/>	Owner:	<input type="text" value="informix"/>
Location:	<input type="text" value="\$INFORMIXDIR/extend/web.4.13.UC1/web.bld(WebUpper)"/>		

User Name:	Default Project:	TEXTAREA Width:	Versioning:
<input type="text" value="default"/>	<input type="text" value="APB 2.0"/>	<input type="text" value="80"/>	<input type="text" value="Off"/>
User Level:	Default Object:	TEXTAREA Height:	WebLint Checking:
<input type="text" value="0"/>	<input type="text" value="AppPage"/>	<input type="text" value="20"/>	<input type="text" value="Off"/>

Figure 10-1
Inserting a UDR into
the WebUdrs Table

4. Click **Continue**.
APB populates the AppPage with UDR information from the **sysprocedures** table. You cannot update some of the text boxes, such as **Param Types**, **Routine Type**, **Owner**, and **Location**.
5. If you want to change the name of the UDR tag to be different from its corresponding UDR, enter the new name in the **Routine ID** text box.
6. Enter the class in the **Class** text box.
For information on the class, see the table describing the **WebUdrs** system table on [page 10-5](#).
7. Enter the list of parameters to the UDR tag.
For information on specifying parameters, see the table describing the **WebUdrs** system table on [page 10-5](#).
8. Enter a description of the UDR in the **Description** text box.
9. Click **Save**.

APB inserts the reference to the UDR into the **WebUdrs** table.

APB manages only the contents of the **WebUdrs** table, not the contents of the **sysprocedures** table. When you delete a reference to a UDR from the **WebUdrs** table, you do *not* also delete the corresponding UDR in the **sysprocedures** table.

If you drop and re-create a UDR with the DROP ROUTINE, CREATE FUNCTION, and CREATE PROCEDURE SQL statements, the new UDR in the **sysprocedures** table has a new **procid** different from the **procid** of the reference to the UDR in the **WebUdrs** system table. APB shows this inconsistency by placing an asterisk before the UDR.

To bring the **WebUdrs** table up to date, use APB to delete the reference to the UDR from the **WebUdrs** table and then use APB to re-insert the reference with the new **procid**.

Using the HTML Data Type

In This Chapter	11-3
The HTML Data Type	11-3
Functions That Use or Return the HTML Data Type	11-4
Example of Using an HTML Data Type	11-5

In This Chapter

This chapter discusses the HTML data type and its uses and how to generate XML-formatted data. It includes the following topics:

- “The HTML Data Type,” following
- “Functions That Use or Return the HTML Data Type” on page 11-4
- “Example of Using an HTML Data Type” on page 11-5

The HTML Data Type

Use the HTML data type to store AppPages in an Informix database.

HTML is a multirepresentational data type. This means that the way the data is internally stored varies, depending on the size of the data. If the HTML object is smaller than 7500 bytes, the data type is internally stored in the row, similar to how a VARCHAR data type is stored. If the HTML object is larger than 7500 bytes, the database server creates a smart large object to store the portion of the HTML object that is greater than 7500 bytes.

Because at least a portion of an HTML data type data is stored in a row, you cannot use smart large object functions of the DataBlade API against the HTML object. See “[The Web DataBlade Module API Functions](#)” on page 14-3 for detailed information on how to manipulate an HTML object.



Important: *The implementation of this feature is transparent to the user. The Web DataBlade module determines internally whether a particular HTML object is stored entirely in the row or extended into a smart large object, and it only retrieves the contents of the smart large object when necessary.*

Use the HTML data type the same way you use the VARCHAR data type. For example, you can use the standard SQL statements (such as SELECT, INSERT, UPDATE, DELETE, and LOAD) to view and update the HTML data type columns.

Because there is a cast from the HTML data type to the CHARACTER data type, you can also use the standard string functions, such as CONCAT() and TRIM(), on the HTML data type columns.

Typically, you use AppPage Builder (APB) to create and edit AppPages. If, however, you use a different application to create and edit AppPages by manipulating columns of data type HTML, you must first execute the **ifx_allow_newline('t')** procedure. Otherwise, you cannot enter new lines in your AppPages and store as the HTML data type.

For example, in DB-Access, execute the following syntax to enable entry of new lines:

```
EXECUTE PROCEDURE ifx_allow_newline('t');
```

To disallow new lines, use the following syntax:

```
EXECUTE PROCEDURE ifx_allow_newline('f');
```

Functions That Use or Return the HTML Data Type

The following Web DataBlade functions take the HTML data type as an argument:

- **WebExplode(HTML, HTML)**. See “WebExplode()” on page 12-4.
- **WebUnHTML(HTML)**. See “WebUnHTML()” on page 12-12.
- **FileToHTML(HTML)**. See “FileToHTML()” on page 12-17.
- **WebURLDecode(HTML)**. See “WebURLDecode()” on page 12-14.
- **WebURLEncode(HTML)**. See “WebURLEncode()” on page 12-15.
- **WebLint(HTML, integer)**. See “WebLint()” on page 12-8.

The following Web DataBlade functions return HTML to the caller:

- **WebExplode()**
- **WebUnHTML()**
- **FileToHTML()**
- **WebURLDecode()**
- **WebURLEncode()**

Example of Using an HTML Data Type

This example shows how to use DB-Access to create a simple table that contains a column of data type HTML for storing AppPages. The following simple AppPage is then inserted into the table:

```
<HTML>
<TITLE>This is the Title.</TITLE>
<BODY>
This is the body
</BODY>
</HTML>
```

First, create the table:

```
CREATE TABLE AppPageTable
(
    id    VARCHAR(20),
    objectHTML
);
```

Then execute the **ifx_allow_newline()** procedure:

```
EXECUTE PROCEDURE ifx_allow_newline('t');
```

Finally, insert the AppPage:

```
EXECUTE PROCEDURE ifx_allow_newline('t');

INSERT INTO AppPageTable
VALUES ( 'mainpage',
        '<HTML>
        <TITLE> This is the title. </TITLE>
        <BODY>
        This is the body.
        </HTML>' );
```

Using DataBlade Module Functions in AppPages

In This Chapter	12-3
WebExplode()	12-4
WebLint()	12-8
WebRelease()	12-11
WebUnHTML()	12-12
WebURLDecode()	12-14
WebURLEncode()	12-15
FileToHTML()	12-17
WebRmtShutdown()	12-19



In This Chapter

This chapter describes the Web DataBlade module server functions that are provided with the Web DataBlade module. These are the functions most commonly required by Web application designers. They are described in the following sections:

- “WebExplode()” on page 12-4
- “WebLint()” on page 12-8
- “WebRelease()” on page 12-11
- “WebUnHTML()” on page 12-12
- “WebURLDecode()” on page 12-14
- “WebURLEncode()” on page 12-15
- “FileToHTML()” on page 12-17
- “WebRmtShutdown()” on page 12-19

You can write additional database server functions to simplify Web application design. For detailed information on writing your own database server functions, refer to *Creating User-Defined Routines and User-Defined Data Types*.



WebExplode()

The **WebExplode()** function expands AppPage tags within an AppPage and retrieves SQL results dynamically. If you use the **WebExplode()** function in an AppPage to execute the same AppPage, there is no explicit limit to the number of recursive **WebExplode()** function calls. The number of recursive **WebExplode()** function calls is determined by your platform, operating system, and system memory.

*Tip: Because the **WebExplode()** function is a server function, it executes all SQL statements within an AppPage as a single transaction block.*

Syntax

The **WebExplode()** function has the following signature:

```
WebExplode(HTML, HTML) returns HTML;
```

The following table describes the arguments to the **WebExplode()** function.

Argument	Data Type	Description
<i>HTML</i>	HTML	The first HTML argument is an AppPage.
<i>HTML</i>	HTML	The second HTML argument specifies any variables passed to the WebExplode() function by calling application as name-value pairs (for example, name1=value1&name2=value2...).



*Important: When you call the **WebExplode()** function, all variable assignments are inherited from the parent process (usually Webdriver). Variables are global in scope. Therefore, if you override the assignment of a variable in the second argument of your call to the **WebExplode()** function or within the AppPage you execute, that variable assignment is retained until you reassign it elsewhere.*

Example

The following procedure illustrates the use of the **WebExplode()** function.

To create an AppPage table and retrieve data dynamically using the WebExplode() function

1. Create the **web_apps** table to store AppPages:

```
create table web_apps
(
  app_id      varchar(40) NOT NULL,
  app_desc    varchar(64),
  app_frm     html,
  primary key (app_id)
);
```

2. Create the **employees** table to store employee data:

```
create table employees
(
  first_name   varchar(40),
  last_name    varchar(40),
  title        varchar(40),
  onsite        boolean,
  department   varchar(40));
```

3. Load data into the **employees** table.
4. Execute the following procedure for each session to store new lines as the HTML data type:

```
EXECUTE PROCEDURE ifx_allow_newline('t');
```

If you want to disallow new lines, execute the following procedure:

```
EXECUTE PROCEDURE ifx_allow_newline('f');
```

5. Insert an AppPage into the **web_apps** table.

The **emp_list** AppPage contains an MISQL tag that retrieves data from the **employees** table, as shown here:

```
EXECUTE PROCEDURE ifx_allow_newline('t');

insert into web_apps values
(
  'emp_list',
  'employee listing',
  '<HTML>
<HEAD><TITLE>Employee List</TITLE></HEAD>
<BODY>
<H2>Current list of employees and job titles:</H2>
<?MISQL SQL="select first_name, last_name, title from
  employees;">
<B>$1 $2</B> $3 <BR>
<?/MISQL>
</BODY>
</HTML>'
);
```

6. Retrieve the AppPage using the **WebExplode()** function.

The **WebExplode()** function executes the query within the MISQL tag and formats the results according to the specifications in the MISQL tag:

```
SELECT WebExplode(app_frm, '') FROM web_apps
WHERE app_id = 'emp_list';
```

The **WebExplode()** function returns the following HTML:

```
<HTML>
<HEAD><TITLE>Employee List</TITLE></HEAD>
<BODY>
<H2>Current list of employees and job titles:</H2>
<B>Gonzo Babbage</B> Product Manager <BR>
<B>Betty Pen</B> Senior Line Worker <BR>
<B>Craig Wallace</B> Line Worker <BR>
<B>Sarah Dun</B> Event Co-ordinator <BR>
<B>Kermit French</B> Event Co-ordinator <BR>
<B>Wilma Jones</B> Salesman <BR>
<B>Simon Smith</B> Senior Salesman <BR>
<B>Beth Hume</B> Product Manager <BR>
</BODY>
</HTML>
```

The following figure shows sample Web browser output.



Figure 12-1
WebExplode()



WebLint()

The **WebLint** function scans an AppPage and reports syntax errors within AppPage tags.

Important: *WebLint()* does not evaluate dynamic tags.

Syntax

The **WebLint()** function has the following signature:

```
WebLint(HTML, INTEGER) returns LVARCHAR;
```

The following table describes the arguments to the **WebLint()** function.

Argument	Data Type	Description
<i>HTML</i>	HTML	The HTML argument is the name of an AppPage.
<i>INTEGER</i>	INTEGER	The INTEGER argument represents the level of checking to be performed.

Levels of INTEGER argument checking are described in the following table.

Level	Description
0	Returns <code>PASS</code> or <code>FAIL</code> Checking stops as soon as an error is encountered.
1	Returns <code>PASS</code> or error text describing the first error encountered
2	Returns <code>PASS</code> or error text describing all errors encountered
3	Same error processing as level 2, with additional checks on variables Issues a warning if a value is not assigned to a variable within the AppPage.

Example

The following `SELECT` statement executes the `WebLint()` function against the `/welcome.html` AppPage in the `wbPages` table:

```
select WebLint(object, 1) from wbPages
where ID = 'welcome' and path = '/' and extension='html';
```

Suppose the `/welcome.html` AppPage contains the following HTML content, with a missing slash (/) in the end MIVAR tag:

```
<TITLE>
<?MIVAR>$title<?MIVAR>
</TITLE>
```

The following error message is displayed by `WebLint()` when the level of checking is greater than 0.

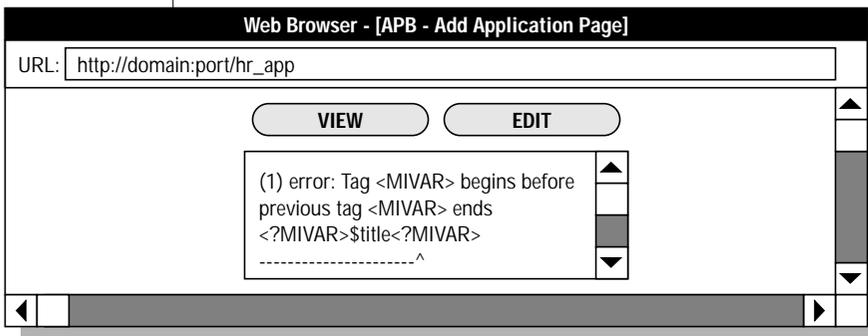


Figure 12-2
WebLint



Tip: You can attempt to execute an AppPage even if `WebLint()` reports errors in the AppPage.

You can execute the `WebLint()` function on the file that contains an AppPage directly from the operating system prompt. Execute the `weblint` command from the `INFORMIXDIR/extend/web.version/utls` directory, or add the `INFORMIXDIR/extend/web.version/utls` directory to your path. Then enter the following command:

```
weblint [level] < AppPage_file
```

WebLint()

Alternately, you can enter this command:

```
cat AppPage_file | weblint [level]
```

WebRelease()

The **WebRelease()** function returns the version of the Web DataBlade module.

Syntax

```
WebRelease() returns LVARCHAR;
```

Arguments

None.

Example

The following `/webrelease.html` AppPage calls the **WebRelease()** function to display the version number and date of the Web DataBlade module:

```
<HTML>
<HEAD><TITLE>WebRelease Example</TITLE></HEAD>
<BODY>
<B>The current version of the Web DataBlade module is:</B>
<?MISQL SQL="execute function WebRelease();">$1<?/MISQL>
</BODY>
</HTML>
```

The following figure shows sample Web browser output.

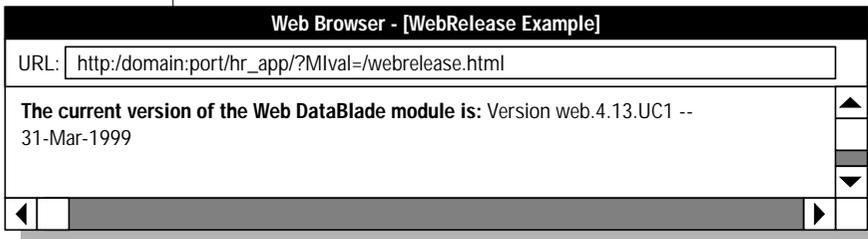


Figure 12-3
WebRelease

WebUnHTML()

The **WebUnHTML()** function replaces certain characters with their entity reference. **WebUnHTML()** scans the AppPage and makes the following replacements.

Character	Entity Reference
<	<
>	>
"	"
&	&

These substitutions allow the HTML tag information to be displayed by a Web browser. If this action is not taken, the browser uses these characters in its attempt to render the HTML tags as formatting information.

Syntax

```
WebUnHTML(HTML) returns HTML;
```

Arguments

The argument is HTML.

Example

The following `/unhtml.html` AppPage uses the `WebUnHTML()` function to display HTML tags within the AppPage:

```
<HTML>
<HEAD><TITLE>WebUnHTML Example</TITLE></HEAD>
<BODY>
To display the horizontal rule HTML tag: <BR>
<?MYSQL SQL="execute function WebUnHTML('<HR>');">$1<?/MYSQL>
<BR>
you can use the <B>WebUnHTML</B> function. <BR> <BR>
Otherwise, the tag will be interpreted, and a horizontal rule:
<HR>
will be displayed.
</BODY>
</HTML>
```

The following figure shows sample Web browser output.

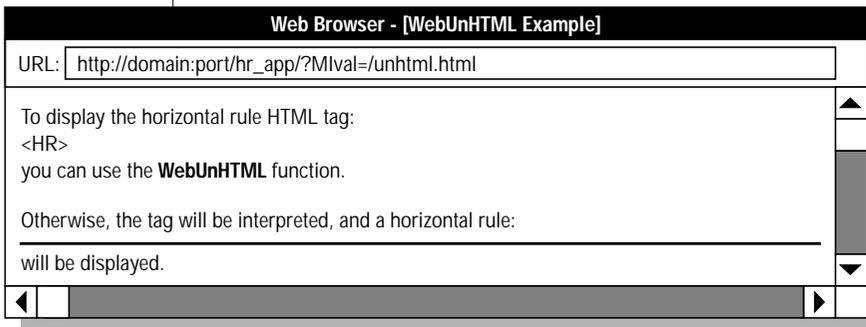


Figure 12-4
WebUnHTML()

WebURLDecode()

The **WebURLDecode()** function replaces hexadecimal values with nonalphanumeric ASCII characters and replaces plus signs (+) with spaces.

Syntax

```
WebURLDecode(HTML) returns HTML;
```

Arguments

The argument is HTML.

Example

Since the **WebExplode()** function decodes information passed in URLs, you do not normally need to decode the URL yourself.

WebURLEncode()

The **WebURLEncode()** function replaces nonalphanumeric ASCII characters with hexadecimal values and replaces spaces with plus signs (+).

Syntax

```
WebURLEncode(HTML) returns HTML;
```

Arguments

The argument is HTML.

Example

The following **encode** AppPage uses the **WebURLEncode()** function to encode job titles, which may contain spaces, for use in URLs:

```
<HTML>
<HEAD> <TITLE>WebURLEncode Example</TITLE> </HEAD>
<BODY>
<H2>Select a job title:</H2>
<?MYSQL SQL="select distinct title, WebURLEncode(title)
  from employees order by title;">
<A HREF=$WEB_HOME?Mival=/encode.html&title=$2>$1</A><BR>
</MYSQL>
<?MIBLOCK COND=$(XST,$title)>
<?MYSQL SQL="select distinct department from employees
  where title='$title';">
<BR>The $title position is in the <B>$1</B> department.<BR>
</MYSQL>
</MIBLOCK>
</BODY>
</HTML>
```

If you do not encode text within links and the text contains spaces, the links do not function properly.

WebURLEncode()

The following figure shows sample Web browser output.

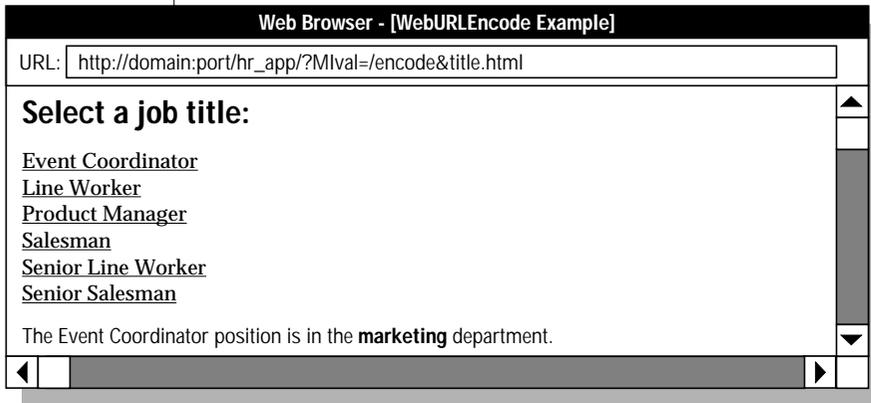


Figure 12-5
WebURLEncode

FileToHTML()

The **FileToHTML()** function converts a file on the operating system file system into an HTML data type.

You typically use the **FileToHTML()** function in an INSERT or UPDATE statement to insert the contents of a file into an HTML column in the database table that contains AppPages.

Syntax

The **FileToHTML()** function has the following two signatures:

```
FileToHTML (filename) returns HTML;
FileToHTML (filename, locale) returns HTML;
```

The following table describes the arguments to the **FileToHTML()** function.

Argument	Data Type	Description
<i>filename</i>	LVARCHAR	Specifies the full pathname of the file on the operating system file system that you want to convert to HTML and insert into a table. The database server always looks for the file on the client computer.
<i>locale</i>	LVARCHAR	Specifies the client locale of the client application. Client locale refers to the language, territory, and code set that the client application uses to perform read and write operations on the client computer. If you are using the default client locale (U.S. English), then you do not need to specify a client locale and can use the first version of the FileToHTML() function, which takes just one argument.

Example

Assume the table in which you store your AppPages is called **webAppPages** and has the following simple schema:

```
CREATE TABLE webAppPages
(
  id    VARCHAR(10),
  apppageHTML
);
```

The following AppPage shows how to use the **FileToHTML()** function in an INSERT statement to insert the contents of the file **/tmp/myfile.txt** into the HTML column of the **webAppPages** table:

```
<HTML>
<HEAD><TITLE>FileToHTML Example</TITLE></HEAD>
<BODY>
<?MISQL SQL="INSERT INTO webAppPages VALUES
      ('benefits' ,
FileToHTML('/tmp/myfile.txt'));"></MISQL>
</BODY>
</HTML>
```

WebRmtShutdown()

The **WebRmtShutdown()** function shuts down the currently running Perl program that was previously started by the MIEXEC tag.

Syntax

```
WebRmtShutdown()
```

Arguments

None.

Returns

WebRmtShutdown returns 0 if the currently running Perl program has been successfully shut down and 1 if not.

Example

The following `/webrmt.html` AppPage calls the **WebRmtShutdown()** function:

```
<HTML>
<HEAD><TITLE>WebRmtShutdown Example</TITLE></HEAD>
<BODY>
<B>To shut down the currently running Perl program,
execute the WebRmtShutdown function.</B>
<?MISQL SQL="EXECUTE FUNCTION WebRmtShutdown();"><?/MISQL>
</BODY>
</HTML>
```

Using Other Webdriver Features

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In This Chapter

This chapter explains Webdriver features that enable you to add HTTP headers to AppPages to retrieve non-HTML pages and use cookies, to upload client files for Web browsers that support the ENCTYPE attribute of the FORM tag, and to pass image map coordinates. It includes the following topics:

- “Adding HTTP Headers to AppPages,” following
- “Uploading Client Files” on page 13-7
- “Passing Image Map Coordinates” on page 13-12

Adding HTTP Headers to AppPages

Webdriver enables you to use HTTP headers in your AppPages to retrieve non-HTML pages and to use cookies.

Retrieving Non-HTML Pages

You can retrieve non-HTML pages by changing the content type of an AppPage and adding an HTTP header to the AppPage.

To change the content type of an AppPage, add an HTTP header to the AppPage to replace the default **text/html** content type header. Use the following syntax within a variable expression to set the content type:

```
$(HTTPHEADER, content-type, mimetype/subtype)
```

Webdriver adds a **content-length** header to the page, because only Webdriver can determine the size of the page.

The following example is a sample plain-text page, stored in your Web application table:

```
This is a plain text page.  
<?MIVAR>$(HTTPHEADER,content-type,text/plain)<?/MIVAR>  
It is displayed without rendering any HTML tags,  
so that characters such as "<HR>" appear normally,  
and are not treated as markup tags.
```

The resulting HTTP response to the Web browser is as follows:

```
Content-length: 222  
Content-type: text/plain  
  
This is a plain text page.  
  
It is displayed without rendering any HTML tags,  
so that characters such as "<HR>" appear normally,  
and are not treated as markup tags.
```

Tip: The `HTTPHEADER` variable expression can be placed anywhere within the `AppPage`.



Using Cookies

Cookies are a mechanism used by Webserver-side connections (such as Webdriver) to store and retrieve information on the client side of the connection (such as your Web browser). You can set cookies in your `AppPages` and then convert cookies into Web DataBlade module variables.

Setting Cookies

You can set cookies on any `AppPage` by adding an HTTP header to the `AppPage`, as follows:

```
$(HTTPHEADER,set-cookie,name=value)
```

You can set additional attributes in the second parameter to the `HTTPHEADER` variable expression, as follows:

```
$(HTTPHEADER,set-cookie,name=value; expires=DATE; path=PATH;  
domain=DOMAIN_NAME)
```

For more information on cookies, see http://home.netscape.com/newsref/std/cookie_spec.html.

accept_cookie Webdriver Variable

Use the **accept_cookie** Webdriver variable if you use AppPage caching and other applications in the same domain that are not used by your Web DataBlade module application.

Variable	Mandatory?	Description
accept_cookie	No	<p>Use the Web DataBlade Module Administration Tool to set the accept_cookie Webdriver variable to the name of cookies that your Web DataBlade module application uses. All other cookies are ignored by Webdriver. Multiple cookie names are separated by commas.</p> <p>If you do not use this variable, Webdriver assumes all cookies in the browser are part of the Web application.</p>

Converting Cookies into Web DataBlade Module Variables

When a cookie is set for a Web browser, the cookie is passed back to the Web server for each request made by that same Web browser. The Web DataBlade module automatically takes any cookies it receives and converts them into Web DataBlade module variables. The Web server environment variable **HTTP_COOKIE** is detected by Webdriver and parsed into variables so that the **HTTP_COOKIE** variable is never seen in an AppPage.

The following **cookie** AppPage determines whether or not the Web browser has retrieved this AppPage previously. The first time the Web browser retrieves the **cookie** AppPage, the AppPage sends a cookie to the Web browser, which the Web browser keeps even if it retrieves other HTML pages before retrieving this AppPage again. On any subsequent retrieval of this AppPage, the browser displays the `Welcome Back!` message:

```
<HTML>
<HEAD><TITLE>Has the user been here before?</TITLE></HEAD>
<BODY>
<H2>Has the user been here before?</H2><HR>
<!-- See if the flag variable has been set --->
<?MIBLOCK COND=$(XST,$flag)>
  <!-- Flag variable has been set --->
  <B>Welcome Back! You have been here before!</B>
<?/MIBLOCK>
<?MIBLOCK COND=$(NXST,$flag)>
  <!-- Flag variable has NOT been set --->
  <!-- Set a cookie --->
  <?MIVAR>$(HTTPHEADER,set-cookie,flag=yes)<?/MIVAR>
  <B>This is the first time you have been to this page!</B>
<?/MIBLOCK>
</BODY>
</HTML>
```

The following figure shows sample Web browser output the first time the **cookie** AppPage is retrieved.

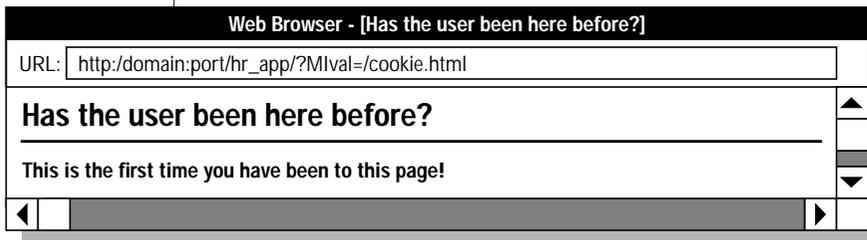


Figure 13-1
Cookie—First Request

The following figure shows sample Web browser output on any subsequent retrieval of the **cookie** AppPage.

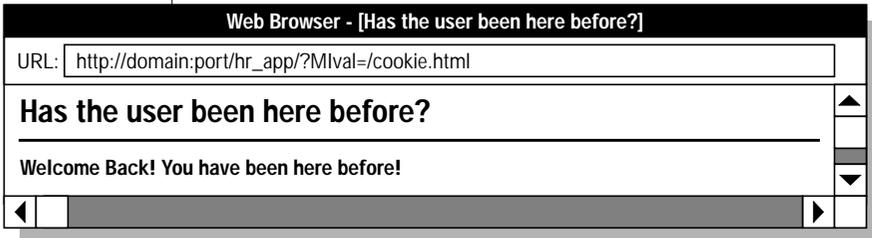


Figure 13-2
Cookie—
Subsequent
Request

Uploading Client Files

If you use a Web browser that supports client file upload, you can use Webdriver to upload files from your client computer.

The following example HTML form retrieves an image file into the **input_image1** variable. The HTML form is processed by the **/process_file.html** AppPage:

```
<FORM ENCTYPE=multipart/form-data METHOD=POST
ACTION=<?MIVAR>$WEB_HOME<?/MIVAR>>
<INPUT TYPE=TEXT NAME=file_name>
<INPUT TYPE=FILE NAME=input_image1>
<INPUT TYPE=SUBMIT VALUE="Send File">
<INPUT TYPE=HIDDEN NAME=Mlval VALUE=/process_file.html>
</FORM>
```

Setting the Directory

Use the Web DataBlade Module Administration Tool to set the following Webdriver variable to upload client files.

Variable	Mandatory?	Content
upload_directory	No	Directory on the Web server machine in which uploaded files are placed Default is /tmp.

Set **upload_directory** to the directory on the Web server computer where the uploaded files are to be placed. In the preceding example, if **upload_directory** is set to `/local/Web/uploads`, Webdriver creates the file `/local/Web/uploads/input_image1.PID` (where *PID* is the process ID for the Webdriver process) when the form is submitted. If **upload_directory** is not set, the uploaded files are placed in the `/tmp` directory by default. After Webdriver finishes processing the AppPage, the uploaded file is removed from the **upload_directory** directory.

Submitting the Form

When you submit the form, you can access the following variables in the AppPage that processes the form.

Variable Name	Description
<i>input_file</i>	Full pathname of the uploaded file on the Web server machine
<i>input_file_name</i>	Full pathname of the client file
<i>input_file_type</i>	MIME type of the uploaded file (may be unknown)

In the preceding example, if the client file is named **D:\images\input_image.gif**, the following variables are accessible in the **process_file** AppPage.

Variable Name	Assignment
input_image1	/local/Web/uploads/input_image1.PID
input_image1_name	D:\images\input_image.gif
input_image1_type	image/gif

Use the **FileToBlob()** function to create a large object from the uploaded image. For more information about large objects, see *IBM Informix Guide to SQL: Reference*.

If Webdriver is unable to write the file to the directory specified by **upload_directory**, it sets the value of the file variable to **MI_ERROR**.

Example

The following example illustrates the use of client file upload in which uploaded files are stored in the **uploads** table with the schema:

```
CREATE TABLE uploads
(
  name          varchar(40),
  object_type   varchar(40),
  object        blob,
  local_file    varchar(100))
put object in (sbspace1);
```

The following example shows the **upload_file** AppPage:

```

<HTML>
<HEAD><TITLE>File Upload Form</TITLE></HEAD>
<BODY>
<HR>
<FORM ENCTYPE=multipart/form-data METHOD=POST
ACTION=<?MIVAR>$WEB_HOME</MIVAR>>
<INPUT TYPE=HIDDEN NAME=Mlval VALUE=/upload_file.html>
<INPUT TYPE=HIDDEN NAME=action VALUE=on>
<TABLE>
<TR><TD>Name: </TD><TD><INPUT NAME=name SIZE=40 TYPE=TEXT>
</TD></TR>
<TR><TD>File: </TD><TD><INPUT NAME=upload SIZE=40 TYPE=FILE>
</TD></TR>
</TABLE>
<HR>
<INPUT TYPE=SUBMIT VALUE="Insert New Object">
</FORM>
<?MIBLOCK COND=$(XST,$action)>
  <HR>
  <?MIVAR NAME=sql_statement>
  INSERT into uploads VALUES
  ('$name', '$upload_type',
  FileToBlob('$upload','client','uploads','object'),
  '$upload_name');
  <?/MIVAR>
  <?MYSQL SQL="$sql_statement">
  Inserted $MI_ROWCOUNT new objects.<P><?/MYSQL>
  <?MIVAR>The SQL executed was <I>$sql_statement</I>.<P><?/MIVAR>
<?/MIBLOCK>
<B> Here are all of the uploaded objects:</B>
<TABLE>
<?MYSQL SQL="select name, object, object_type, local_file from uploads;">
<TR><TD><A HREF="$WEB_HOME?LO=$2&type=$3">$1</A>
</TD><TD>$4</TD></TR>
<?/MYSQL>
</TABLE>
</BODY>
</HTML>

```

The following example shows sample Web browser output.

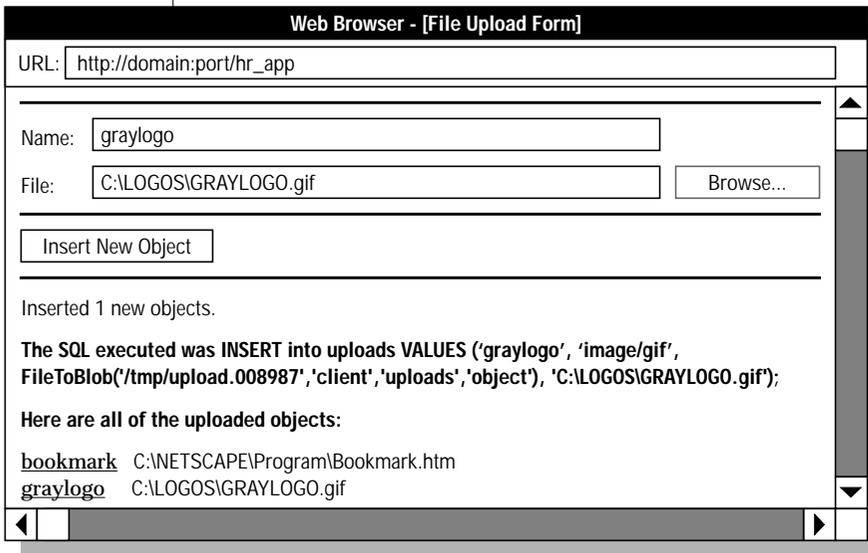


Figure 13-3
File Upload Form

Passing Image Map Coordinates

Set the **MImap** variable to enable image map coordinates to be passed to AppPages.

Variable	Mandatory?	Content
MImap	Yes	Set to <code>on</code> or <code>off</code> . When <code>on</code> , the URL is treated as an image map, and the values are passed as <i>x</i> - and <i>y</i> -coordinates. Default is <code>off</code> .



Important: *MImap* must be set in the URL that invokes the AppPage. *MImap* must not be set as a Webdriver variable in a Webdriver configuration.

There are two ways to pass image map coordinates within a Web DataBlade module application. You can pass coordinates with Webdriver by using:

- The ISMAP attribute of the IMG tag
- An HTML form

These methods are described in the following sections.

IMG Tag

To pass *x*- and *y*-coordinates through Webdriver, set the **MImap** variable to `on` in the URL that calls the AppPage to which the coordinates are passed. This prevents the coordinates from being overridden in the URL when you use the ISMAP attribute of the IMG tag to create an image map.

When the **MImap** variable is set to `on` in `PATH_INFO` (the portion of a URL consisting of name-value pairs following the pathname and preceding the `?`), Webdriver parses `QUERY_STRING` (the portion of a URL following the `?`) into two variables, called *x_value* and *y_value*, which hold the values from the image map. An example image map URL is as follows:

```
http://myhost:port/hr-map/webdriver/MImap=on&Mival=image_example?100,13
```

You can then access *x_value* and *y_value* (in this example, 100 and 13, respectively) in the same way that you access other variables. The following **/image_ismap.html** AppPage illustrates the use of image maps with the IMG tag:

```
<HTML>
<HEAD><TITLE>Standard Image Map Example</TITLE></HEAD>
<BODY>
<H2>Click on the image:</H2>
<TABLE BORDER>
<TR><TD VALIGN="top">
<!-- Display the image as an image map -->
<A HREF= " <?MIVAR>$WEB_HOME</MIVAR>MImap=on&Mlval=/image_ismap.html">
<IMG BORDER=0
SRC=" <?MIVAR>$WEB_HOME</MIVAR>?Mlval=/sun.gif" ISMAP></A>
</TD></TR></TABLE><HR>
<!-- Show resulting coordinates from the image -->
<!-- Output values x_value and y_value -->
<!-- if the standard image is clicked. -->
<?MIBLOCK COND=$(XST,$x_value)>
Output from Standard Image Map:<BR>
<?MIVAR>x_value = $x_value</MIVAR><BR>
<?MIVAR>y_value = $y_value</MIVAR>
</MIBLOCK>
</BODY>
</HTML>
```

The following figure shows sample Web browser output.

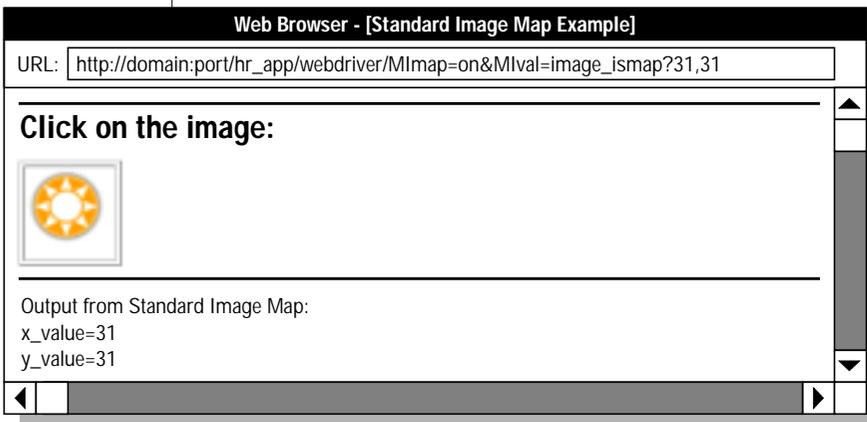


Figure 13-4
Standard Image
Map

FORM Tag

The following `/image_form.html` AppPage illustrates the use of image maps with an HTML form:

```
<HTML>
<HEAD><TITLE>Form Image Map Example</TITLE></HEAD>
<BODY>
<H2>Click on the image:</H2>
<TABLE BORDER>
<TR><TD VALIGN="top">
<!-- Display the image as an input for a form -->
<FORM METHOD="POST" ACTION="<?MIVAR>$WEB_HOME<?/MIVAR>">
<INPUT TYPE="HIDDEN" NAME="Mival" VALUE="/image_form.html">
<INPUT NAME="imagemap" TYPE="image" BORDER=0
  SRC="<?MIVAR>$WEB_HOME<?/MIVAR>?Mival=/sun.gif">
</FORM>
</TD></TR>
</TABLE>
<!-- Output imagemap.x and imagemap.y if a form --->
<HR>
<?MIBLOCK COND=$(XST,$imagemap.x)>
  Output from Form Variables:<BR>
  <?MIVAR>imagemap.x = $imagemap.x<?/MIVAR><BR>
  <?MIVAR>imagemap.y = $imagemap.y<?/MIVAR>
<?/MIBLOCK>
</BODY>
</HTML>
```

The following figure shows sample Web browser output.

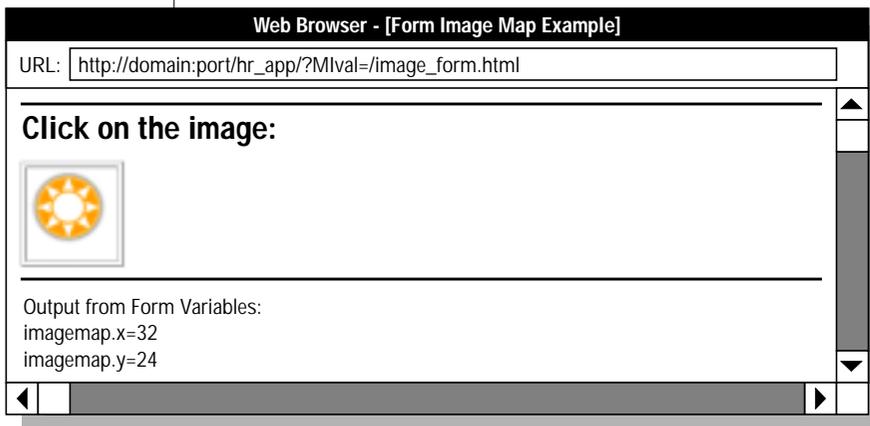


Figure 13-5
Form Image Map

Two-Pass Query Processing

Webdriver generates an SQL statement to retrieve an AppPage by building a call to the **WebExplode()** function, as described in *IBM Informix Web DataBlade Module Administrator's Guide*. The SQL statement looks something like the following example:

```
SELECT WebExplode (object, 'name=value&name2=value2')
FROM wbPages WHERE ID='mypage' and path='/' and extension='html';
```

The preceding query successfully retrieves the requested AppPage in all but the following two cases:

- The AppPage contains an MISQL tag that attempts to update the table in which the AppPage is stored. In the preceding example, this table is **wbPages**.

In this case, the following error is returned:

```
Exception from Informix: XIX000:-7435:This statement references a
table that is used in the parent queries.
```

- The AppPage contains an MISQL tag that issues a data-definition language (DDL) statement. An example of a DDL statement is the DROP TABLE statement. You cannot issue a DDL statement inside a user-defined routine (in this case, the **WebExplode()** function) because the user-defined routine is executed as part of a data-manipulation language (DML) statement.

In this case, the following error is generated:

```
Exception from Informix: XIX000:-7502:Illegal SQL statement in
user-defined routine: 'drop table mytable;'
```

The workaround for the preceding situations is to inform Webdriver, via the **MIqry2pass** Webdriver variable, that it must use a two-pass method to execute the query. This means the query is broken up into two parts, executed one after the other.

Variable	Mandatory?	Description
MIqry2pass	No	Specifies a query to be executed in two parts MIqry2pass selects an object and then executes a function. Used only in a URL. Default is set to OFF.

First, Webdriver retrieves the AppPage with the following SQL statement:

```
select object from wbpages where ID='mypage'and path='/' and  
extension='html';
```

Then Webdriver executes the **WebExplode()** function on the retrieved AppPage that has been cached in Webdriver's memory:

```
execute function WebExplode('<?MYSQL>...', 'name=value&name2=value2');
```

To enable two-pass query processing, set the **MIqry2pass** Webdriver variable to **ON**. By default, **MIqry2pass** is set to **OFF**.

You cannot set the **MIqry2pass** Webdriver variable with the Web DataBlade Module Administration Tool, because this variable is never stored as part of a Webdriver configuration. You must set the **MIqry2pass** Webdriver variable as part of the URL used to retrieve the AppPage.

The following URL invokes the **/special_page.html** AppPage and sets the **MIqry2pass** Webdriver variable to **ON** so that the AppPage is retrieved using the two-pass method:

```
/hr_app/?MIval=/special_page.html&MIqry2pass=on
```

AppPage Builder (APB) uses this technique to allow you to insert rows into the same table from which it selects AppPages.



Important: *Since the two-pass method has a performance penalty, set the **MIqry2pass** Webdriver variable to **ON** only when necessary.*

Using DataBlade Module API Functions in AppPages

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The Web DataBlade Module API Functions	14-3
WebHtmlToBuf()	14-5
WebBufToHtml()	14-8



In This Chapter

This chapter describes the IBM Informix Web DataBlade module API routines. It includes the following chapters:

- “The Web DataBlade Module API Functions,” following
- “WebHtmlToBuf()” on page 14-5
- “WebBufToHtml()” on page 14-8

The Web DataBlade Module API Functions

As described in other chapters of this guide, you store AppPages in columns of data type HTML, a Web-DataBlade-module-specific data type. The HTML data type is a multirepresentational data type, which means that the way the data is internally stored varies, depending on the size of the data. Sometimes the entire AppPage is stored in the table row, other times part of the AppPage is stored in a smart large object. The implementation of this feature is transparent to the user; it is the Web DataBlade module that determines how the AppPage is stored.

Because at least a portion of an HTML data type data is always stored in a row, you cannot use smart large object functions of the DataBlade API, such as **mi_lo_open()** and **mi_lo_read()**, to access the HTML object. For this reason, the Web DataBlade module provides the following two API functions so you can manipulate the contents of an HTML data type in your C programs: **WebHtmlToBuf()** and **WebBufToHtml()**.

Use the **WebHtmlToBuf()** function to copy the contents of an HTML object (an AppPage) into an object of type MI_LVARCHAR in your C program. You can then use standard DataBlade API functions to manipulate the MI_LVARCHAR object. Then use the **WebBufToHtml()** function to copy the contents of the MI_LVARCHAR object back into an HTML object so you can update or insert the AppPage back into the table that stores AppPages.

The following sections describe in more detail how to use the two Web DataBlade module API functions.

For more information on the HTML data type, refer to [Chapter 11, “Using the HTML Data Type.”](#)

WebHtmlToBuf()

The **WebHtmlToBuf()** API function copies the contents of an HTML object into an MI_LVARCHAR object.

Syntax

```
MI_LVARCHAR *  
WebHtmlToBuf (HTML *html_object)
```

html_object A pointer to the HTML object to be converted into an MI_LVARCHAR data type.

Usage

In your C program, do not call the **WebHtmlToBuf()** API function directly; rather, use the **mi_routine_get()**, **mi_routine_exec()**, and **mi_routine_end()** DataBlade API functions instead.

First use the **mi_routine_get()** DataBlade API function to look up the **WebHtmlToBuf()** function by its signature and to fetch its function descriptor.

Then use the **mi_routine_exec()** DataBlade API routine to execute the **WebHtmlToBuf()** function. Pass the pointer to the HTML object to the **mi_routine_exec()** function, which returns contents of the HTML object as a MI_DATUM object. In your C program, cast this MI_DATUM object to an MI_LVARCHAR object.

Remember to use the **mi_routine_end()** DataBlade API function to release the resources associated with the **mi_routine_get()** function.

See the sample C program at the end of this section for an example of using these API functions.

For detailed information on the functions and data types of the DataBlade API, refer to the *DataBlade API Programmer's Manual*.

Return Values

A pointer to the MI_LVARCHAR object that contains the contents of the converted HTML object.

Example

The following example C program shows how to use the **WebHtmlToBuf()** API routine to convert the contents of the HTML object **html** into an MI_LVARCHAR object.

The example uses the DataBlade API routines **mi_routine_get()**, **mi_routine_exec()**, and **mi_routine_end()**:

```
#include <stdio.h>
#include <ctype.h>
#include <string.h>
#include <stdlib.h>
#include <mi.h>
#include <alloca.h>
#include <assert.h>

/*****
 *htmlToLVarchar( conn, html)
 *   Takes in an HTML data type and converts it to an LVARCHAR.
 *
 * Input :
 *   MI_CONNECTION : an open connection
 *   html : the HTML data to be converted into an LVARCHAR
 * Returns either:
 *   NULL - error during conversion
 *   mi_lvvarchar : the HTML data converted into an LVARCHAR
 * Notes :
 *   This example uses the WebHtmlToBuf() function that is registered
 *   with the database server at the same time that the Web DataBlade
 *   Module is registered.
 */

mi_lvvarchar *
htmlToLVarchar(MI_CONNECTION *conn, mi_lvvarchar *html) {
    MI_FUNC_DESC *routineFuncDesc;
    MI_DATUM *data;
    mi_integer error;

    routineFuncDesc = mi_routine_get(conn, 0, "function
WebHtmlToBuf(html)");

    if (routineFuncDesc == NULL)
    {
        printf("mi_routine_get() returned NULL\n");
        return(NULL);
    }
    data = mi_routine_exec(conn, routineFuncDesc, &error, html);
    if (error == MI_ERROR)
    {
```

```
printf("execution encountered an error\n");  
return(NULL);  
}  
  
mi_routine_end(conn, routineFunctDesc); /* release resources */  
return((mi_lvarchar *)data);  
}
```

WebBufToHtml()

The **WebBufToHtml()** API function copies the contents of an MI_LVARCHAR object into an HTML object.

Syntax

```
HTML *  
WebBufToHtml (MI_LVARCHAR *lvarchar_object)
```

lvarchar_object A pointer to the MI_LVARCHAR object to be converted into an HTML data type.

Usage

In your C program, do not call the **WebBufToHtml()** API function directly; rather, use the **mi_routine_get()**, **mi_routine_exec()**, and **mi_routine_end()** DataBlade API functions instead.

First use the **mi_routine_get()** DataBlade API function to look up the **WebBufToHtml()** function by its signature and to fetch its function descriptor.

Then use the **mi_routine_exec()** DataBlade API routine to execute the **WebBufToHtml()** function. Pass the pointer to the MI_LVARCHAR object to the **mi_routine_exec()** function, which returns the data converted into an HTML object.

Remember to use the **mi_routine_end()** DataBlade API function to release the resources associated with the **mi_routine_get()** function.

See the sample C program at the end of this section for an example of using these API functions.

For detailed information on the functions and data types of the DataBlade API, refer to the *DataBlade API Programmer's Manual*.

Return Values

A pointer to the HTML object that contains the contents of the converted MI_LVARCHAR object.

Example

The following example C program shows how to use the **WebBufToHtml()** API routine to convert the contents of the MI_LVARCHAR object **buf** into an HTML object.

The example uses the DataBlade API routines **mi_routine_get()**, **mi_routine_exec()**, and **mi_routine_end()**:

```
#include <stdio.h>
#include <ctype.h>
#include <string.h>
#include <stdlib.h>
#include <mi.h>
#include <alloca.h>
#include <assert.h>

/*****
 *lVarcharToHtm(conn, buf)
 *   Takes in an LVARCHAR and converts it to an HTML data type.
 *
 * Input:
 *   MI_CONNECTION : an open connection
 *   mi_lvarchar : a buffer to be converted into an HTML data type
 * Returns either:
 *   NULL - error in conversion
 *   mi_lvarchar : the input buffer converted into an HTML data type
 * Notes :
 *   This example uses the WebBufToHtml() function that is registered
 *   with the database server at the same time that the Web DataBlade
 *   Module is registered.
 */
mi_lvarchar *
lVarcharToHtm(MI_CONNECTION *conn, mi_lvarchar *buf) {
    MI_FUNC_DESC *routineFuncDesc;
    MI_DATUM *data;
    mi_integer error;

    routineFuncDesc = mi_routine_get(conn, 0, "function
WebBufToHtml(lvarchar)");

    if (routineFuncDesc == NULL)
    {
        return(NULL);
    }
    data = mi_routine_exec(conn, routineFuncDesc, &error, buf);
    if (error == MI_ERROR)
    {
        return(NULL);
    }
}
```

WebBufToHtml()

```
    }  
    mi_routine_end(conn, routineFunctDesc); /* release resources */  
    return((mi_lvarchar *)data);  
}
```

Debugging Web DataBlade Module Applications

The Web DataBlade module is one of many components of your Web-enabled applications. Other components are your Web browser, your Web server, and the Informix database. You can use a variety of techniques to resolve problems with creation, configuration, or execution of Web applications:

- To debug Web applications as you are developing them:
 - Use RAW mode to get more information about your Webdriver environment.
 - Use the **WebLint()** function to find syntax errors within AppPage tags.
- To obtain more information when an error occurs:
 - Enable Web DataBlade module tracing.
 - Check the appropriate log files.
- To determine which component of your installation is failing, retrieve your AppPage directly by running CGI Webdriver interactively, bypassing your Web browser and Web server.

The following sections describe these techniques.

Using RAW Mode with Webdriver

Webdriver allows you to enable RAW mode to help develop and debug Web applications. When you enable RAW mode, you can:

- Display the AppPage as stored in the database without expanding the AppPage tags.
- Display variables and identify where variable assignments are made.

To enable RAW mode, set the following Webdriver configuration file variable using the Web DataBlade Module Administration Tool.

Variable	Mandatory?	Content
raw_password	Yes	Password to enable RAW mode

You can retrieve the unexpanded AppPage by specifying `RAW=value_of_raw_password` in a URL. Webdriver returns the unexpanded AppPage as stored in the database, including the AppPage tags. RAW mode also displays all variables and where they were assigned. The following URL retrieves the `/testit.html` AppPage in RAW mode:

```
http://myhost:port/hr_app/?MIval=/testit.html&RAW=topsecret
```

In the example, `/hr_app` refers to the URL prefix that maps to a Webdriver mapping.

The following illustrations show sample RAW mode output.

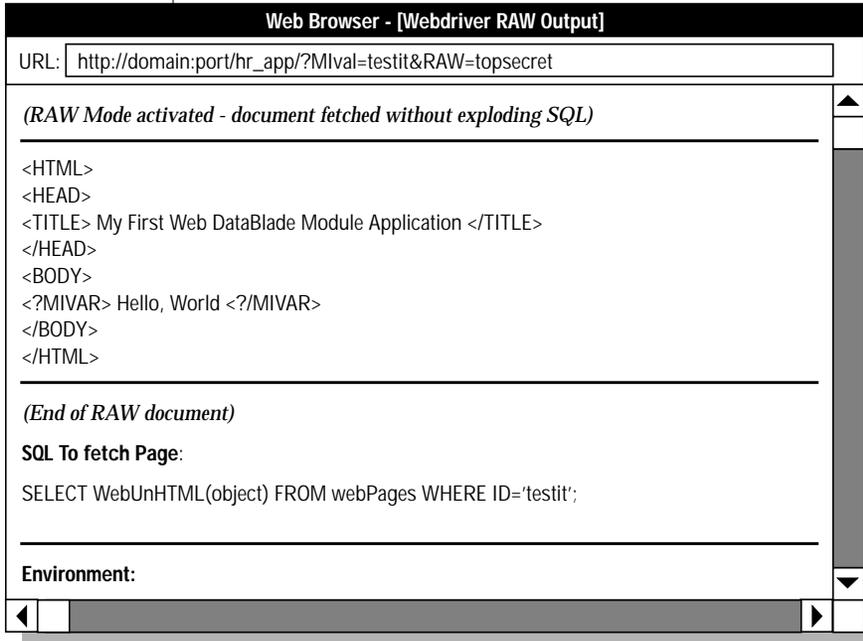


Figure A-1
Webdriver RAW
Mode Output 1

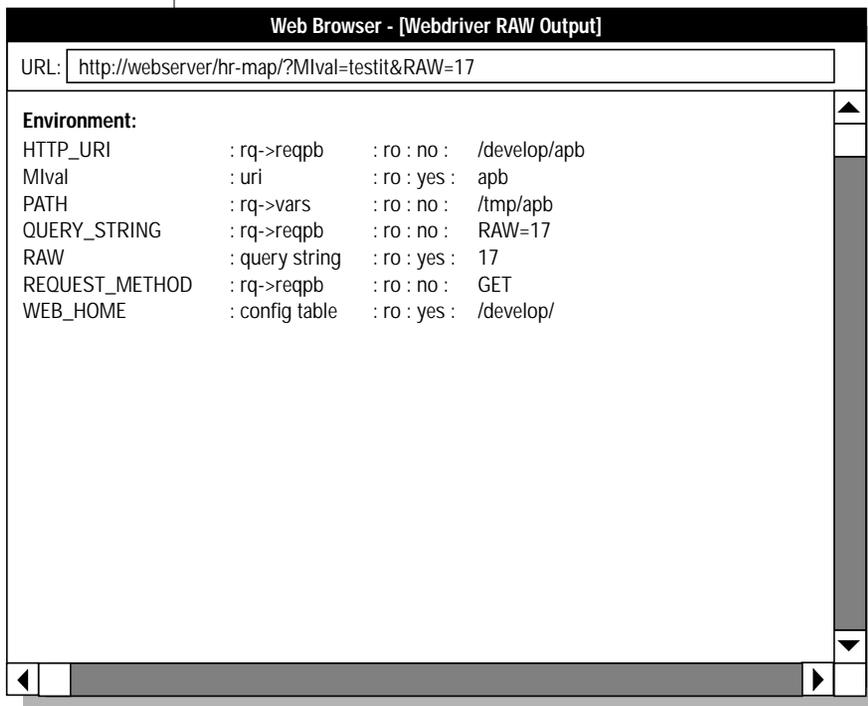


Figure A-2
Webdriver RAW
Mode Output 2

The following environment variable information is an example of what is shown in the preceding figure:

```
Mlval : query string : rw : yes : testit
```

Each of the columns is described in the following subsections.

Name of the Variable

The first field in the environment variable list shows the name of the variable: in this case, `MIval`. The second value identifies where the variable has been set, with the following meanings.

Environment Setting	Where Set?
config table	webconfigs table
query string	QUERY_STRING environment variable
path info	PATH_INFO environment variable
cookie	Web browser cookie
post	METHOD=POST in the calling HTML form
uri	NSAPI URL (NSAPI only)
environment	Web server environment (CGI only)
rq->vars	Web server environment (NSAPI only)
rq->headers	Web server environment (NSAPI only)
rq->reqpb	Web server environment (NSAPI only)
sn->client	Web server environment (NSAPI only)
iis cblock	Web server environment (ISAPI only)
iis filter	Web server environment (ISAPI only)
session	Session variable
driver_err	MI_DRIVER_ERROR
apache hdrs	Web server environment (APACHE only)
apache req	Web server environment (APACHE only)

Variable Mode

The third field shows the mode of the variable. The mode can be either `rw` or `ro`. The `rw` mode means that the value can be overridden, and `ro` mode means that the value cannot be overridden.

Variable Passed

The fourth field can be set to `yes` or `no`; it tells whether or not Webdriver passes the variable to the **WebExplode()** function.

Current Value

The final field is the current value of the variable.

Using `WebLint()`

Use the **WebLint()** function to find syntax errors within AppPage tags. **WebLint()** is described in [“WebLint\(\)” on page 12-8](#).

Enabling `WebExplode()` Tracing

Use the Web DataBlade Module Administration Tool to set the following variables for your Webdriver configuration to enable logging of the **WebExplode()** function trace information.

Variable	Mandatory?	Content
<code>MI_WEBEXPLEVEL</code>	Yes	Enables WebExplode() function tracing.
<code>MI_WEBEXPLOG</code>	No	File to which WebExplode() messages are written.

MI_WEBEXPLEVEL Trace Settings

The following table lists the MI_WEBEXPLEVEL trace settings.

Trace Value	Information Displayed
1	Lowest granularity HTML output on entry into major routines such as WebExplode() .
2	Medium granularity Message output on entry to all functions.
4	Highest granularity Message output for internal loops.

The granularity trace values in the preceding table can be applied to each of the components listed in the following table.

Trace Value	Information Displayed
8	Watches variable access
16	Traces extended variable-processing functions
32	Shows details of user-defined tags usage Includes cache hits.
64	Shows SQL statement being executed by MISQL tag
128	Shows messages communicated to Webdriver
256	Reserved for system usage
1024	Watches how MIDEFERRED and deferred variables are being used
2048	Traces direct UDR invocation
4096	Traces MI_EXEC



The trace value is additive; therefore, you can turn on multiple settings simultaneously. For example, if you set `MI_WEBEXPLEVEL` to 40, the `WebExplode()` function generates trace information for both tags and variable access. Add 1 to the value of `MI_WEBEXPLEVEL` to generate output within your AppPages as HTML comments. The output contains the session ID. The `WebExplode()` function writes the output to the trace file.

***Important:** If you add 1 to the value of `MI_WEBEXPLEVEL` to generate output within your AppPages as HTML comments, the additional text within your HTML might change how the Web browser renders your AppPage.*

MI_WEBEXPLOG Trace File

When you enable tracing, the `WebExplode()` function writes the information to the trace file specified by the `MI_WEBEXPLOG` variable. If you do not set `MI_WEBEXPLOG` (or if the server cannot write to the specified file), the server creates a file in the `/tmp` directory with a `.trc` file extension. You can also write your own message to the trace file using the `TRACEMSG` variable-processing function. For example, you can log errors to the trace file within your AppPages as follows:

```
<?MIVAR>$(TRACEMSG, You encountered the error: $MI_ERRORMSG)<?/MIVAR>
```

Enabling Webdriver Tracing

To enable Webdriver tracing, set the Webdriver variables **debug_file** and **debug_level** in the **Global** section of the **web.cnf** file. The following table describes each variable.

Variable	Description
debug_level	Enables Webdriver tracing to the log file specified by the debug_file variable For a full list of possible values for this variable, refer to the table on page A-10 .
debug_file	Specifies the full pathname of the log file to which Webdriver writes messages

debug_level Variable

You can also set the **debug_level** Webdriver variable for your Webdriver configuration using the Web DataBlade Module Administration Tool. The value of the **debug_level** Webdriver variable, if set for your Webdriver configuration, overrides the value of the variable in the Global section of the **web.cnf** file.

For detailed information on using the Web DataBlade Module Administration Tool to set Webdriver variables, refer to *IBM Informix Web DataBlade Module Administrator's Guide*.

The following table lists the possible trace settings for the **debug_level** Webdriver variable.

Trace Value	Information Displayed
1	Logs all pblocks (NSAPI only) pblocks contain the name-value pairs passed from the Web browser to the Netscape Web server.
2	Logs callbacks including errors
4	Logs Webdriver query requests to the database server, such as calls to the WebExplode() function or authorization requests
8	Logs large object requests
16	Logs AppPage headers
32	Logs large object headers
64	Logs client file upload information
128	Logs information as AppPages are added and retrieved from the disk cache
256	Logs request variables.
512	Logs information similar to the information logged by the NSAPI driver (CGI only)
1024	Logs connection pool information
2048	Logs session management information, such as persistent variables being updated and new sessions being created
4096	Logs parameters sent to the WebExplode() function in a decoded format
8192	Logs parameters sent to the WebExplode() function in an encoded format
16384	Time stamps each request of Webdriver
32768	Logs callback messages

The trace value is additive; therefore, you can turn on multiple settings simultaneously.

The debug_file Variable

When you enable tracing, Webdriver writes the information to the trace file specified by the **debug_file** variable in the **Global** section of the **web.cnf** file. If the trace file does not exist, Webdriver creates it. If the trace file exists, Webdriver appends additional messages to it.

The following example shows a **Global** section of a **web.cnf** file:

```
<Global>
dbconnmax      10
anchorvar      WEB_HOME
debug_file     /disk1/webdriver.log
debug_level    4
maxcharsize    2
</Global>
```

In the example, Webdriver writes tracing messages to the file `/disk1/webdriver.log`. Webdriver writes only messages about query requests to the database server, such as calls to the **WebExplode()** function or authorization requests.

Checking Log Files

Be sure to check your Web server error log files for any additional information when you encounter an error.



Running CGI Webdriver Interactively

To debug configuration issues, you must first determine which component of your installation is failing. If you are unsure whether it is the Web server or Webdriver that is failing when you attempt to retrieve an AppPage, bypass the Web browser and Web server and call Webdriver interactively.

Important: This works only for the CGI implementation of Webdriver.

To run Webdriver interactively

1. Log in as the owner of your Web server (HTTPD).
2. Move to the directory in which the Webdriver executable file is located:

```
cd /disk6/netscape/ns-home/cgi
```

3. Set the following variables in your UNIX environment:

SCRIPT_NAME

QUERY_STRING

SCRIPT_NAME is the relative path of the Webdriver CGI program.

For example, if you configured your Web server to have a CGI directory `/cgi` and the Webdriver CGI program resides in that directory, then set **SCRIPT_NAME** to `/cgi/webdriver`:

```
setenv SCRIPT_NAME/cgi/webdriver
```

QUERY_STRING should include the setting for the **Mival** Webdriver variable and any other variables you would normally set in the URL when you invoke the AppPage:

```
setenv QUERY_STRING "Mival=mypage"
```

4. Invoke Webdriver:

```
webdriver
```

The output is similar to the following example:

```
Content-type: text/html
Content-length: 3703
<HTML>
.....
```

Webdriver generates an appropriate error message if the AppPage cannot be retrieved. The following example specifies the name of an AppPage that does not exist:

```
setenv Mival wrong
```

Webdriver prints an error within the following output:

```
webdriver

Content-type: text/html
Content-length: 225
<HTML> <HEAD><TITLE> Error Message</TITLE>
<HEAD> <BODY>
<H2>HTTP/1.0 404 Not Found</H2>
<B>Error from Informix:</B><HR>
  The resource you requested was not found.<P>
  Zero rows were returned from the server
</BODY> </HTML>
```

AppPage Builder Schema

AppPage Builder (APB) provides a flexible and extensible base for developing Web applications with the Web DataBlade module. APB has built-in support for common multimedia objects, such as images, audio clips, video clips, and documents.

APB uses the same database schema as IBM Informix Data Director for Web (DDW). DDW is a set of Windows tools also used for developing Web applications with the Web DataBlade module.

This appendix describes the following tables that make up APB database schema:

- **wbExtensions**
- **wbPages**
- **wbPageVersions**
- **wbBinaries**
- **wbBinaryVersions**
- **wbTags**
- **wbTagVersions**
- **wbPreviews**
- **wbProjects**
- **wbResProjects**
- **wbInfo**
- **wbUsers**
- **wbObjectTypes**

The **wbExtensions** Table

The **wbExtensions** table contains a row for each type of file extension you can specify when invoking an object in an AppPage. Examples of extensions are **html**, **gif**, and **doc**.

The row for each extension describes the table that stores objects of this type (**source_table**), the column in the storage table that identifies the object (**ID_column**), the column in the storage table that contains the object (**content_column**), and the object's MIME super type and subtype (**super_type** and **sub_type**).

When you initially install AppPage Builder in your database, the **wbExtensions** table contains a default set of extensions that include most types of objects you should ever need to invoke in an AppPage. For a complete list of default extensions, see [“The **wbExtensions** Table” on page 3-5](#). You can, however, add a new extension to the **wbExtensions** table if the default set is not adequate. For detailed information on how to add a new extension, see [“Adding an Extension” on page 4-10](#).

The following CREATE TABLE statement describes the schema of the **wbExtensions** table:

```
CREATE TABLE wbExtensions
(
  extension          VARCHAR(12),
  name               VARCHAR(30),
  source_table       VARCHAR(18),
  super_type         VARCHAR(18),
  sub_type           VARCHAR(18),
  ID_column          VARCHAR(18),
  content_column     VARCHAR(18),
  retrieval_method   INTEGER,
  path_column        VARCHAR(18),
  PRIMARY KEY (extension) CONSTRAINT wb_extension
);
```

The **wbPages** Table

The **wbPages** table stores your AppPages.

The **ID**, **path**, and **extension** columns uniquely identify an AppPage. AppPages always have an extension of **html** or **htm**. You can also store simple text files (extension **txt**) in the **wbPages** table. The AppPage itself is stored in the **object** column, which is of data type HTML.

AppPage Builder also stores other information about the AppPage, such as a description of the AppPage, when it was last changed, and the user who last changed it.

The following CREATE TABLE statement describes the schema of the **wbPages** table:

```
CREATE TABLE wbPages
(
  ID                VARCHAR(30),
  path              VARCHAR(178),
  extension         VARCHAR(12),
  description       VARCHAR(254),
  author           VARCHAR(30),
  keywords         VARCHAR(254),
  current_version   INTEGER,
  last_changed     datetime year to second,
  last_changed_by  VARCHAR(30),
  read_level       INTEGER,
  last_locked      datetime year to second,
  last_locked_by   VARCHAR(30),
  object           HTML,
  PRIMARY KEY (ID,path,extension) CONSTRAINT wbPageId,
  FOREIGN KEY (extension) REFERENCES wbExtensions (extension)
) PUT object in ($2);
```

The **wbPageVersions** Table

The **wbPageVersions** table stores previous versions of AppPages.

The **wbPageVersions** table has a schema similar to the **wbPages** table but with a few extra columns used to store versioning information.

The following CREATE TABLE statement describes the schema of the **wbPageVersions** table:

```
CREATE TABLE wbPageVersions
(
  version_ID          SERIAL,
  ID                 VARCHAR(30),
  path              VARCHAR(178),
  extension         VARCHAR(12),
  description       VARCHAR(254),
  author           VARCHAR(30),
  keywords         VARCHAR(254),
  current_version   INTEGER,
  last_changed     datetime year to second,
  last_changed_by  VARCHAR(30),
  read_level       INTEGER,
  last_locked     datetime year to second,
  last_locked_by  VARCHAR(30),
  delete_status    INTEGER DEFAULT 0,
  version_label    VARCHAR(80),
  version_comment  VARCHAR(254),
  object          HTML,
  PRIMARY KEY (version_ID) CONSTRAINT wbPageVersionId,
  FOREIGN KEY (extension) REFERENCES wbExtensions
) PUT object in ($2);
```

The **wbBinaries** Table

The **wbBinaries** table stores binary data, such as images, Microsoft Word files, video clips, and bitmaps.

The **ID**, **path**, and **extension** columns uniquely identify a binary object. The extension of the binary object determines what type of object it is, based on information in the **wbExtensions** table. For example, the extensions **gif** and **jpeg** indicate that the object is an image, and the extension **doc** indicates that the object is a Microsoft Word document. The binary object itself is stored in the **object** column, which is of data type BLOB.

AppPage Builder also stores other information about the binary object, such as a description of the object, when it was last changed, and the user who last changed it.

The following CREATE TABLE statement describes the schema of the **wbBinaries** table:

```
CREATE TABLE wbBinaries
(
  ID                VARCHAR(30),
  path              VARCHAR(178),
  extension         VARCHAR(12),
  description       VARCHAR(254),
  height            INTEGER,
  width             INTEGER,
  current_version   INTEGER,
  last_changed      datetime year to second,
  last_changed_by   VARCHAR(30),
  read_level        INTEGER,
  last_locked       datetime year to second,
  last_locked_by    VARCHAR(30),
  object            BLOB,
  PRIMARY KEY (ID,path,extension) CONSTRAINT wbBinId,
  FOREIGN KEY (extension) REFERENCES wbExtensions (extension)
) PUT object IN ($2);
```

The **wbBinaryVersions** Table

The **wbBinaryVersions** table stores previous versions of binary objects.

The **wbBinaryVersions** table has a schema similar to the **wbBinaries** table but with a few extra columns used to store versioning information.

The following CREATE TABLE statement describes the schema of the **wbBinaryVersions** table:

```
CREATE TABLE wbBinaryVersions
(
  version_ID          SERIAL,
  ID                  VARCHAR(30),
  path                VARCHAR(178),
  extension           VARCHAR(12),
  description         VARCHAR(254),
  height              INTEGER,
  width               INTEGER,
  current_version     INTEGER,
  last_changed        datetime year to second,
  last_changed_by    VARCHAR(30),
  read_level          INTEGER,
  last_locked         datetime year to second,
  last_locked_by     VARCHAR(30),
  delete_status       INTEGER DEFAULT 0,
  version_label       VARCHAR(80),
  version_comment     VARCHAR(254),
  object              BLOB,
  PRIMARY KEY (version_ID) CONSTRAINT wbBinaryVersionID,
  FOREIGN KEY (extension) REFERENCES wbExtensions
)  PUT object IN ($2);
```

The wbTags Table

The **wbTags** table stores system and user-defined dynamic tags.

The **ID** column stores the unique identifier of the dynamic tag. You specify this identifier in your AppPage with the syntax `<?tag_id>` when you want to invoke a dynamic tag. The dynamic tag itself is stored in the **object** column, which is of data type HTML.

The **wbTags** table is similar to the **webTags** system table in that they both store dynamic tags. The **webTags** system table is created when you register the Web DataBlade module in your database and is the default table for storing dynamic tags. This means that, by default, the **WebExplode()** function looks in the **webTags** table when it invokes a dynamic tag. AppPage Builder, however, stores dynamic tags in the **wbTags** table. For this reason, if you use AppPage Builder to create your AppPages and user-defined dynamic tags, you *must* set the variable **MI_WEBTAGSTABLE** to `wbTags` in your Webdriver configuration. This ensures that the **WebExplode()** function looks in the **wbTags** table, and not the **webTags** table, for dynamic tags.

The **webTags** system table is described in the *IBM Informix Web DataBlade Module Administrator's Guide*.

The following CREATE TABLE statement describes the schema of the **wbTags** table:

```
CREATE TABLE wbTags
(
  ID                VARCHAR(30),
  description       VARCHAR(254),
  parameters       VARCHAR(254),
  class            VARCHAR(64),
  current_version   INTEGER,
  last_changed     datetime year to second,
  last_changed_by  VARCHAR(30),
  last_locked     datetime year to second,
  last_locked_by  VARCHAR(30),
  object           HTML,
  wizData         BLOB,
  PRIMARY KEY (ID) CONSTRAINT wbTagId
) PUT object in ($2), wizData in ($2);
```

The **wbTagVersions** Table

The **wbTagVersions** table stores previous versions of dynamic tags.

The **wbTagVersions** table has a schema similar to the **wbTags** table but with a few extra columns used to store versioning information.

The following CREATE TABLE statement describes the schema of the **wbTagVersions** table:

```
CREATE TABLE wbTagVersions
(
  version_ID          SERIAL,
  ID                  VARCHAR(30),
  description          VARCHAR(254),
  parameters          VARCHAR(254),
  class               VARCHAR(64),
  current_version     INTEGER,
  last_changed        datetime year to second,
  last_changed_by    VARCHAR(30),
  last_locked         datetime year to second,
  last_locked_by     VARCHAR(30),
  delete_status       INTEGER DEFAULT 0,
  version_label       VARCHAR(80),
  version_comment     VARCHAR(254),
  object              HTML,
  wizData             BLOB,
  PRIMARY KEY (version_ID) CONSTRAINT wbTagVersionID
) PUT object in ($2) , wizData in ($2);
```

The **wbPreviews** Table

The **wbPreviews** table stores configuration variables that IBM Informix Data Director for Web uses during development.

The **wbPreviews** table is used by Data Director for Web only; AppPage Builder does not use this table. For more information about Data Director for Web, refer to the *IBM Informix Data Director for Web User's Guide*.

The following CREATE TABLE statement describes the schema of the **wbPreviews** table:

```
CREATE TABLE wbPreviews
(
  ID                VARCHAR(30),
  object            HTML,
  PRIMARY KEY (ID) CONSTRAINT wbPreviewName
) PUT object in ($2);
```

The **wbProjects** Table

The **wbProjects** table stores AppPage Builder projects.

When you use AppPage Builder to create a Web application, you can logically group the AppPages and binary objects that make up the application into a project for easier management of the application. The **wbProjects** table stores information about all existing projects.

The following CREATE TABLE statement describes the schema of the **wbPreviews** table:

```
CREATE TABLE wbProjects
(
  name                VARCHAR(30),
  description         VARCHAR(254),
  owner              VARCHAR(30),
  last_locked        datetime year to second,
  last_locked_by     VARCHAR(30),
  last_deployed      datetime year to second,
  last_deployed_by   VARCHAR(30),
  deployed_db        VARCHAR(18),
  deployed_server    VARCHAR(18),
  deployed_project    VARCHAR(30),
  preview            VARCHAR(30),
  PRIMARY KEY (name) CONSTRAINT wbProjectName,
  FOREIGN KEY (preview) REFERENCES wbPreviews (ID)
);
```

The wbResProjects Table

The **wbResProjects** table describes the many-to-many relationship between the projects stored in the **wbProjects** table and the objects in a Web application (AppPages stored in the **wbPages** table and binary objects stored in the **wbBinaries** table).

A project can include many AppPages and binary objects, and a particular AppPage or binary object can be associated with many projects. However, each row in the **wbResProjects** table describes a single relationship.

For example, assume the `/pages/welcome.html` AppPage is used in two projects: **hr_project** and **sales_project**. Further assume that the **hr_project** project also contains a binary object `/images/logo.gif`. The **wbResProjects** table contains the following three rows to describe these relationships.

ID	path	extension	project
welcome	/pages	html	hr_project
welcome	/pages	html	sales_project
logo	/images	gif	hr_project

The following CREATE TABLE statement describes the schema of the **wbResProject** table:

```
CREATE TABLE wbResProjects
(
  ID                VARCHAR(30),
  path              VARCHAR(178),
  extension         VARCHAR(12),
  project           VARCHAR(30),
  PRIMARY KEY (ID,path,extension,project) CONSTRAINT wbResProjId,
  FOREIGN KEY (project) REFERENCES wbProjects (name)
);
```

The **wbInfo** Table

The **wbInfo** table stores information about the AppPage Builder database schema and the versioning model used to version AppPages, binary objects, and dynamic tags.

The following CREATE TABLE statement describes the schema of the **wbInfo** table:

```
CREATE TABLE wbInfo
(
  name          VARCHAR(80),
  value         VARCHAR(254),
  description   VARCHAR(254),
  PRIMARY KEY (name) CONSTRAINT wbInfoName
);
```

The **wbUsers** Table

The **wbUsers** table stores information about users, such as their password, their level of security when reading AppPages, their default project, and so on.

The following CREATE TABLE statement describes the schema of the **wbUsers** table:

```
CREATE TABLE wbUsers
(
  name                VARCHAR(40) NOT NULL,
  password            VARCHAR(40) NOT NULL,
  security_level      INTEGER      NOT NULL,
  default_project     VARCHAR(30) NOT NULL REFERENCES wbProjects,
  def_object_type     VARCHAR(40) NOT NULL,
  textarea_width      INTEGER      DEFAULT 80,
  textarea_height     INTEGER      DEFAULT 20,
  versioning          CHAR         DEFAULT 't',
  web_lint            INTEGER      DEFAULT 2,
  PRIMARY KEY        (name)
);
```

The **wbObjectTypes** Table

The **wbObjectTypes** table stores the types of objects you can add to your Web application using AppPage Builder.

The **Add Object** AppPage of AppPage Builder lists seven types of objects you can add to your application: **AppPage**, **Audio**, **Document**, **Dynamic Tag**, **Image**, **User-Defined Routine**, and **Video**. Each of these object types corresponds to a single row in the **wbObjectTypes** table. Each of these object types, in turn, maps to one or more rows in the **wbExtensions** table, based on the MIME supertype of each extension.

AppPage Builder uses these relations between the **wbObjectTypes** and **wbExtensions** tables to determine which extensions correspond to a particular object type. For example, the **Image** object type can have the following four extensions: **bmp**, **jpeg**, **jpg**, or **gif**.

The following CREATE TABLE statement describes the schema of the **wbUsers** table:

```
CREATE TABLE wbObjectTypes
(
  object_type          VARCHAR(40) NOT NULL,
  super_type          VARCHAR(40) NOT NULL,
  page_suffix         VARCHAR(40) NOT NULL,
  PRIMARY KEY         (object_type)
);
```

Web DataBlade Module Variables

This appendix provides the full list of Webdriver and **WebExplode()** variables. The appendix is organized into the following sections:

- “[Webdriver Variables Stored in the web.cnf File](#)” on page C-2
- “[Webdriver Variables Stored in the Database](#)” on page C-6
- “[WebExplode\(\) Variables](#)” on page C-27

Use the Web DataBlade Module Administration Tool to set the Webdriver and **WebExplode()** variables that are stored in the database as part of your Webdriver configuration.

Many Webdriver variable names changed in Version 4.0 of the Web DataBlade module. This appendix also provides, where applicable, the old name of the Webdriver variable.

For detailed information about using the Web DataBlade Module Administration Tool, refer to the *IBM Informix Web DataBlade Module Administrator's Guide*.

Webdriver Variables Stored in the web.cnf File

This section describes the Webdriver variables that are stored in the Global, Setvar, and Map sections of the **web.cnf** file.

The Global Section of the web.cnf File

The following table lists all the variables you can set in the Global section of the **web.cnf** file.

Variable	Mandatory?	Description
dbconnmax	No	Specifies the maximum number of connections to the database The default value is 16.
anchorvar	Yes	Specifies the name of the anchor variable used when an AppPage calls another AppPage This variable is mandatory. For the NSAPI and Apache Webdrivers, anchorvar should always be set to WEB_HOME , with a trailing forward slash (/). For the ISAPI Webdriver, the variable should be set to WEB_HOME/drvisapi.dll . For the CGI Webdriver, the variable should be set to WEB_HOME/webdriver . Since anchorvar is always set to WEB_HOME , you can always use WEB_HOME as an anchor variable in any AppPage.
driverdir	No	Specifies the directory that Webdriver uses to internally coordinate its interaction with the Web server The default value of this variable is /tmp. This variable is only used by the Apache and CGI implementations of Webdriver.
debug_file	No	Specifies the full pathname of the log file to which Webdriver messages are written
debug_level	No	Enables Webdriver tracing to the log file specified by the debug_file variable You can override the value of the debug_level variable in the Global section of the web.cnf file by setting it in your Webdriver configuration using the Web DataBlade Module Administration Tool.

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Variable	Mandatory?	Description
maxcharsize	No	<p>When set to a value greater than 1, <i>each</i> character sent to the WebExplode() function is URL-encoded.</p> <p>If this variable is not set, Webdriver URL-encodes only special characters (such as &) before sending it to the WebExplode() function.</p> <p>It is recommended that you set this variable to a value greater than 1 <i>only</i> if you are using a multibyte character set. This is because you might see a degradation in performance if Webdriver is forced to URL-encode every character before sending it to the WebExplode() function.</p> <p>You can override the value of this variable for your Webdriver mapping by adding it as a Webdriver variable to the appropriate Webdriver configuration.</p>
config_user	No	<p>The name of the user who is allowed to use the Web DataBlade Module Administration Tool.</p> <p>Add this variable to the web.cnf file only with the webconfig utility.</p>
config_password	No	<p>The password of the config_user user.</p> <p>Add this variable to the web.cnf file only with the webconfig utility.</p>
dbconntimeout	No	<p>Sets the maximum time (in seconds) that a Webdriver connection to the database is allowed to be idle. Webdriver automatically closes any database connections that have been idle for longer than the value of dbconntimeout.</p> <p>The following sample shows how to set dbconntimeout to 120 seconds:</p> <pre> <GLOBAL> debug_file /tmp/driver.log debug_level -1 dbconntimeout 120 dbconntimeout 128 anchorvar WEB_HOME/ </GLOBAL> </pre> <p>If no database request is made on a connection for 2 minutes, then Webdriver closes the connection.</p>

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The Setvar Section of the web.cnf File

You set Informix environment variables in the Setvar section of the **web.cnf** file.

The following Informix environment variables are discussed in the *IBM Informix Web DataBlade Module Administrator's Guide*:

- **INFORMIXSERVER**
- **INFORMIXDIR**

For a complete list of the Informix environment variables you can set in the Setvar section of the **web.cnf** file, refer to *IBM Informix Guide to SQL: Reference*.

Important: Do not set the Informix environment variables *DBDATE* and *DBCENTURY* in your **web.cnf** file. Their settings will be ignored. Instead, set them in your environment before you register the DataBlade module in your database.



The Map Section of the web.cnf File

The following table lists all the variables that can be included in the Map section of the **web.cnf** file.

Map Variable	Mandatory?	Description
database	Yes	The name of the database to which Webdriver connects when a URL prefix specifies this Webdriver mapping
user	Yes	The name of the user who connects to the database specified by the database variable
password	Yes	The encrypted password of the user specified by the user variable
password_key	Yes	The key that Webdriver uses to decrypt the password specified by the password variable.

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Map Variable	Mandatory?	Description
server	No	The Informix database server to use when making the connection to the database If this variable is not set, the connection is made using the INFORMIXSERVER database server.
config_name	Yes	The name of the Webdriver configuration to use The Webdriver configuration is stored in the WebConfigs system table in the database specified by the database variable.
config_security	No	When set to ON , security is enabled for this Webdriver mapping, which means that only the user specified by the config_user variable in the Global section of the web.cnf file can use this Webdriver mapping. The config_security variable should appear only in Webdriver mappings used to invoke the Web DataBlade Module Administration Tool.

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Webdriver Variables Stored in the Database

This section describes the Webdriver variables that are stored in the database as part of a Webdriver configuration. These include both schema-related Webdriver variables and feature-related Webdriver variables.

Managing Webdriver Connections to the Database

To modify the behavior of Webdriver connections to the database for specific Webdriver configurations, use the Web DataBlade Module Administration Tool to set the Webdriver variables described in the following table.

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
connection_life	MI_WEBRECONNECT	No	Specifies the life of a connection, or in other words, the maximum number of requests (an integer value) that Webdriver makes to the database before the connection is shut down and reestablished The default value is 100. You should set this Webdriver variable to another value only under the guidance of Technical Support.
connection_wait	MI_WEBDBCONNWAIT	No	Specifies the amount of time, in milliseconds, that Webdriver yields and waits to establish a connection if Webdriver was unable to make the initial connection due to the maximum number of database connections having already been reached The maximum number of Webdriver connections to the database server is specified by the dbconnmax Webdriver variable in the Global section of web.cnf file.

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
connect_as_user	MI_USER_REMOTE	No	<p>When set to ON, specifies that Webdriver establish the connection to the database as the user specified by the REMOTE_USER Web browser variable and not as the user specified in the Map section of the web.cnf file</p> <p>By default, if this Webdriver variable is not set, Webdriver always establishes connections to the database as the user specified by the user Webdriver variable in the appropriate Map section of the web.cnf file.</p> <p>This Webdriver variable applies only to the NSAPI, ISAPI, and Apache implementations of Webdriver. In addition, you can only use this Webdriver variable if you have enabled user authentication for the corresponding Web server.</p>
connect_user_max	MI_USER_DBCONNMAX	No	<p>Specifies the maximum number of connections that Webdriver establishes as the user specified by the REMOTE_USER Web browser variable</p> <p>The default value of this Webdriver variable is 1.</p> <p>The connect_user_max Webdriver variable can only be set in conjunction with the connect_as_user Webdriver variable.</p> <p>This Webdriver variable applies only to the NSAPI, ISAPI, and Apache implementations of Webdriver. In addition, you can only use this Webdriver variable if you have enabled user authentication for the corresponding Web server.</p>
query_timeout	MI_WEBQRYTIMEOUT	No	<p>Specifies the maximum number of seconds that Webdriver allows a query to run before Webdriver interrupts the query</p>

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
keepalive	MI_WEBKEEPALIVE	No	<p>Specifies the interval in seconds at which Webdriver checks the Web browser connection</p> <p>If the browser is no longer connected because a STOP or CANCEL signal has been sent by the browser, the running query is interrupted, and the Web server is freed to execute the next query request.</p> <p>This variable applies only to the NSAPI, ISAPI, and Apache implementations of Webdriver.</p>
init_sql	MI_WEBINITIALSQL	No	<p>Specifies that Webdriver send initial SQL statements to the database server when Webdriver makes a connection to the database</p> <p>Set this Webdriver variable to one or more SQL statements, separated by semicolons and terminated by a carriage return. Do not include quotes.</p> <p>For example, if you want to set the isolation level of the connection to the database to Dirty Read, set the init_sql Webdriver variable to the value <code>SET ISOLATION TO DIRTY READ;</code></p>

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Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
max_html_size	MI_WEBMAXHTMLSIZE	No	<p>Specifies the largest AppPage, in bytes, that Webdriver sends to the browser. AppPages larger than this size are not sent to the browser.</p> <p>The default value for this Webdriver variable is 128 KB. The maximum value is 2³² KB.</p>
maxcharsize	New in Version 4.0	No	<p>When set to a value greater than 1, <i>each</i> character sent to the WebExplode() function is URL-encoded.</p> <p>If this variable is not set, Webdriver URL-encodes only special characters (such as &#x26) before sending it to the WebExplode() function.</p> <p>Informix recommends you set this variable to a value greater than 1 <i>only</i> if you are using a multibyte character set. This is because you might see a degradation in performance if Webdriver is forced to URL-encode every character before sending it to the WebExplode() function.</p> <p>You can specify the maxcharsize variable in the Global section of the web.cnf file if you want to specify globally that characters should be URL-encoded. By adding the variable to a Webdriver configuration, however, you can control this behavior for a single Webdriver configuration and not for the whole database server.</p>

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Using Server-Side Includes in AppPages with the Apache or NSAPI Webdriver

To use server-side includes in your AppPages with the `DYNAMIC` option to the `PARSE-HTML` variable-processing function, you must use the Web DataBlade Module Administration Tool to set the Webdriver variable described in the following table.

Webdriver Variable	Mandatory?	Description
<code>parse_html_directory</code>	Yes	Specifies the full pathname of the directory on the Web server computer where Webdriver temporarily stores the AppPage to be subsequently read by the Web server Webdriver does not create this directory, so be sure the directory exists before you use server-side includes in an AppPage.

Resetting User Name/Password Combinations

To reset user name/password combinations so users can change their passwords within a Web application, use the Web DataBlade Module Administration Tool to set the Webdriver variable listed in the following table.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
<code>auth_cache</code>	<code>MI_WEBAUTHCACHE</code>	Yes	<p>Allows you to reset user name and password combinations so users can change their passwords within an application</p> <p>You can set the auth_cache Webdriver variable to three values: <code>on</code>, <code>off</code>, and <code>check</code>. The default value is <code>on</code>.</p> <p>If you set the variable to <code>on</code>, Webdriver always uses the password value in the Web server cache. If you set the variable to <code>off</code>, Webdriver always uses the password value in the database. If you set the variable to <code>check</code>, and the value in the Web server cache is different from the Web browser value, Webdriver updates the Web server cache with the password value in the database.</p>

Enabling NSAPI, ISAPI, and Apache Security

To use the security features of the Netscape Web server, Microsoft Internet Information Server, or Apache Web Server, use the Web DataBlade Module Administration Tool to set the Webdriver variables listed in the following table.

Variable Name	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
MIusertable	Same	Yes	Name of the table that contains user access information
MIusername	Same	Yes	Name of the VARCHAR column in the user access table (MIusertable) that contains the name of the database user
MIuserpasswd	Same	Yes	Name of the VARCHAR column of the user access table (MIusertable) that contains the password of the database user
MIuserlevel	Same	Yes	Name of the INTEGER column of the user access table (MIusertable) that contains the access level of the database user
MIpagelevel	Same	Yes	Name of the INTEGER column of the table that stores your AppPage that contains the access level of the AppPage
MIusergroup	Same	No	Name of the INTEGER column of the user access table (MIusertable) that contains the group access level of the user
iis_nt_user	MI_WEBNTUSER	Yes	(ISAPI Webdriver only) Name of a valid Windows NT user

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Variable Name	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
iis_nt_password	MI_WEBNTPASSWORD	Yes	(ISAPI Webdriver only) Password of a valid Windows NT user
redirect_url	MI_WEBREDIRECT	No	URL to redirect users to if they do not have access to the AppPage they attempt to retrieve
auth_crypt_udr	New in Version 4.0	No	<p>Enables password encryption when set to ON</p> <p>If password encryption is enabled, Webdriver encrypts the password entered by the user and compares it to the encrypted password in the MIusertable table. If they match, then the user is authenticated.</p> <p>If set to OFF (default value), then Webdriver does not encrypt the password.</p>

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Enabling Basic AppPage-Level Security

To configure AppPage-level authorization, use the Web DataBlade Module Administration Tool to set the Webdriver variables listed in the following table.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
MIpagelevel	Same	Yes	Specifies the name of the INTEGER column of the table that stores AppPages that contains the access level of the AppPage
MI_WEBACCESSLEVEL	Same	Yes	Specifies the access level of all users for a particular Webdriver configuration
redirect_url	MI_WEBREDIRECT	No	Specifies the URL to redirect users to if they do not have access to the AppPage they attempt to retrieve
error_page	MI_WEBERRORPAGE	No	Set to the value of the AppPage that contains error-handling routines

Customizing the Query to Retrieve Large Objects

To customize the query that Webdriver uses to retrieve large objects, add the Webdriver variables described in the following table to your Webdriver configuration using the Web DataBlade Module Administration Tool.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
lo_query_string	MI_WEBLOQUERY	Yes	Contains the SQL statement that is used to query the database for a large object Use standard C language variable syntax '%s' to specify a parameter string.
lo_query_params	MI_WEBLOPARAMS	Yes	Specifies the variables that are substituted for the parameters in the SQL statement specified by the lo_query_string variable You <i>must</i> use the variable name MlvalObj to specify the name of the large object you want to retrieve.
lo_error_zerorows	MI_WEBLOZEROROWS	No	Specifies the integer error number that Webdriver should return if the SQL statement that Webdriver uses to retrieve large objects, specified by the lo_query_string variable, returned zero rows
lo_error_sql	MI_WEBLOSQLERROR	No	Specifies the integer error number that Webdriver should return if an SQL error occurs when Webdriver retrieves a large object using the SQL statement specified by the lo_query_string variable

Enabling AppPage Caching

To set AppPage caching for your Webdriver configuration, use the Web DataBlade Module Administration Tool to set the Webdriver variables listed in the following table.

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
cache_page	MI_WEBCACHEPAGE	Yes	Specifies whether AppPage caching is enabled or disabled Set to ON to enable AppPage caching and OFF to disable AppPage caching. The default value is OFF .
cache_directory	MI_WEBCACHEDIR	Yes	Specifies the full pathname of the directory on the Web server computer in which cached AppPages and large objects are placed If this variable is not set, neither AppPages nor large objects are cached.
cache_page_buckets	New in Version 4.0	No	Specifies the number of subdirectories per AppPage created under the directory specified by cache_directory . The default is one subdirectory per AppPage Set this variable only if you intend on caching AppPages that might have over 1000 different versions.

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Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
cache_page_life	MI_WEBPAGELIFE	No	<p>Specifies the length of time after which an AppPage is refreshed from the database</p> <p>Set cache_page_life in units of seconds (s or S), hours (h or H), or days (d or D). For example, the value 5d indicates five days.</p>
cache_admin	MI_WEBCACHEADMIN	No	<p>Specifies the name of the Cache Administration AppPage</p> <p>The Cache Administration AppPage is not stored in the database, but is an internal AppPage managed by Webdriver.</p> <p>When Mlval is set to this value, Webdriver invokes this AppPage so you can add, delete, purge, or view cache entries in the cache_directory directory.</p> <p>The default value is <code>cacheadmin</code>.</p>

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Enabling AppPage Caching

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
cache_admin_password	MI_WEBCACHEPASSWORD	No	Specifies that cache administration requests are processed only if the password entered in the Cache Administration AppPage matches this value
cache_page_timestamp	New in Version 4.0	No	<p>Specifies that Webdriver, when invoking an AppPage for which AppPage caching has been enabled, adds time stamp information at the bottom of the page</p> <p>The time stamp is enclosed in an HTML comment and thus is only seen if a user views the HTML source of the AppPage in their browser.</p> <p>The default value is OFF. To enable this feature, set this Webdriver variable to ON.</p>

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Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
cache_page_debug	New in Version 4.0	No	<p>Specifies that Webdriver invokes AppPages that contain deferred sections (delimited with the MIDEFERRED tag) without returning an error, even if AppPage caching has <i>not</i> been enabled</p> <p>This Webdriver variable is used to debug problems with partial AppPage caching.</p> <p>The cache_page_debug Webdriver variable can be set to two values: <code>show_defer</code> and <code>execute_defer</code>.</p> <p>When set to <code>show_defer</code> and you invoke an AppPage with a deferred section, Webdriver returns the deferred section in its original form. If the Webdriver variable is set to <code>execute_defer</code>, Webdriver executes the deferred section when you invoke the AppPage.</p>

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Enabling Large Object Caching

To set large object caching, use the Web DataBlade Module Administration Tool to set the Webdriver variables listed in the following table.

Webdriver Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
cache_directory	MI_WEBCACHEDIR	Yes	Specifies the directory on the Web server computer in which cached large objects are placed If not set, large objects are not cached.
cache_buckets	MI_WEBCACHESUB	No	Specifies the number of subdirectories per database created under the directory specified by cache_directory The default is one subdirectory per database.
cache_maxsize	MI_WEBCACHEMAXLO	No	Specifies the maximum size in bytes of large objects to be cached The default is 64 KB.

Enabling Webdriver Tracing

The following table describes each variable for enabling Webdriver tracing.

Variable	Name of Variable in Versions 3.3 and Previous	Description
debug_level	MI_WEBDRVLEVEL	Enables Webdriver tracing to the log file specified by the debug_file variable
debug_file	New in Version 4.0	Specifies the full pathname of the log file to which Webdriver messages are written

Enabling Use of Session Variables in AppPages

To enable the use of session variables in your AppPages use the Web DataBlade Module Administration Tool to set the following Webdriver variables.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
session	MI_WEBSESSION	Yes	This variable allows you to select the method for binding a session ID to the browser. This variable can have values of <code>url</code> , <code>cookie</code> , or <code>auto</code> . If set to <code>url</code> , then the session ID is bound to any dynamic anchor variable contained within the page. Typically, this variable would be \$WEB_HOME . If set to <code>cookie</code> , the session ID is tracked with a variable sent back to the browser as a cookie. If you select <code>auto</code> , Webdriver automatically determines which method is best to use.
session_home	MI_WEBSESSIONHOME	Yes, if using <code>auto</code> or <code>url</code>	This variable identifies which configuration file variable is used by your application to anchor HREF tags. For example, if your application uses WEB_HOME as its anchor, WEB_HOME is the value set for this variable. If multiple values are required for this variable, they should be separated by commas.

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Enabling Use of Session Variables in AppPages

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
session_location	MI_WEBSESSIONLOC	Yes	This variable describes how the persistent state is handled. If the session code is going to run within the same process, this variable needs to refer to the full path of the directory to create session state files. This directory must be created and owned by the same user who owns the Web server. If the code is going to run as a separate process, the variable needs to refer to a port and IP address in the form <code>port@ip-address</code> .
session_buckets	MI_WEBSESSIONSUB	No	This variable is used to define the number of subdirectories that are available to hash the session data if the site is exceptionally large. It is only required if session management is being controlled within the same process. The default is 100.
session_life	MI_WEBSESSIONLIFE	No	This variable is used to define the amount of time a session is allowed to continue. It measures time from the last update to the session stack (if a session stack exists) or time from session creation. Granularity is in seconds (default), hours (h) or days (d) and uses the same syntax as cache_page_life . For more information about AppPage caching, refer to the <i>IBM Informix Web DataBlade Module Administrator's Guide</i> .

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Handling Errors with the MI_DRIVER_ERROR Variable

Set the following Webdriver variables with the Web DataBlade Module Administration Tool to modify the error messages seen by the browser as different types of errors are encountered.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
show_exceptions	MI_WEBSHOWEXCEPTIONS	No	Set to <i>on</i> or <i>off</i> . When <i>on</i> , Webdriver displays the database exception returned by the WebExplode() function. When <i>off</i> , Webdriver displays the HTTP/1.0 500 Server error message. Default is <i>off</i> .
redirect_url	MI_WEBREDIRECT	No	Set to the URL to redirect users to if they do not have access to the AppPage they attempt to retrieve.
error_page	MI_WEBERRORPAGE	No	Set to the value of the AppPage that contains error handling routines.

Displaying Database Errors in a Browser

To display database errors in your browser, instead of the generic HTTP/1.0 500 Server error error, use the Web DataBlade Module Administration Tool to set the following Webdriver variable for your Webdriver configuration.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
show_exceptions	MI_WEBSHOWEXCEPTIONS	No	Use the Web DataBlade Module Administration Tool to set the show_exceptions variable to <code>on</code> or <code>off</code> . When <code>on</code> , Webdriver displays the database exception returned by WebExplode() . When <code>off</code> , Webdriver displays the HTTP/1.0 500 Server error message. Default is <code>off</code> .

Managing Cookies

Use the Web DataBlade Module Administration Tool to set the following Webdriver variable to specify the cookies that Webdriver recognizes.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Description
accept_cookie	MI_WEBACCEPTCKI	No	Use the Web DataBlade Module Administration Tool to set the accept_cookie Webdriver variable to the name of cookies that your Web DataBlade module application uses. All other cookies are ignored by Webdriver. Multiple cookie names are separated by commas. If you do not use this variable, Webdriver assumes all cookies in the browser are part of the Web application.

Uploading Client Files

Use the Web DataBlade Module Administration Tool to set the following Webdriver variable to upload client files.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
upload_directory	MI_WEBUPLOADDIR	No	Directory on the Web server machine in which uploaded files are placed. Default is /tmp.

Passing Image Map Coordinates

Set the **MIimap** variable to enable image map coordinates to be passed to AppPages.

Variable	Mandatory?	Content
MIimap	Yes	Set to <code>on</code> or <code>off</code> . When <code>on</code> , the URL is treated as an image map, and the values are passed as <i>x</i> - and <i>y</i> -coordinates. Default is <code>off</code> .

Two-Pass Query Processing

Use the Web DataBlade Module Administration Tool to set the following Webdriver variable to specify that Webdriver execute a query in two parts.

Variable	Mandatory?	Description
MIqry2pass	No	Specifies a query to be executed in two parts. MIqry2pass selects an object and then executes a function. Used only in a URL. Default is set to <code>OFF</code> .

Using RAW Mode with Webdriver

To enable RAW mode, use the Web DataBlade Module Administration Tool to set the following Webdriver variable in your Webdriver configuration.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
raw_password	MI_RAWPASSWORD	Yes	Password to enable RAW mode

Caching Information in the wbExtensions Table

Use the Web DataBlade Module Administration Tool to set the **extensions** Webdriver variable to control whether Webdriver caches the information contained in the **wbExtensions** table.

When you are developing AppPages and possibly adding new extension types to the **wbExtensions** table, you do not want Webdriver to cache this information but instead to retrieve it each time it is needed, in case the information has changed.

After you deploy your application to a production environment, you should improve performance by caching the information in the **wbExtensions** table. To enable extension information caching, set the **extensions** Webdriver variable to `cache`.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
extensions	MI_WEBEXTENSIONS	No	Default setting is <code>nocache</code> . Set to <code>cache</code> to enable caching.

Using the New AppPage Builder or Data Director for Web

If you use the version of AppPage Builder included in Version 4.12.UC1 or later of the IBM Informix Web DataBlade module, or you use Data Director for Web, to develop AppPages, you must set the **schema_version** Webdriver variable to the value `wb`. This Webdriver variable is automatically included in the **apb2** and **ddw** Webdriver configurations when you install the Web DataBlade Module Administration Tool in your database.

If you use Version 3.32 or earlier of AppPage Builder to develop AppPages, you should *not* include the **schema_version** variable in your Webdriver configuration.

Variable	Name of Variable in Versions 3.3 and Previous	Mandatory?	Content
schema_version	MI_WEBSHEMADEF	No	Set to <code>wb</code> if you are using Version 4.12.UC1 or later of the IBM Informix Web DataBlade module or Data Director for Web.

WebExplode() Variables

This section describes the **WebExplode()** variables. These variables are stored in the database as part of a Webdriver configuration.

Enabling WebExplode() Tracing

Use the Web DataBlade Module Administration Tool to set the following variables for your Webdriver configuration to enable logging of **WebExplode()** function trace information.

Variable	Mandatory?	Content
MI_WEBEXLEVEL	Yes	Enables WebExplode() function tracing
MI_WEBEXPLOG	No	File to which WebExplode() messages are written

Managing Dynamic Tags

Use the Web DataBlade Module Administration Tool to set the following dynamic tag **WebExplode()** variables.

Variable	Mandatory?	Description
MI_WEBTAGSTABLE	No	<p>Specifies the database table that the WebExplode() function searches for the body of a dynamic tag</p> <p>This variable can be set to the following two values: <code>webTags</code> or <code>wbTags</code>.</p> <p>The default value if this variable is not set is <code>webTags</code>.</p> <p>You <i>must</i> set the MI_WEBTAGSTABLE variable to <code>wbTags</code> in your Webdriver configuration if you developed your Web application using the APB application included in Version 4.0 or later of the Web DataBlade module or Version 2.0 of Data Director for Web.</p>
MI_WEBTAGSSQL	No	<p>Specifies a user-defined SELECT statement that the WebExplode() function runs to retrieve the body of a dynamic tag</p> <p><i>Never</i> set the MI_WEBTAGSSQL variable in your Webdriver configuration. The variable should only be set for Web applications that were developed with Version 1.1 or earlier of Data Director for Web.</p> <p>The MI_WEBTAGSTABLE variable takes precedence over the MI_WEBTAGSSQL variable. This means that if you have both variables set in your Webdriver configuration, the WebExplode() function searches for the dynamic tag in the table specified by the MI_WEBTAGSTABLE variable.</p>
MI_WEBTAGSCACHE	No	<p>Specifies whether the WebExplode() function should cache dynamic tags or not</p> <p>This variable should be set to <code>on</code> to turn on caching or <code>off</code> to turn off caching.</p> <p>The default value is <code>on</code>.</p> <p>Turn off dynamic tag caching when you are developing your AppPages to ensure that you always see the latest version of the dynamic tag and not the cached version. When you deploy your application to a production environment, however, you should turn on dynamic tag caching to increase the performance of your Web application.</p>

Limiting Loop Processing With the MIBLOCK Tag

Use the Web DataBlade Module Administration Tool to set the **MI_LOOP_MAX** variable for your Webdriver configuration to limit the number of loops executed when you use the FOR, FOREACH, and WHILE attributes of the MIBLOCK AppPage tag. During loop processing, if the maximum number of loops is reached, the **WebExplode()** function raises an exception and stops loop processing.

For example, assume you have set **MI_LOOP_MAX** to 100 in your Webdriver configuration and you execute the following AppPage:

```
<?MIBLOCK WHILE=1>  
We are in an infinite loop  
<?/MIBLOCK>
```

Although logically the previous MIBLOCK statement results in an infinite loop, processing stops as soon as 100 loops have been executed, and you receive an error in your AppPage.

Variable	Mandatory?	Content
MI_LOOP_MAX	No	Limits the number of loops executed when you use the FOR, FOREACH, and WHILE attributes of the MIBLOCK AppPage tag

Limiting The Number Of Times an AppPage Can Call Itself Recursively

Use the **MI_WEBEXPLODE_DEPTH** variable to set the maximum number of times an AppPage can call itself recursively. You recursively call an AppPage by explicitly executing the **WebExplode()** function on the AppPage with the MISQL tag.

Use the Web DataBlade Module Administration Tool to set the **MI_WEBEXPLODE_DEPTH** variable for your Webdriver configuration.

Limiting The Number Of Times an AppPage Can Call Itself Recursively

For example, assume you invoke the following AppPage called **/recurse.html**, passing it the *name/value* pair \$DEPTH=10:

```
<?MIVAR NAME=DEPTH>${-, $DEPTH, 1}<?/MIVAR>
<?MIVAR>DEPTH : $DEPTH<?/MIVAR>

<?MISQL SQL="select WebExplode(object, 'DEPTH=$DEPTH') from wbpages
              where id = 'recurse' and path = '/' and extension = 'html';">
$1
<?/MISQL>
```

This AppPage calls itself recursively. If the **MI_WEBEXPLODE_DEPTH** variable has not been set, then the AppPage calls itself recursively until all database server resources have been used. If, however, you set **MI_WEBEXPLODE_DEPTH** to 100, the AppPage calls itself 100 times, and then stops.

Variable	Mandatory?	Content
MI_WEBEXPLODE_DEPTH	No	Limits the number of times an AppPage can call itself recursively.

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Glossary

anchor variable Variable in an AppPage whose value is based on the URL prefix used to invoke the AppPage. You do not set the anchor variable in your AppPage; rather, Webdriver automatically generates the value. You can use anchor variables to link one or more AppPages in the same Web application.

WEB_HOME is the Web DataBlade module anchor variable.

Apache Webdriver The implementation of Webdriver that uses the Apache API to connect to databases and execute AppPages.

See also [Webdriver](#), [CGI Webdriver](#), [ISAPI Webdriver](#), [NSAPI Webdriver](#).

AppPage An HTML page that includes AppPage tags and functions that dynamically execute SQL statements to query the database and format the results.

AppPage Builder (APB) A development tool packaged with the Web DataBlade module that allows you to create and update AppPages. APB is itself a Web DataBlade module application made up of linked AppPages.

AppPage tags Tags that are provided with the Web DataBlade module and are processed by the **WebExplode()** function. The tags identify elements of an HTML page and specify the structure and formatting for that page.

CGI Webdriver The implementation of Webdriver that uses a CGI program to connect to databases and execute AppPages.

See also [Webdriver](#), [Apache Webdriver](#), [ISAPI Webdriver](#), [NSAPI Webdriver](#).

code set	<p>A set of unique bit patterns that are mapped to the characters contained in a specific natural language, which include the alphabet, digits, punctuation, and diacritical marks. There can be more than one code set for a language: for example, the code sets for the English language include ASCII, ISO8895-1, and Microsoft 1252. You specify the code set that your database server uses when you set the GLS locale.</p> <p>See also multibyte code set, Global Language Support (GLS), locale.</p>
deployment	<p>Moving a Web application from a development environment to a production environment.</p>
directive	<p>An entry in a Web server's configuration file, that identifies the steps in the Web server's request-response processes that handle HTTP transactions. Examples of directives in Netscape's obj.conf file are NameTrans and Service.</p>
dynamic tag	<p>An HTML tag that allows multiple AppPages to share AppPage segments. For example, a TITLE dynamic tag might contain a standard title AppPage segment common to all the AppPages that make up a particular Web application. Each AppPage then uses the same TITLE dynamic tag for its title.</p> <p>See also system dynamic tag, user-defined dynamic tag.</p>
Global Language Support (GLS)	<p>An application environment that allows Informix application-programming interfaces (APIs) and database servers to handle different languages, cultural conventions, and code sets. Developers use the GLS libraries to manage all string, currency, date, and time data types in their code. Using GLS, you can add support for a new language, character set, and encoding by editing resource files, without access to the original source code, and without rebuilding the DataBlade module or client software.</p>
INFORMIXDIR	<p>The Informix environment variable that specifies the directory in which Informix products are installed.</p>
INFORMIX-SERVER	<p>The Informix environment variable that specifies the name of the Informix database server to which you want to connect.</p>
ISAPI Webdriver	<p>The implementation of Webdriver that uses the Microsoft Windows NT Internet Information Server API to connect to databases and execute AppPages.</p> <p>See also Webdriver, Apache Webdriver, CGI Webdriver, NSAPI Webdriver.</p>

large object	A data object that exceeds 255 bytes in length. A large object is logically stored in a table column but physically stored independently of the column, because of its size. Large objects can contain non-ASCII data.
locale	A set of files that define the native-language behavior of the program at run-time. The rules are usually based on the linguistic customs of the region or the territory. The locale can be set through an environment variable that dictates output formats for numbers, currency symbols, dates, and time as well as collation order for character strings and regular expressions. See also Global Language Support (GLS) .
MI_DRIVER_ERROR	A variable, accessible in AppPages, that contains a description of a Webdriver error. By querying the contents of this variable, an error-handling AppPage can determine the exact error that occurred and take appropriate action.
MI_WEBCONFIG	A Web DataBlade module environment variable that contains the full pathname of the web.cnf file. This variable is used by the NSAPI, ISAPI, and Apache implementations of Webdriver to locate the file when they create connections to an Informix database server.
multibyte code set	A code set that is made up of both single-byte and multibyte characters. Examples of multibyte code sets are EUC and Shift JIS. See also code set .
multirepresentational data type	A data type whose storage location varies depending on the size of the data. The Web DataBlade module HTML data type is an example of a multirepresentational data type. The first 7500 bytes of the HTML object are stored in the row; any portion of the HTML object that exceeds 7500 bytes is stored as a smart large object.
NSAPI Webdriver	The implementation of Webdriver that uses the Netscape API to connect to databases and execute AppPages. See also Webdriver , Apache Webdriver , CGI Webdriver , ISAPI Webdriver .
ONCONFIG file	The file that contains parameters for configuring the Informix database server. An example of a parameter in the ONCONFIG file is SBSPACENAME .

processing variable	A variable in an AppPage that contains processing information about the execution of an SQL statement, such as the number of rows or columns returned from a SELECT statement. An AppPage accesses processing variables after an MISQL tag executes its SQL statement.
RAW Mode	A way to display an AppPage stored in the database without expanding the AppPage tags. You can also display the variables in an AppPage and identify where variable assignments are made. RAW mode is useful for debugging.
sbspace	A logical storage area that contains one or more chunks that store only smart large object data.
server-side includes	A mechanism for including dynamic text in AppPages. Server-side includes are special command codes that are recognized and interpreted by the Web server; their output is placed in the AppPage before the AppPage is sent to the browser. Server-side includes can be used, for example, to include a date or time stamp in the text of the AppPage.
smart large object	<p>A large object that:</p> <ul style="list-style-type: none"> ■ Is stored in an sbspace, a logical storage area that contains one or more chunks ■ Has read, write, and seek properties similar to a UNIX file ■ Is recoverable ■ Obeys transaction isolation modes ■ Can be retrieved in segments by an application <p>Smart large objects include CLOB and BLOB data types.</p>
sqlhosts file	An Informix file that contains information that lets a client application locate and connect to an Informix database server anywhere on a network.
system dynamic tag	<p>Dynamic tags provided by the Web DataBlade module that allow you to reuse existing HTML to simplify the construction and maintenance of Web applications. Examples of system dynamic tags are CHECKBOXLIST, RADIOLIST, and SELECTLIST.</p> <p>See also dynamic tag, user-defined dynamic tag.</p>
UDR tag	See user-defined routine tag .

URL prefix	Part of a URL that client applications send to the Web server to invoke HTML pages, execute CGI programs (such as the CGI Webdriver,) call Web server plug-ins (such as the NSAPI, Apache, or ISAPI Webdriver), and so on. The Web server interprets the URL prefix to perform the appropriate action depending on how you have configured your Web server.
user-defined dynamic tag	A dynamic tag you create to reuse existing HTML to simplify the construction and maintenance of Web applications. See also <i>dynamic tag</i> , <i>system dynamic tag</i> .
user-defined routine	A routine, written in one of the languages that IBM Informix Dynamic Server supports, that provides added functionality for data types or encapsulates application logic.
user-defined routine tag	Tag in an AppPage that directly executes an existing user-defined routine and places the output of the execution of the routine within the AppPage.
variable expression	An expression in an AppPage that starts with a \$ character followed by a variable-processing function and two or more variables within parentheses. For example, the variable expression \$(+,\$NUMA,\$NUMB) adds the two variables \$NUMA and \$NUMB. See also <i>variable-processing function</i> .
variable-processing function	An AppPage function used in a variable expression to evaluate or manipulate variables. For example, the variable-processing function “+” in the variable expression \$(+,\$NUMA,\$NUMB) adds the two variables \$NUMA and \$NUMB. See also <i>variable expression</i> .
vector variable	A set of variables with the same name that are passed into the AppPage using check boxes or the MULTIPLE attribute of selection lists.
virtual processor	One of the multithreaded processes that make up the Informix database server and are similar to the hardware processors in the computer. For example, in the Web DataBlade module, you must add a WEB virtual processor to use the MIEXEC tag in an AppPage.
walking window	Two or more linked AppPages in which each AppPage displays a subset of the entire set of rows returned from a SELECT statement. You can navigate through the set of returned rows by clicking buttons on the AppPages.

web.cnf file	The default name of the Webdriver configuration file that describes the connection between the Web server and the Informix database server.
Web DataBlade Module Administration Tool	A Web DataBlade module application used to add, update, or delete Webdriver mappings and Webdriver configurations for the database to which you are connected.
Webdriver	<p>A client application that connects to an Informix database, at the request of a Web server, and retrieves AppPages from a table. Webdriver passes the retrieved AppPage to the WebExplode() function and returns the resulting HTML to the Web server.</p> <p>See also Apache Webdriver, CGI Webdriver, ISAPI Webdriver, NSAPI Webdriver.</p>
Webdriver configuration	The name given to a set of Webdriver variables and user-defined variables associated with a particular Web DataBlade module application. Webdriver configurations are stored in the WebCMConfigs system table in the database.
Webdriver configuration file	See web.cnf file .
Webdriver mapping	<p>The name given to the set of Webdriver variables in a single Map section of the web.cnf file that Webdriver uses to connect to a particular database. Webdriver mappings have the same name as the corresponding URL prefixes defined for a Web server and the Web DataBlade module application stored in a database.</p> <p>See URL prefix.</p>
Webdriver variable	<p>A variable that Webdriver uses to connect to a database and to obtain information about a Web DataBlade module application. There are two types of Webdriver variables: those that reside in the web.cnf file (collectively known as Webdriver mappings) and those that reside in the database (collectively known as Webdriver configurations).</p> <p>See also Webdriver mapping, Webdriver configuration.</p>
WebExplode() function	An Informix database server function that builds dynamic HTML pages based on data stored in a database. The WebExplode() function parses AppPages that contain AppPage tags and dynamically builds and executes the SQL statements embedded in the tags. The WebExplode() function returns the HTML page to the client application, usually Webdriver.

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